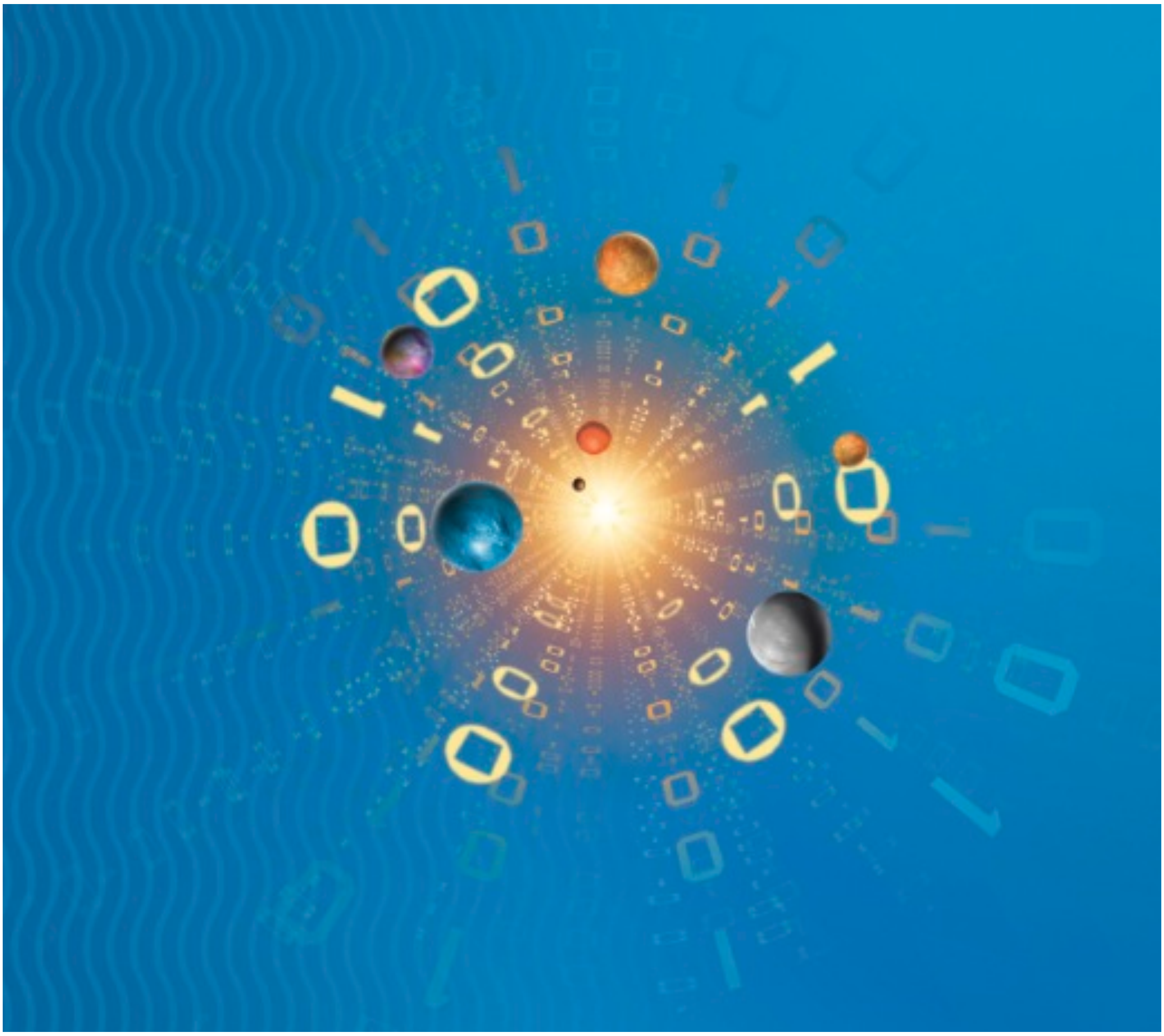
Proposal for a 3 year Extension: 2013-2015



Presented by the CoRoT Scientific Committee

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Executive Summary

CoRoT is working perfectly. In space for more than 1800 days, it has generated 1 Terabyte of scientific data, in 22 periods of quasi-uninterrupted observation.
Its photometric accuracy is only a few percent above the photon noise in the seismology channel and twice the photon noise in the exoplanet channel over periods up to 150 days, with a duty cycle higher than 90%. It still fulfils the scientific specifications and there is no sign of significant aging.

CoRoT has made many "premières" in both planet detection and stellar microvariability.
For instance CoRoT has discovered the first member of the new class of planets: Super-Earths orbiting very close to their parent star. It has also discovered the first two brown dwarfs at short orbital period and has provided the measure of their radii
The precise characterization of Solar Like Oscillations in stars has been achieved for the first time. Oscillation modes have been measured down to the ppm (part-per-million) level for stars with intermediate (~2Msun) to very high (~45 Msun) mass, revealing phenomena hitherto out of reach. Seismology of Red Giants really started with CoRoT and is now one of the most promising and active fields with applications in Galactic evolution.
Beyond oscillations, the CoRoT data revealed the signature of various phenomena which are now studied actively: granulation, activity, mapping of inhomogeneities on stellar surfaces.

Because CoRoT is probing effects that were not detectable so far, new types of signal analysis as well as new theoretical tools are being developed.
All these data are being interpreted in terms of planetary systems evolution and physical processes in stellar interiors. Most of these results are published and already widely cited in the scientific literature. The number of papers based on CoRoT data is approximately 400.

After one year of proprietary period to the Co_Is, CoRoT data are released to the public. The CoRoT public site has been visited approximately 10 000 times, from all over the world.

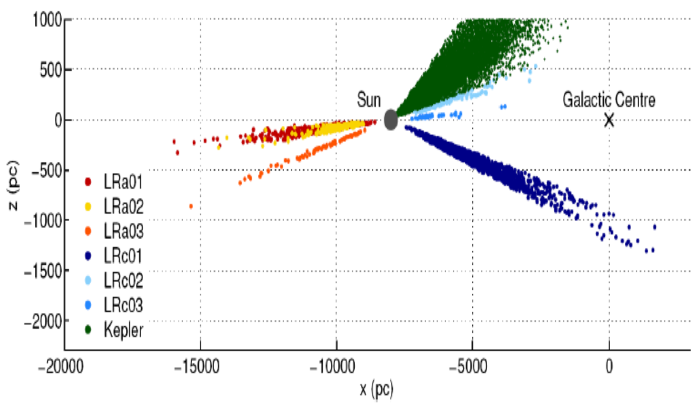
Two years after CoRoT, the Kepler mission was launched. Kepler is the "big brother" of CoRoT, using the same techniques but with different specifications and mission profile.
The high potential and performances of Kepler makes it a major contributor to both exoplanet search and stellar microvariability monitoring. It is thus very important now to consider

CoRoT specificities and how they can be optimally used to make the most relevant contribution to these scientific fields.
The main asset of Kepler compared with CoRoT is the length of the light curves. It can observe quasi-continuously the same objects selected within its 100 square degrees field of view (FOV) fixed for the whole mission.

On the other hand, the main specificities of CoRoT is to have both a field optimized for the observation of a large sample of faint stars but also a field optimized for the observation of bright targets and this within an accessible FOV of ~700 sq.deg. (1400 sq.deg. in the perspective of an extension to 15deg of the CoRoT eyes).

While most of the Kepler Earth-like candidates are out of reach for existing radial velocity facilities, the tight link between CoRoT detections and the accompanying radial velocity campaigns allow to assess the nature of the detected transiting body, stellar or planetary and to measure both their radii and their masses.
This is of prime importance to probe the internal structure of sub-Jupiters companions.
While Kepler, on a heliocentric orbit, observes always the same region of the sky, CoRoT points in different directions in both the inner and the outer region of the Galaxy.

This means that it is possible to identify "niches" for each mission and to perform complementary programmes when possible.
For instance, the fantastic discovery of the solar like oscillations in Red Giants by CoRoT has triggered in both missions very active new researches. Their universal calibration now gives the possibility to probe the stellar populations of the galaxy, and opens a new discipline: Galactic Structure and Evolution using Seismology. In this programme CoRoT and Kepler are complementary because they observe different regions of the galaxy.
Only CoRoT observes in the outer galactic disk, and accesses many young regions and young populations. This "niche" will be very rewarding as these young stars are very poorly known yet and their evolution is the driver of the chemical evolution of the galaxy.
Since CoRoT can, contrary to Kepler, observe two very different regions of the Galaxy, it will test whether the planetary system characteristics and star-to-planet ratio are the same in these two regions.
In its seismology field CoRoT has the possibility to observe very bright stars with a very high accuracy. This mode will be used to look at already known planetary systems, to measure the structure of the host star, look for reflected light for the non-transiting planet and detect smaller transiting planets in the system.



The galactic plane as mapped by CoRoT and Kepler (from Miglio et al. 2010)

A Proposal for a three Year Extension

Table of contents

1 Introduction

The CoRoT mission has been flying successfully since December 27th 2006, for a 3 year nominal duration.
A first extension of 3 years has been proposed and accepted, starting in March 2010, till March 2013.
Presently, as the instrument is working very well and continues to satisfy the early scientific specifications, a new extension is possible.

This document explains why we propose to extend the mission for 3 more years.

First it highlights the major successes and the discoveries CoRoT has obtained during these five years, as a pioneer mission.
It summarises the global observing programme, and what has been achieved since the launch.
It also gives some indications of the international impact of the mission.
A list of publications using CoRoT data since 2008, which counts approximately 400 entries, is given in the Annex.

Then the document presents the evolution of the instrument, which in fact is not degrading at all.

The international context has changed significantly essentially for two reasons.
First the discovery of the first data of this ultra-high stellar space photometry on long uninterrupted periods have changed our vision of the subject. It has lead to develop new methods and new tools for interpretation.
Then the successful launch of the second generation Kepler mission in March 2009 has created a new high quality source of data and brought into the community many new competent scientists.

The place of CoRoT in this context is analysed. It is shown that many « niches » exist for CoRoT and that in some cases the complementarity with Kepler is very important.

These scientific cases are developed and proposed as a programme for this 3 year extension.

The scientific international activities will continue as well as the outreach initiatives which remain a major concern for all the Team.

2 A few recent Highlights

The discovery of the hitherto smallest planet CoRoT-7b has demonstrated the capability of the spacecraft to discover and characterize Small Planets, almost in the same size as the Earth and thus completely fulfils the CoRoT design criteria up to expectation.
The CoRoT planet family contains a larger diversity of objects than known before.

The challenge, in asteroseismology, of detecting with photometry Solar Like Oscillations in solar like stars, has been achieved for the first time in a convincing way, thus opening the road to extend helioseismology beyond the solar case. CoRoT is still unique in this domain, and will continue to be as it is, the only satellite in orbit to study the interior of a large number of bright stars of all types.

The Additional programmes are also very successful, in particular in the field of eclipsing binaries, classification of variability, special and rare types of variables and stellar activity, rotation and convection.

2.1 Planet hunting programme

By the end of September 2011, 22 fields have been observed by CoRoT. They cover a total area of ~58 degree square on the sky with some 10% overlaps. 145 074 light curves have been collected for a wide diversity of stars (Table 1). Whatever the stellar photometric behaviour is, all these light curves are analyzed for transit searches. Transits are detected in about 100 up to 300 light curves per run, and about 3760 light curves have been examined in details. They present various depth, shape and duration. These detected transits are however predominantly transiting stellar systems. About 80% to 90% of them are discarded due to the long duration of the transit events, through the identification of secondary eclipses or from light curve modulation. The remaining candidates are screened out by follow-up observations, using various techniques from photometric observations to radial velocity measurements.

These follow-up observations play a major role in the CoRoT science and require a huge effort in terms of manpower and number of telescope nights. They allow assessing the nature of the detected transiting body, stellar or planetary and, in the later case, to measure its mass. Bouchy et al. (2009) give a complete overview of the strategy for radial velocity observations and Deeg et al. (2009) present the ground-based photometric follow-up ones. In total, 625 candidates have been screened out by various observational means. 27 planets are identified and fully characterized among which one is a two-planets transiting system (Table 2).

Table 1: *CoRoT* runs from 2007 to 2011.

Run	Date start	duration [d]	Nb of Targets	Nb dwarfs FGKM, V≤ 14	Nb Cand.	to FUp	Data Status	Planets
IRa01	02/2007	45	9 921	920	254	40	Public	2
SRc01	04/2007	26	7 015	620	261	62	Public	0
LRc01	05/2007	152	11 448	633	229	29	Public	4
LRa01	10/2007	150	11 448	1061	304	79	Public	4
SRa01	03/2008	25	8 189	-	163	29	Public	0
LRc02	04/2008	150	11 448	1203	286	56	Public	6
SRc02	09/2008	21	11 448	847	336	45	Public	0
SRa02	10/2008	32	10 305	-	217	32	Public	1
LRa02	11/2008	115	11 448	1929	362	36	Public	3
LRc03	04/2009	89	5 724	388	244	61	Public	2
LRc04	07/2009	83	5 724	598	174	51	Public	0
LRa03	10/2009	148	5 329	498	125	25	Public	0
SRa03	03/2010	24	4 169	522	86	13	Public	3
LRc05	04/2010	84	5 724	303	229	32	Public	1
LRc06	07/2010	77	5 724	557	227	28	CoIs	0
LRa04	09/2010	79	4 662	587	153	14	CoIs	FUp on going
LRa05	12/2010	95	4 648	400	116	29	CoIs	Fup on going
LRc07	04/2011	67	5 724	391	TBD	15	Alarms	Fup on going
LRc08	07/2011	84	5 724	290	TBD	16	Alarms	Fup on going
SRa04	10/2011	52	5 588	530	TBD	12	Alarms	Fup on going

Column 6: number of transit candidates detected; Column 7: number of candidates assessed worth for follow-up observations. Following the DPU 1 break down in March 2009, the number of light curves is divided per 2 in the fields listed after the double line. Column 9: number of confirmed planets or candidates with a high planet probability . The double black line marks the lost of one CCD. The magenta line marks the end of the nominal lifetime.

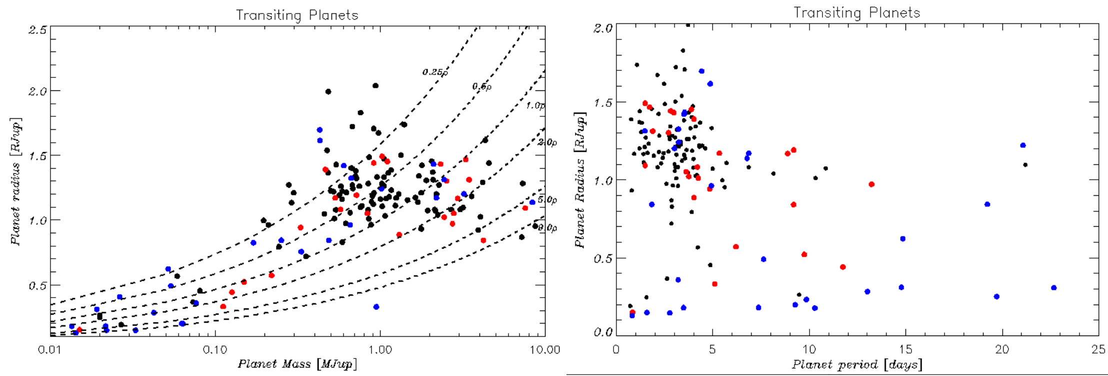


Figure 1 : *CoRoT planets (red dots) compared to the transiting population and Kepler planets (blue dots). Space-based observations are required to probe the domain of small size planets except for M-dwarfs.*

In all fields, there is a handful of remaining candidates for which a proper spectroscopic characterization is not feasible, mainly due to the faintness of the host-star. They remain potential planets.

Planet	Planet Mass	Planet Radius	Orbital Period	Orbital Semi-axis	Eccentricity	Spectral Type	Stellar Mass	Star's [Fe/H]	Mag V	Nb of related papers
1b	1.030	1.490	1.509	0.0254	0.00	G0V	0.95	-0.30	13.60	60
2b	3.310	1.465	1.743	0.0281	0.00	G7V	0.97	0.00	12.57	76
3b	21.600	1.010	4.257	0.0570	0.00	F6V	0.95	-0.30	13.30	43
4b	0.720	1.190	9.202	0.0900	0.00	F8V	1.10	0.05	13.70	40
5b	0.467	1.388	4.038	0.0495	0.09	F9V	1.00	-0.25	14.00	28
6b	2.960	1.166	8.887	0.0855	0.10	F9V	1.06	-0.20	13.90	27
7b	0.015	0.150	0.854	0.0172	0.00	K0V	0.93	0.03	11.70	103
8b	0.220	0.570	6.212	0.0630	0.00	K1V	0.88	0.30	14.80	19
9b	0.840	1.050	95.270	0.4070	0.00	G3V	0.99	-0.01	13.90	19
10b	2.750	0.970	13.241	0.1055	0.53	K1V	0.89	0.26	15.22	19
11b	2.330	1.430	2.994	0.0436	0.00	F6V	1.27	-0.03	12.94	14
12b	0.917	1.440	2.828	0.0402	0.07	G2V	1.08	0.16	15.52	13
13b	1.308	0.885	4.035	0.0510	0.00	G0V	1.09	0.01	15.04	11
14b	7.600	1.090	1.512	0.0270	0.00	F9V	1.13	0.05	16.03	13
15b	63.300	1.120	3.060	0.0450	0.00	F7V	1.32	0.10	15.60	
16b	0.535	1.170	5.352	0.0618	0.33	G5V	1.10	0.19	15.64	
17b	2.450	1.020	3.768	0.0461	0.00	G2V	1.04	0.00	15.46	
18b	3.470	1.310	1.900	0.0295	0.08	G9V	0.95	-0.10	14.99	
19b	1.110	1.450	3.897	0.0518	0.05	F9V	1.21	-0.02	14.78	
20b	4.240	0.840	9.200	0.0902	0.56	G2V	1.14	0.14	14.66	
21b	2.530	1.300	2.725	0.0417	0.00	FIV8	1.29	0.00	16.00	
22b	< 0.15	0.520	9.757	0.0940	<0.6	G0IV	1.14	0.21	13.93	
23b	2.8	1.050	3.631	0.0477	0.16	G0V	1.14	0.05	15.63	
24b	< 0.112	0.330	5.113	0.0560	0.00	K1V	0.91	0.30	15.60	
24c	0.127	0.440	11.759	0.0980	0.00	K1V	0.91	0.30	15.60	
25b	0.330	0.940	4.861	0.0560	0.00	G0V	1.08	0.02	15.00	
26b	0.577	1.080	4.205	0.0510	0.00	G8IV	0.98	-0.20	15.80	

Table 2. *Planets discovered by CoRoT as of January 2012: Mass in Jupiter mass, radius in Jupiter radius, orbital period in days, stellar mass in solar mass. The number of related ppers stops at CoRoT 14b, as the other discoveries are recent and not yet interpreted in ubushed papers, but it is larger than 1!*

2.1.1 Hot-Jupiter population

Out of the 27 CoRoT planets, 17 belong to the giant planet population and 2 are brown dwarfs. Like the regular members of the hot-Jupiter class, they exhibit a large spread in their orbital and physical characteristics as presented in Table 2 and in Figure 1.

2.1.1.1 An extended domain of orbital periods

The long duration and high duty cycle of space-based observations allow exploring the transiting population over an extended range of orbital periods. This asset of space-based observations is well illustrated by CoRoT results: 25% of the CoRoT planets have indeed an orbital period greater than 8 days. Among them, CoRoT-9b is the first transiting planet at long orbital period discovered by a transit survey. The planet orbits a solar like G3-type star in 95 days (Deeg et al. 2010). Its Jupiter's size and low eccentricity makes it a perfect representative of the extrasolar temperate giant planet population with an internal structure close to Jupiter's. This sample is the largest known population of planets discovered by radial velocity surveys but up to now, there was no measure of their radius.

2.1.1.2 Physical properties

Three CoRoT planets belong to the bloated population, that is a planet whose radius is larger than can be accommodated by "standard" irradiated H-He planet models. There is still no clear consensus on the origin of these radius excesses. Tidally driven orbital evolution and the corresponding planet tidal heating event is one of the mechanisms regularly invoked (e.g. Jackson et al., 2008). This is the case of the very young CoRoT-2b system (Alonso et al.,

2008) for which Gillon et al. (2010) reported a slight eccentricity of the orbit that might support such tidal origin.

On the opposite, appear some amazingly compact objects. CoRoT-20b is the most striking example with a mass of 4.24 M_{Jup} , a radius of 0.84 M_{Jup}, and an inferred density ϱ = 8.87 +/- 1.1 g cm^{-3}. According to planetary evolution models, the interior of this compact planet should contain a very large amount of heavy elements, with a central dense core whose mass would be in the range between 680 and 1040 M_{earth}. Although mixing heavy elements in the envelopes rather than confining them to a central core can lead to substantially smaller values (by a factor estimated to be ~ 2 to 3), the origin of such a huge amount of heavy elements is difficult to explain within the framework provided by the current planetary formation models.

2.1.1.3 Dynamical evolution

An amazing characteristic of the planet population at very short orbital distance, a < 0.1AU typically, is the co-existence of low and high eccentricity systems in a narrow range of orbital periods. The exact process responsible for large eccentricities is still under debate but two major mechanisms are put forward: gradual planet migration due to interaction with the circumstellar gas disk (Papaloizou et al., 2007) or planet-planet or planet-companion star interactions combined with tidal dissipation (Nagasawa et al., 2008, e.g.). Whatever the mechanism, in-situ formation of these massive bodies so close to their host star appears highly unlikely and it is commonly accepted that this planet population have undergone a significant orbital evolution since the time of their formation.

Among the hot-Jupiter population, CoRoT-10b and CoRoT-20b belong to the class of the few transiting exoplanets with highly eccentric orbit. The origin of this diversity in eccentricity is still unclear. It could have been produced by Kozai oscillations with a distant companion of stellar nature or by planet - planet scattering. No hints of non-transiting companions have been reported so far for any of these 2 CoRoT systems but clearly they would deserve radial velocity monitoring in order to put further constraints on the origin of the planet's eccentricity. More interestingly, while CoRoT-10b's predicted orbital evolution appears in agreement with the regular fate of close-in planets which spiral-in to their host star and will ultimately a collide into it, CoRoT-20b is one of the very few stable planets that is evolving toward a triple synchronous state with identical orbital, planetary and stellar spin periods, assuming the absence of processes extracting angular momentum from the system, such as stellar wind. Why the orbital evolution of these planets is different from that of the other transiting exoplanets is not clear.
Measuring the stellar obliquity through the Rossiter-McLaughing effect (Bouchy et al. n CoRoT 2b and Triaud et al. on CoRoT 3b) provide additional constraints to understand their orbital evolution. Another track would be to assess the presence of any additional companions in the system by long-term radial velocity monitoring.

2.1.1.4 Probing the stellar surface and spots evolution

The continuous photometry over long time spans allows 1) to measure the rotation period of the star and look for possible synchronization of the stellar rotation period and the planetary orbital period; 2) to investigate magnetic activity in the photosphere of the host stars.

Among the CoRoT planets, CoRoT-4 remains the only system for which the synchronization could be clearly detected (Aigrain et al., 2008; Lanza et al., 2009). Being not synchronized despite a similar orbital period, makes CoRoT-6b a good case to probe possible star-planet magnetic interactions. Lanza et al. (2010) used the light curve to map the longitudinal distribution of the photospheric active regions and trace their evolution. They reported some statistical evidences of active regions lagging the sub-planetary point during some temporal intervals. While the detection is still marginal, it is however a good illustration of the interest of uninterrupted sequence of photometric observations to probe the star - planet interaction and the evolution of planetary systems.

Concerning magnetic activity various studies have mapped active regions on some of the CoRoT host stars (e.g. Lanza et al., 2011). Among them, the young Sun-like star, CoRoT-2 has been intensively studied. Its light curve (Alonso et al., 2008) shows flux variations up to 6%, related to the star's activity modulated by the stellar rotation. Different approaches have been used to reconstruct the surface active regions of the planet host star and follow their evolution. Lanza et al. (2009a) used a maximum entropy spot modelling techniques to reconstruct the surface active regions of the planet host star and follow their evolution. They identified two active longitudes at the surface of the star, located on opposite hemispheres. This result is in good agreement with Huber et al. (2010) who used a different approach based on a modelling of the stars' surface over regular strips. Lanza et al. (2009) found also evidence of a short-term spot cycle which suggests possible magnetic interaction between the star and its hot Jupiter-like planet.

Planet transits act like a magnifying glass for the host star surface. They could be used to probe spots physical characteristics. Modelling the series of 77 transits of CoRoT-2b across its parent star stellar disk, Silva-Valio et al. (2010) estimated a spot's size ranging from 0.2 to 0.7 planet radius and a temperature ranges mainly from 3600 to 5000 K. The stellar activity should be taken into account when modelling a transit. Indeed, it impacts the planet's radius measurement by distorting the bottom of the transit. As a result, the transit depth is affected and could appear shallower than in reality. In the case of CoRoT-2b, (Silva-Valio et al., 2010) fitted the deepest transit of the series which yields a planet's radius ~ 3% larger than the value reported in the discovery paper which was calculated from the phase folded light curve.

2.1.2 Small size population

With the discovery of CoRoT-7b, CoRoT opened the domain of small size planets around solar-like stars. Except for planet orbiting M-type dwarfs, the small-size regime is indeed only accessible from space-based observations.

CoRoT-7b remains the smallest planet discovered by CoRoT so far. The planet orbits an active late K-type star in 0.85 days which is among the brightest CoRoT targets. When passing in front of its parent star, it produces a dimming of 0.35 mmag. As first illustrated by Léger et al., (2009), in this mass domain the main difficulty lies in establishing the exact nature of the transiting companion. In the peculiar case of CoRoT-7, the star’s activity challenged the estimate of the mass of the planet. Stellar activity indeed results in a stellar jitter that dominates the radial velocity signal (Queloz et al., 2009) making the planet's mass subject to controversies. Different studies carried out on the same radial velocity measurement set provide a wide range of estimated mass of the planet, from 2 $M_{\oplus}$ (Pont et al., 2010) up to 8.0 $M_{\oplus}$ (Ferraz-Mello et al., 2010) with an uncertainty as large as 20%. Recently however, Hatzes et al. (2011) revised the analysis of the radial velocity data and by analyzing those RV data for which multiple measurements were made in a given night, removed the star’s activity signature. This simple procedure allowed a clear detection of the reflex motion induced by the planet. They found a mass of 7.42 +/- 1.21$M_{\oplus}$ and a mean density of ϱ = 10.4 +/-1.8 g cm^{-3}. The interesting outcome of these studies is that it also allows defining a better strategy for radial velocity measurements of small size planets in the case of active stars.

Not only the stellar activity, but also the faintness of a parent star or a long orbital period poses challenges to planet characterization. The CoRoT-22 system with V=14 mag is a good illustration of this difficulty (Moutou et al., 2012). The planet has an orbital period of 9.7 days, a radius close to CoRoT-8b's (Bordé et al., 2010), but a mass that appears at least one and a half times smaller. The 31 radial velocity measurements collected with SOPHIE, HIRES and HARPS remain inconclusive and provide an upper detection limit only. Deciphering the system's nature has thus required additional complementary observations, including Adaptive Optics and intensive blend simulations. These simulations take into account all the information collected on the target and its environment with the goal to assess the probabilities of other scenarios : 1) all types of triple systems, 2) most configurations of contaminating eclipsing binaries. In the case of CoRoT-22b, they allowed to demonstrate that the planet scenario is 30 to 600 times more probable than a false positive scenario. Blend simulations are yet the only way to assess a planet probability to candidates in the small size regime when radial velocity measurements do not allow concluding; a situation that is repeated for several candidates currently under study in the 14-15 mag range.

2.2 A new grip on stellar physics

After 5 years in orbit CoRoT has observed about 130 bright stars in the so-called seismology field spanning a large part of the HR diagram (see figure 13) and more than 130 000 fainter ones in the so-called exoplanet field with a lower signal to noise ratio and time sampling.
Time series cover up to 160 days with a duty cycle larger than 90%. The data are photon noise limited over most of the magnitude range.
The quality of the data meets the specifications and the seismic parameters are accessed at the precision necessary for interpretation.
CoRoT has then discovered very diverse and new structures and founded the field of Time Domain Stellar Astrophysics. It has shown the way for more advanced and detailed analysis; some of these were expected for a long time, some others are completely new.
Among the main observational successes, one can recall the first detection and precise characterization of solar-type oscillations in stars other than the Sun (Michel et al. 2008) which was expected for decades, the discovery of the underlying structure of Red Giants oscillations (De Ridder et al. 2009) which opened the way to a brand new and vivid field for seismology, the first detection of solar-type oscillations in massive stars (Belkacem et al. 2009, Degroote et al. 2010) which are still subject of great debates and great expectations as well as the discovery of hundreds of low amplitude peaks in delta Scuti stars (Poretti et al. 2009), the first precise follow up of the oscillations of a Be star during an outburst (Huat et al. 2009), a unique view on mass-loss-oscillation relation, the first detection of deviation in g-modes period spacings in a massive star (Degroote et al. 2010), a direct signature of the edge of the convective core,…

Beyond this technical and observational success, theoretical interpretations of CoRoT data are growing rapidly in number and in diversity. While this process is developing under our eyes, it is possible to see on a few examples how these data have already addressed some of the open questions in stellar structure and evolution.

2.2.1 The size of the convective cores

This very important quantity, which has dramatic consequences on the age of stars, and especially on the classical galactic age indicators (A and F stars) affects the seismic parameters in different ways, depending on the evolutionary stage and the mass, and probably the rotation rate. Relevant CoRoT data concern presently main sequence stars slightly above the Sun, the early subgiant domain and hot stars.

*** On the main sequence slightly above the Sun**:

The bright star HD 49933 has been observed by CoRoT during two different runs, separated by one year. These two observations have been extremely successful in disentangling the difficulties (not foreseen before) in performing accurate seismology on this kind of stars (Appourchaux et al. 2008)

One of the first results of CoRoT observations was to reveal that the modes intrinsic width of early F solar-type pulsators are about 2 to 3 times higher than expected (and thus the modes lifetimes 2 to 3 times shorter...). As a consequence, the identification of the modes is more ambiguous than anticipated and the intended precision on the determination of eigenfrequencies is also more difficult to achieve for these objects.

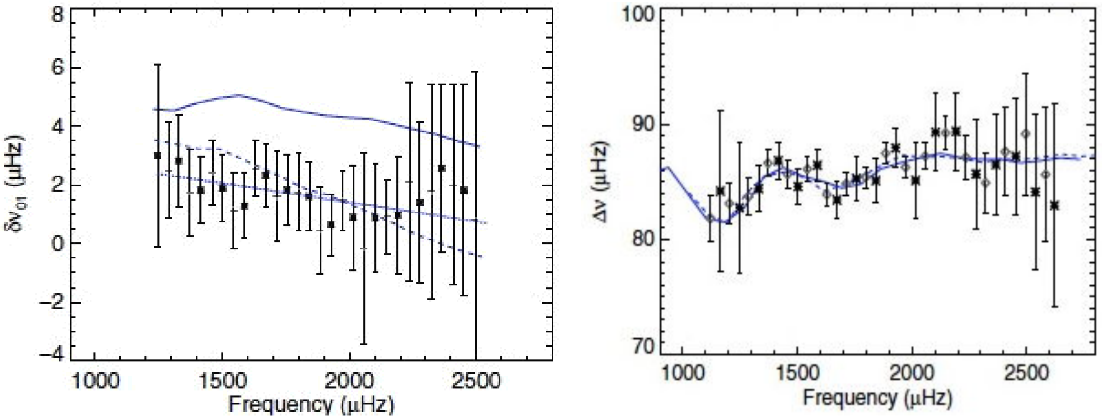


Figure 2. *Comparison between the best models without microscopic diffusion and the data, for the large separation (right) and for the small separation (left). In black, the observed values with their error bars. In solid line the best model without overshoot and in dashed line, with core overshoot. (from Benomar et al. 2010).*

Tiny shifts of the small differences as a function of frequency are detected (Benomar et al. 2010), and compared to models. The mode identification on this star has now converged (Benomar et al. 2009) and allows reliable interpretations. The behaviour of the small separation clearly indicates a core more extended than predicted by the classical Schwarzschild criterion of approximately 0.1 to 0.2 pressure scale height at the edge of the core (Figure 2).

*** Off the main sequence:**

The star HD 49385, a 1.3Mo situated at the end of the main sequence, observed by CoRoT for 137 days continuously, revealed an echelle diagram with a specific new feature, absent in Main Sequence solar type pulsators, a strong curvature of the l = 1 ridge (Figure 3). It has been understood as resulting from the strong coupling existing between p and g cavities for l = 1 modes in stars having exhausted hydrogen in their core. This signature found in several other CoRoT and Kepler objects now is thus a clear indicator for a star in the subgiant phase, burning hydrogen in a shell around a quasi-isothermal helium core. In addition, the sensitivity of their frequencies to the evanescent region between g and p cavities can be used to derive a diagnostic of its structure. In the case of HD 49385, this analysis suggests two possible situations with either very small extension of the mixed region (dOv < 0:05Hp), or a moderate one (0:18 < dOv < 0:2Hp) (Deheuvels and Michel 2011).

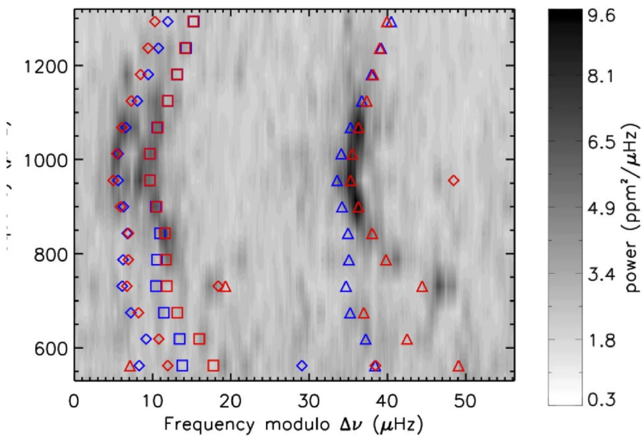


***Figure 3**. The presence of mixed modes and the curvature of the l = 1 ridge modified by avoided crossings in HD 49385. The observed echelle spectrum (in black) is compared to a Main Sequence model fitting l=0 and 2 modes (in blue) and a post-MS models also fitting the l=1 ridge (in red). (from Deheuvels and Michel 2011).*

*** In more massive stars:**
In hotter stars, a signature of the limit of the convective core can been found in the unequal period differences of g modes. The first example is HD 50230 where Degroote et al. (2010) for the first time discovered this phenomenon. While the mean spacing (9418s) indicates an extended core (Ov > 0.2) (Figure 4, left), as well as the periodic deviation form equal spacing (2450s). The slight decrease of its amplitude with period (240s) (Figure 4. right) indicates probably a smooth gradient of chemical composition in the radiative zone above the core.

The modelling of two late Be stars (~4.5Msun) HD181231 and HD 175869 (Neiner et al. 2012, A&A in press) suggests the need of a very large extension (Ov >0.3) to match the observed frequencies with the prograde modes theoretically expected in these very fast rotators. The possible contribution of different processes is discussed in a quantitative approach.

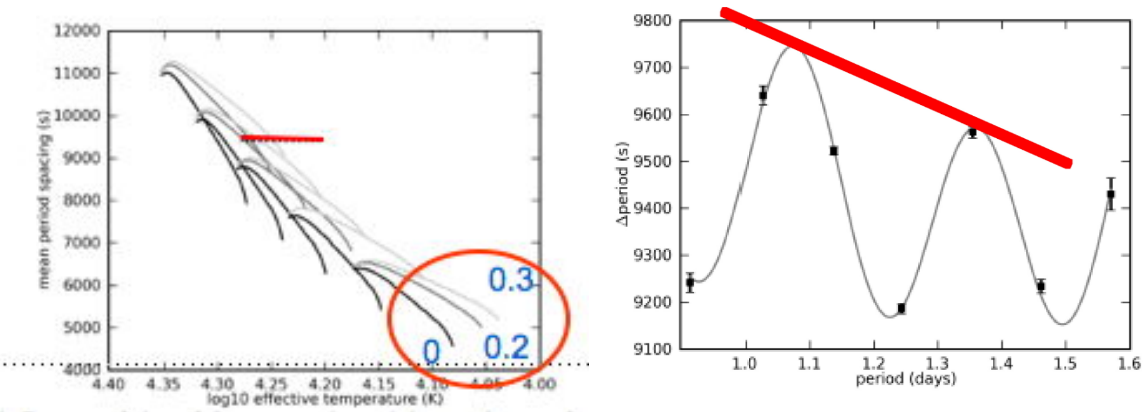


***Figure 4**. **Left**: Period spacing in the O star HD 50230 as determined by models with different Ov values, compared to the observed spacing in Red;*

***Right:** The frequency dependence of the spacing, showing both the oscillatory behaviour and the decrease infrequency from Degroote et al. 2010).*

2.2.2 The structure of the outer convective zones

The regions of discontinuities, as the He ionisation zone and/or the bottom of convective zone manifest themselves through oscillations in the large separation and the second difference, as a function of frequency. These oscillations have been predicted and detected for the first time in the solar like star HD 49933 (Mazumdar and Michel, 2009) and also in a bright giant HD 181907 (Miglio et al. 2010). Their periods give an estimate of the acoustic depth of these two discontinuities (Figure 5), though the depth of the convective zone is more difficult to assess.

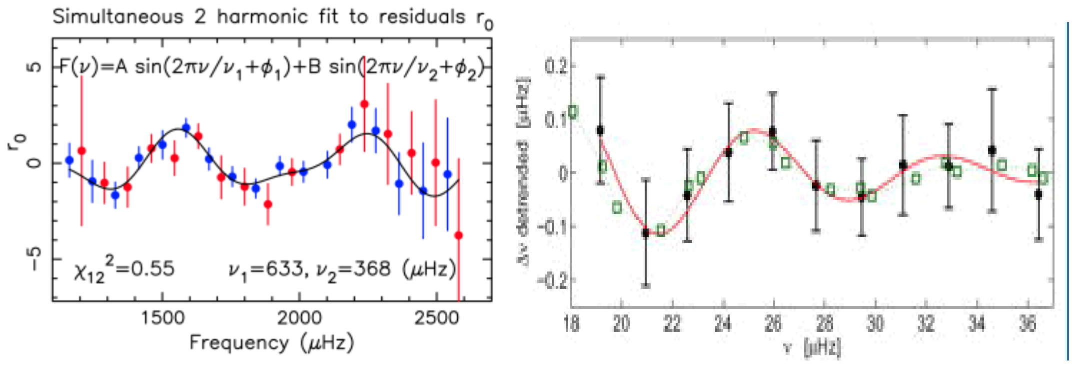


***Figure 5**. Detection of the oscillation of the small difference as a function of frequency*
***Left**: in HD 49933 a main sequence star (from Mazumdar and Michel 2010, Roxburgh et al. 2011)*
***Right**: in the giant star HR 7349 (from Miglio et al. 2010).*

2.2.3 Super adiabatic outer layers:

*** Amplitudes and line widths:**

The seismic data obtained by CoRoT enable us for the first time to measure directly the amplitudes and line widths of solar-like oscillations for stars other than the Sun. From those measurements it is possible, as was done for the Sun, to constrain models of the excitation of acoustic modes by turbulent convection. Samadi et al. (2010b) have compared a stochastic excitation model described in Samadi et al. (2010a) with the asteroseismology data for HD 49933 obtained by Benomar et al .(2009). Using the seismic determinations of the mode line widths and the theoretical mode excitation rates computed for this specific case (Samadi et al. 2010a), they have derived the expected surface velocity amplitudes of the acoustic modes. Using a calibrated quasi-adiabatic approximation relating the mode amplitudes in intensity to those in velocity, they have finally derived the expected values of the mode amplitude in intensity. As shown in Figure 6 left, except at rather high frequency, the theoretical amplitude calculations are within 1 error bars of the mode amplitudes in intensity derived for HD 49933 from the CoRoT data. Calculations that assume a solar surface metal abundance result in amplitudes larger by 35% around the peak frequency (max 1.8 mHz) and by up to a factor of two at lower frequency. This illustrates the importance of taking the surface metal abundance of the solar-like pulsators into account when modelling the mode driving. These results validate the main assumptions of the model of stochastic excitation in the case of a star significantly hotter than the Sun.
However, the discrepancies seen at high frequency (≥1.9 mHz) highlight some deficiencies of the modelling, whose origin remains to be understood.

*** Granulation:**

HD 49933 shows also very clear evidence of a photometric granulation background. Ludwig et al (2009) have computed models based on Ludwig (2006) approach which provides the observable disk-integrated brightness fluctuations directly emerging from 3D hydrodynamical model atmospheres. Two representative 3D hydrodynamical models of the atmosphere of

HD49933 were considered: one with a solar metal abundance and the second with a metal to hydrogen abundance of [Fe/H]=-1. Both models have the same effective temperature and gravity, close to that of the target.
As shown in Figure 6 right, the calculation done by Ludwig et al (2009) results in a significant over-estimation by a factor of three in total power. The level of the granulation background significantly decreases with surface metal abundance, as shown by the 3D hydrodynamical model with low metal abundances.
Nevertheless, this model still over-estimated by a factor of about two the observations. At the present time, we are then left with a puzzling discrepancy between the predicted and observed granulation background in HD 49933, but also in several other objects.

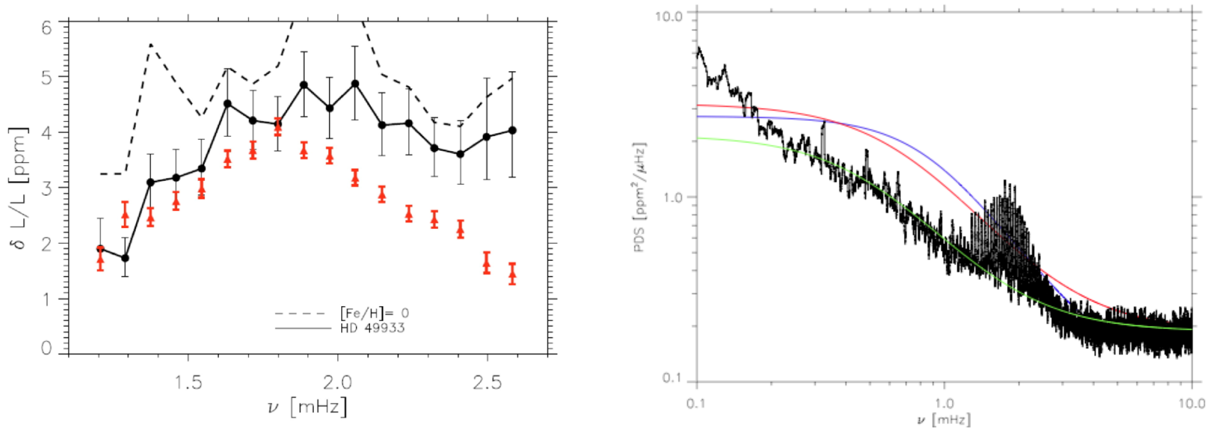


Figure 6. *Theoretical predictions compared to the observations of the star HD49933.*

Left: *Bolometric amplitude of the modes as a function of the mode frequency. The filled circles connected by the thick solid line correspond to the mode amplitudes in intensity, L=L, derived for HD 49933 by Samadi et al (2010a) taking into account the surface metal abundance of the star. The thick dashed solid line corresponds to the mode amplitude in intensity associated with the model with [Fe/H]= 0. The red triangles and associated error bars correspond to the mode amplitudes in intensity, (L=L) CoRoT, obtained from the CoRoT data by Benomar et al (2009). These measurements have been translated into bolometric amplitudes following Michel et al (2009).*

Right*: Power density spectrum (PDS) in ppm^2/μHz as a function of frequency. In blue: theoretical PDS obtained by Ludwig et al (2009) with a 3D hydrodynamical model close to HD49933 in terms of effective temperature and gravity. In red: PDS of the granulation background computed on the basis of Samadi et al (2011) theoretical 1D model. All the models here assumed a solar metal abundance. In yellow: analytical fit performed on the CoRoT data by Michel et al (2008) assuming a lorentzian function (Harvey model).*

2.2.4 Magnetic activity and rotation

*** Activity cycle detected from seismic indexes**

Using the observations HD 49933 over two runs separated by a year, Garcia et al. (2010) have detected for the first time a magnetic cycle using seismic indexes. The large separation and the amplitudes of the p modes seem to vary out of phase, as well as a spot proxy (Figure 7). This behaviour is well known in the Sun and correlated to the solar cycle. The present observations lead to an estimate of the period of 120 days. More observations from CoRoT but also from the ground next year will complement these results.

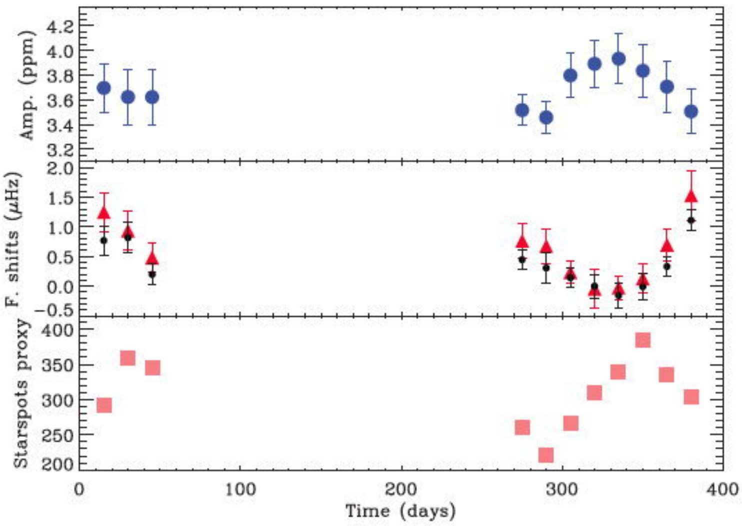


Figure 7. *The stellar cycle of HD 49933.*

Time evolution beginning 6 February 2007 of the mode amplitude (top); the frequency shifts using two different methods (middle), cross correlations (red triangles) and individual frequency shifts (black circles); and a starspot proxy (bottom) built by computing the standard deviation of the light curve. All of them were computed by using 30-day-long subseries shifted every 15 days (50% overlapping). The corresponding 1σ error bars are shown. From Garcia et al. 2010.

***Spot modelling and differential rotation**

The first long duration light curves of CoRoT have triggered an intense activity in terms of surface modelling, identification of hotter and cooler regions at the surface and their variation with time (see also § 2.1.1.4, and Figure 8).

The first very successful attempt concerns the host star of the planet CoRoT-2b, an active G7 dwarf (Lanza et al. 2009, Silva-Valio et al. 2010). Different techniques have been used, giving coherent results (Savanov, 2010).

Since then many other objects have been studied, starting to give some hints on the distribution of spots and the area covered, as well as indications of star-planet interaction.

Improvements of the modelling can be obtained using complementary spectroscopic observations. This has been done for CoRoT 7 where a very intensive follow-up programme has been achieved to confirm the planetary nature of the transiting object. Lanza et al. (2010) for the first time compared simulated apparent radial velocity changes induced by the distribution of active regions derived from the light curve modelling, to the spectroscopic observations. They show that magnetic activity cannot be responsible for a longer period oscillation around 3.7 days, and comforts the hypothesis of a second orbiting object in the system.

*** Activity indexes**

A first attempt to define activity indexes from the analysis of light curves has been proposed by Hulot et al. (2011). The low frequency component is generally sufficiently accurate to measure a reliable activity index, which captures only the low frequency energy excess. When a rotational modulation is seen in the light curve, a Rossby number can be computed, using a theoretical estimate of the convective turnover time. Figure 9 shows a clear trend of a decreasing activity index with Rossby number; the large scatter is probably due to different physical situations as for instance differential rotation.

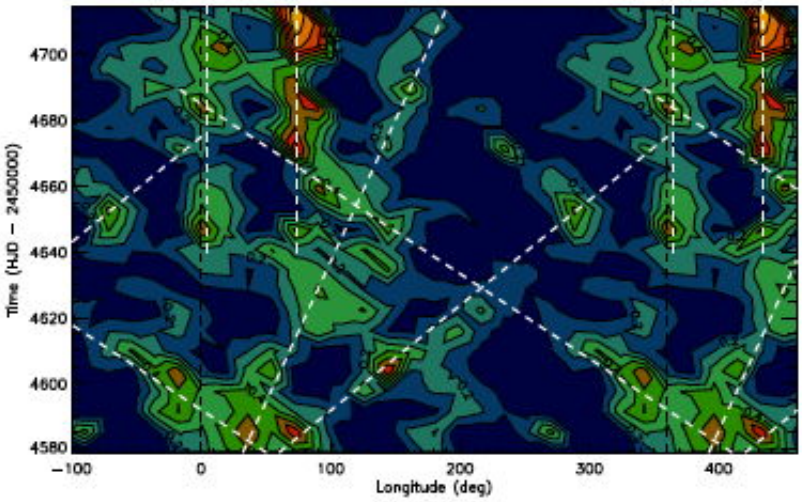


Figure 8. *Spot modelling and differential rotation of CoRoT 6 from Lanz et al.(2011).*

Isocontours of the ratio f / fmax, where f is the spot covering factor and fmax = 0.0059 its maximum value, versus time and longitude. The two dashed black lines mark longitudes 0° and 360°beyond which the distributions are repeated to easily follow spot migration. The contour levels are separated by 0.1 fmax with yellow indicating the maximum covering factor and dark blue the minimum. The dashed white lines trace the migration of the active regions associated with each active longitude.

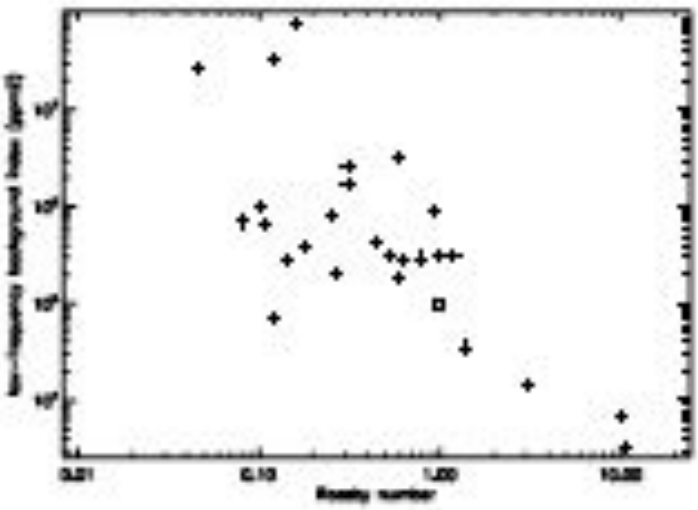


Figure 9. *The low-frequency micro-variability index, plotted against the Rossby number.*

The active Sun, i.e. at its maximum, corresponds to the square, while the quiet Sun would have a log-index lower by 2.

2.2.5 Interaction of young stellar objects with the circumstellar environment

Though CoRoT was not designed at all to observe very crowded regions, a 24 days run on the young cluster NGC 2264 has been tried. This observation has already contributed extensively on the knowledge of these stellar regions, in several different aspects.

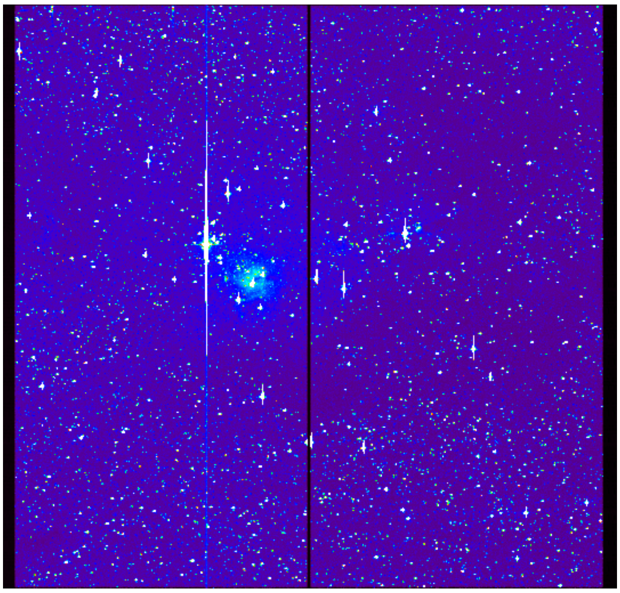


Figure 10 *: The young NGC 2264 observed by CoRoT in the exoplanet field in December 2007. 900 stars member of the cluster have been followed*

The Corot data has shown us that the star-disk interaction regulates the dynamics of the inner disk region, lifting-up gas and dust in accretion columns that eclipse the star periodically. The observed eclipses in the optical, due to the dust structure, vary in width and depth from one rotational cycle to the next, and are often observed in high inclination systems. This was already observed in the classical T Tauri star AA Tau, and only with CoRoT we were able to confirm it as a common feature in other CTTS system and we started to determine the inner disk structure characteristic (inner disk warp height, structure, dynamics). With the current Corot and Spitzer observations, a much better characterization of the inner disk features will become possible, by looking at these regions simultaneously in the optical and infrared.

CoRoT has been used to detect over 35 candidate eclipsing binaries in the star-forming region NGC2264. These are the target of ongoing ground-based radial velocity and photometric follow-up. Once we have solved their orbits and modelled their light curves in detail, these objects will be powerful tests of evolutionary models for young stars.

The light curves obtained by CoRoT on PMS stars of NGC 2264 have allowed us to derive the rotation distributions of Class II and Class III stars at few Myr of age. The derived distributions are free from typical biases affecting ground-based measurements, and in particular show that the 1-day peak observed by ground is spurious and due to day-night periodicity.
The same observations have identified a population around the known star forming sites with variability (both stochastic and periodic) properties similar to those of the star forming region members. This result points to the existence of a less concentrated young population, related to the star formation event, that makes the history of the star formation in the region more

complex than previously thought. The youth of these new candidates has been confirmed by an X-ray XMM/Newton pilot observation.

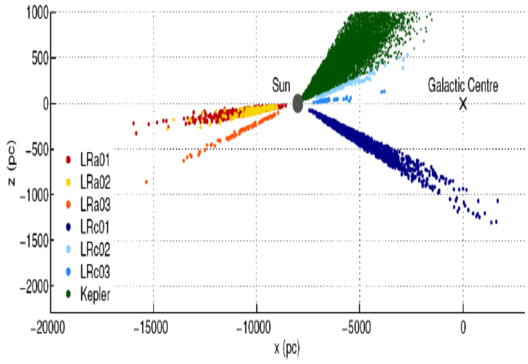
Using observations conducted by CoRoT we were able to investigate the pulsational properties of PMS stars in much more detail and with a much higher precision than possible before. We discovered several new pulsating PMS members of NGC 2264; among those are the first candidates for PMS gamma Doradus and hybrid delta Scuti-gamma Doradus type pulsation. Only with the precision of the CoRoT light curves we could show that granulation plays an important role in pulsating PMS stars.

2.2.6 Eclipsing Binaries

Among the achievements of the detailed study of the bright targets (seismo-field binaries and bright exo-field targets) it is worth mentioning:
* the substantial increase of the number of binaries with (non radial) pulsating components of all types and, in particular, the detection and characterization of several EBs containing Gamma Dor pulsators (Maceroni et al. 2011, Sokolovsky et al. 2010, Damiani et al. 2010, Dolez et al. 2009). As the few binaries with gamma Dor components known before CoRoT were not eclipsing their absolute parameters values were affected by large uncertainties.
* the detection of tidally induced pulsation, specifically in a short period eccentric binary with twin B-type components (HD 174884, Maceroni et al. 2009), so far the third known and the best studied case. Note that the accuracy of CoRoT photometry allows to break the degeneracy known to affect the light curve solution of detached partially eclipsing systems. As a consequence, the physical parameters can be well constrained, even in presence of grazing eclipses. The analysis evidenced as well that standard stellar models partly fail to reproduce the system physical parameters and other effects, such as stellar rotation shall be included in the models to reconcile theory and observations.
* the detection in a massive O-type star (HD 46149) of solar-like oscillations, whose observed frequency range and spacings are compatible with theoretical predictions (Degroote, et al. 2010).
* the full modelling of the complex system AU Mon (an Algol type system showing interactive phenomena, the presence of a disc) and the discovery of long period periodicities, suggesting the presence of mass exchange/loss modulation).
* unfortunately missed opportunity of a complete study of HR 6902, a rare Zeta Aur binary. Zeta Aur systems are formed by a red giant and a hot star and are ideal benchmarks of evolved star models. Only a part of primary eclipse was covered, so that the information from binarity is incomplete. This long period system will be reobserved this summer, covering the secondary eclipse.
* the distribution of eclipse amplitude of the exoplanet field EBs has been found to be complete down to amplitudes below 0.01 magnitudes (Maceroni 2010) thanks to the CoRoT accuracy, allowing to detect low amplitude eclipses. Moreover, the long continuous monitoring allowed a higher degree of completeness towards long periods of period distribution, if compared to the results of ground based surveys (Maceroni et al. 2011, CUP in press). At variance with previous studies on ground based surveys, the period distribution is essentially flat up to a few days and is similar (though not identical) to that of Kepler EBs. This suggests, according to current theories, a scale independent binary formation process.

2.2.7 Galactic astronomy using seismology

As seen on Figure 11, CoRoT and Kepler do not observe the same regions of the sky. The centre field of CoRoT is not very far from Kepler one, though closer to the galactic plane. The anticentre field of CoRoT is on the opposite direction, in a quite young surrounding .



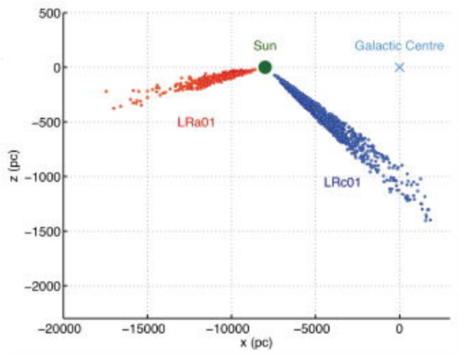


Figure 11. Left*: Positions in the (x,y) plane of the Red giants observed by Kepler (in green) and by CoRoT during the two first long runs, LRa01 in the "antGcentre" direction (in red) and LRc01 in the "centre direction " (in blue),*

Right*: Positions in the (z,x) plane of thee Red Giant of two different runs as observed by CoRoT.*

This very interesting situation is starting to give a strong push to population studies. A new branch of seismology e.g. ensemble seismology is born. It uses the seismic parameters to categorise stars and to understand their evolution stage. Let's mention that these parameters are very precise and almost independent of the distances of the object.

The very first CoRoT long run boosted the number of known pulsating Red Giants from less than 10 to over 700 (Hekker et al. 2009). It also established the existence of non-radial long lived mixed-modes and at the same time the clear appearance of the p-modes large separation signature in the observed spectra (de Ridder et al. 2009).

The fact that the spectrum and the echelle diagram are dominated by a p-modes structure characterizing mostly the envelope, very much as for the Sun, has been established (Mosser et al. 2011). This already allowed impressive applications as illustrated by Miglio et al (2009) who showed that the population of red giants observed with CoRoT and characterized in the plane ν_{max} and $\Delta\nu$ could be compared with theoretical expectations and suggest a regular star formation rate rather than recent star burst events.

Then, the pattern of mixed-modes characterizing the stellar core was also revealed in Kepler and CoRoT data (Beck et al. 2011; Mosser et al. 2011). As shown by Bedding et al. (2011) and by Mosser et al. (2011), this pattern depends evidently on the evolutionary stage. The differences are detected in the seismic data and then allow to discriminate red giants burning hydrogen in shell (Red Giant Branch) from those burning helium in the core (Red Giant horizontal branch), which are undistinguishable from their surface fundamental parameters.

In addition the two directions of CoRoT observations indicate different population of Red giants as explained on Figure 12.

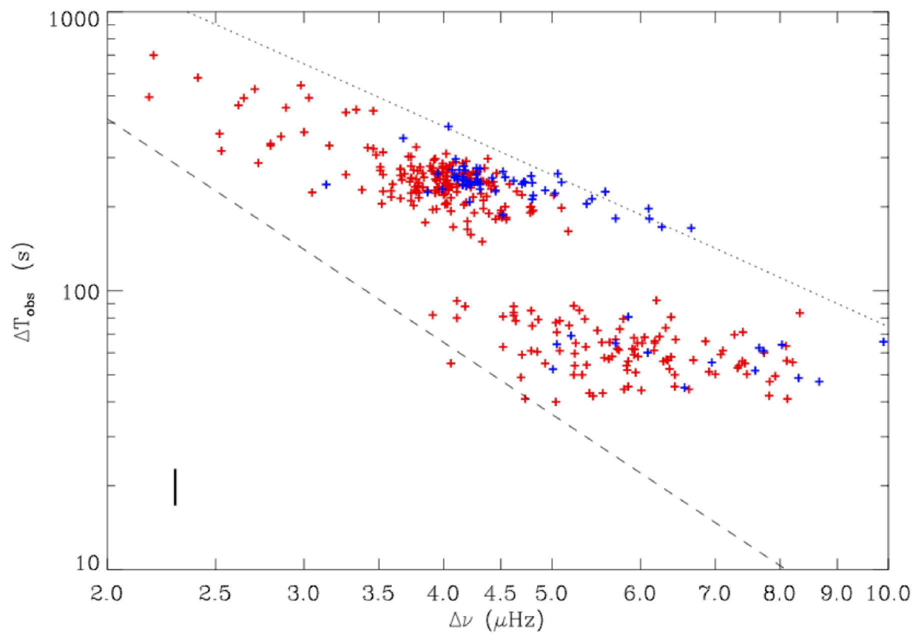


Figure 12. *Diagram (ΔT, Δν) for l=1 mixed modes in the two opposite regions observed by CoRoT; in red: centre, in blue: anticentre.*

The upper cloud corresponds to stars in the helium burning core phase, while the lower one concerns stars in the hydrogen shell burning stage.As mass is increasing from left to right, it shows that there is a lack of low mass stars in the anticentre direction. from Mosser et al. 2011.

2.2.8 The importance of ground based complementary observations

The ground based complementary observations are of primordial importance for the CoRoT programme of stellar physics since they are the necessary step to take advantage of the fact that we can work with bright, well characterized stars. This has always been important for the interpretation work when coming to the modeling of the stars, but it is also become more and more important in the preparatory phase of target selection, when our program has become more focused on very specific Ground-based spectroscopic observations began at once with the launch of the CoRoT satellite and they involve several high-resolution echelle spectrographs: FEROS@2.2m and HARPS@3.6m at ESO--La Silla (Chile), FOCES at Calar Alto (Spain), SOPHIE at the Observatoire Haute Provence (France), FIES@NOT and HERMES@MERCATOR (both at the Observatorio Roque de los Muchachos, La Palma, Spain). A small number of spectra were also observed with CORALIE at ESO-La Silla and HERCULES at Mt. John Observatory (New Zealand).

After the completion of the ESO Large Programme with FEROS (LP 178-D.0361, 60 nights in total), we obtained two subsequent Large Programmes with HARPS, the famous planet--hunter echelle spectrograph primarily used for the measurements of radial velocities.
All these Large Programmes were under the supervision of INAF-Osservatorio Astronomico di Brera (Milano, Italy).

The first Large Programme with HARPS (LP 182.D-0356) consisted of 45 nights of observations between December 2008 and December 2009, while the current LP 185.D-0056 started on June 2010 and will end in January 2013. As for now, we have taken about 2800 HARPS spectra of CoRoT asteroseismic targets.
The high-resolution spectra make the detection of high-degree modes possible since the stellar

disk can be spatially resolved thanks to the Doppler shifts induced by the star's rotation. Therefore, by measuring the observed variations in the line profiles, it is possible to know what kind of modes are excited in the stars and to assign the spherical wave numbers to each of them. The use of HARPS for asteroseismic purposes is a key aspect in the exploitation of the CoRoT light curves in the seismo field.
Moreover, the successful use of HARPS and SOPHIE for measuring the radial velocity variations in red :giants is opening new possibilities for the future asteroseismic modelling of these stars (Fig.).

The HARPS spectra are reduced and normalized in an homogeneous way using a semi-automated pipeline developed at INAF-OAB. Then, they are distributed within the team supporting the Large Programmes a few weeks after the completion of the observations.

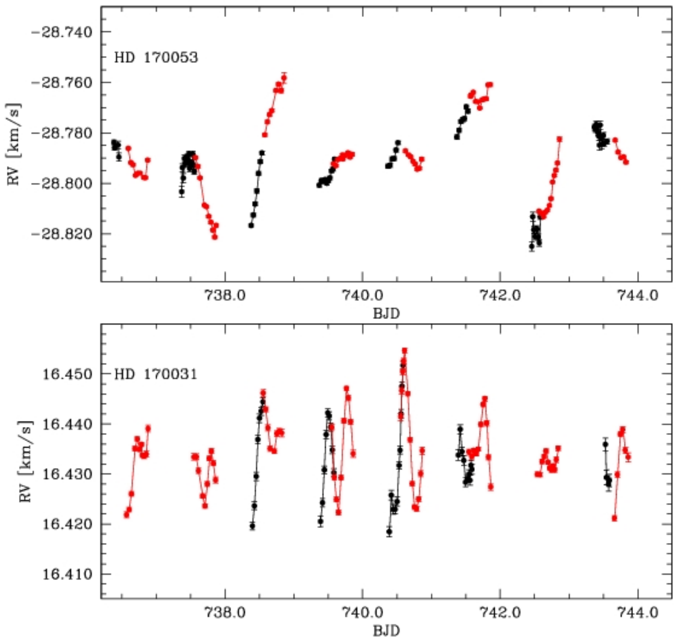


Figure 12b : *Radial velocity variations in red giants.*

Black points: SOPHIE measurements; red points: HARPS measurements.

3 The observational programme already achieved

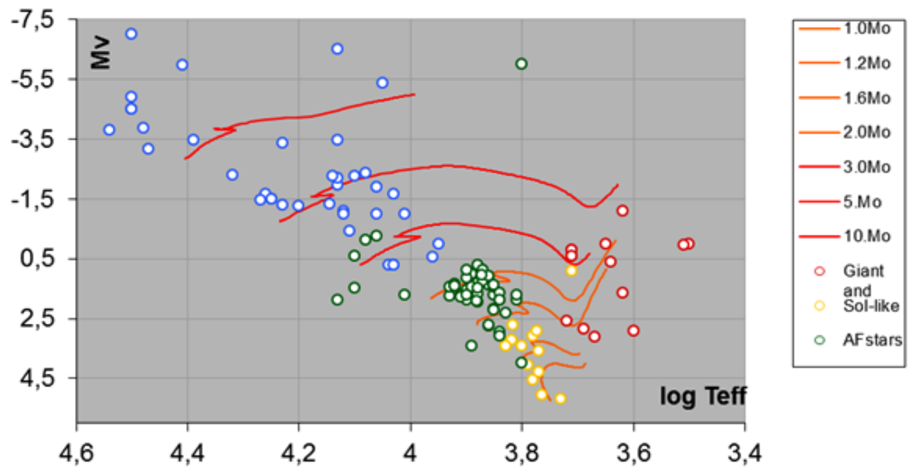
The mission has been working perfectly during more than 1800 days, producing 1 Terabyte of scientific data (4,4 Tbytes of raw data), in 22 periods of almost uninterrupted observation .

The nominal programme has been completed following the main objective and strategy developed before the launch. Since then, we have followed the priority axes proposed for the CoRoT II extension.
For the exoplanet search programme, a major aspect was to optimize the number of 80 days runs on different fields (for the exofield) in order to optimize the number of planets detection. A strong interest to reobserve selected transiting planets was also expressed.
For the seismology programme, the priority was given to several specific types of stars (solar-like closer to the Sun, hot stars, hot supergiants, red giants in cluster,chemically peculiar stars, young stars,…) and for many of them long runs were required.
The strategy proposed to solve the apparent contradiction between the length of the runs required by both programmes has been successful. It consisted in observing consecutively 2 times the same field (or some specific objects) during 80 days, but changing the Exo field.
This observational strategy allowed completing several aspects during the CoRoT II extension in terms of priorities for both programmes. This is illustrated in numbers hereafter.

3.1 Targets and fields already observed

The pointings chosen to optimize the compromise between the seismology and the exoplanet programme are named after the principal target of the seimo field.

* **In the seismo field** 140 stars have been observed, 39% in Long Runs (85-160 days), 25% in Intermediate Runs (50-85days) and 36% in Short Runs (<50days).



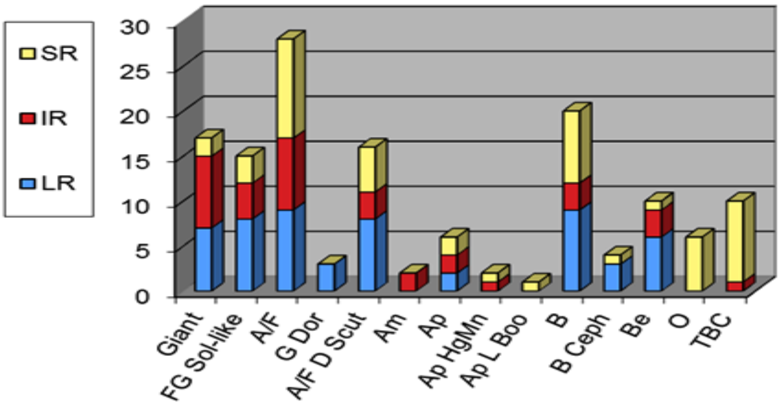


Figure 13: *The 140 'bright' stars observed (01/01/2012) in the Seismo field of CoRoT.*

Top: *distribution in the HR diagram.* ***Bottom:*** *distribution by stellar type and length of the run (160d > LR > 85 > IR > 50d > SR)*

* **In the exoplanet field,** CoRoT has already covered a total area of ~58 degree square on the sky with some 10% overlaps. 145 074 light curves have been collected for a wide diversity of stars. The number of targets observed in each run is given in Table 1.

3.2 Data treatments.

The aim of the CoRoT data processing is to correct the raw data from instrumental and environmental perturbations, well known and modelled so far.
The data reduction pipeline is divided in two parts: the N1 pipeline corrects simultaneous effects whereas the N2 pipeline applies to a whole run, correcting longer term effects.
The output data of the CoRoT pipelines are light-curves.
The main part of these light-curves come from on-board computed light-curves but a small number of them come from small images, called "imagettes" that are transmitted to the ground stations and reduced to light-curves by the pipe-lines.

The N1 pipeline is now mature; it includes the elimination of the aliasing caused on a CCD by the reading of another CCD, the subtraction of the offset and of the background, the correction of the duration of the exposure and absolute dating, the indication of the orbital events (SAA, Earth eclipses, …).
These corrections apply to both on-board light-curves and imagettes.
Then the detection of energetic particle impacts and the jitter correction are applied to light-curves.
All the corrections have been checked and eventually rewritten during the last three years. A special care was dedicated to the jitter correction that takes now into account the relativistic aberration that produces a radial shift of the position of the stars, equivalent to a slow variation of the focal length.

Although most of the functions of the N2 pipelines are quite similar, the seismology pipeline and the exoplanet pipeline are distinct and don't evolve together.
In the last three years, an important work has been devoted to the processing of the imagettes. A first version of a specific pipeline reducing to light-curves the imagettes of the explanet field has been implemented and running, leading to the simultaneous production of all the light-curves of the explanet field since LRa03.

A new version of the exo-imagette pipeline is the only update that will be needed for the CoRoT III extension; it will particularly improve the reduction of slightly saturated imagettes and is already under development at LAM (Marseille).
Concerning the seismology field where the imagettes are downloaded in order to improve the duty-cycle, especially in the SAA, it turned out that they are not helpful and the processing was abandoned.
The other improvements of the pipelines concerned the compensation of the diminution of the quantum efficiency and the correction of the effect of the changing of the CCD temperature.
After their production, the N2 data from the seismology field go into a validation step, performed by scientists.
For these reasons, data from the seismology field and from the exoplanet field are not always released together.

3.3 Duration of the runs and duty cycle

The durations of the runs and the duty cycle remain in complete agreement with the proposed programme, as seen on Table 3.
The duty cycle takes into account the losses due to to SAA crossing, satellite manœuvre, DPU1 breakdown and telemetry losses.

3.4 The Mission archive at IAS

The data policy, presently accepted by all the partners, states that all the data are delivered to all the Co_Is, and that they have a private access for one year.
Gentlemen agreements among them, as proposed by the Scientific Committee, manage the sharing of the different scientific questions without too much conflicts.
We propose to continue the same policy, which has been very long to install, after many discussions.

The private archive is restricted to the Co_Is and GIs during the one year proprietary period.

The public archive is opened since 19 December 2008.
The statistics presented in Figure 14 and 15 concern the requests on this archive since its opening, up to now (January 2012).

The total number of data downloads is 8999 (1061 downloads through the interface allowing data selection, 7938 downloads of complete runs through zip file ready for download);
The total volume of data downloaded is 22,5 Terabytes, mainly through zip files (89 Gb through the selection interface).

The geographical repartition of the connections as seen on figure 16 gives an idea of the world wode spred of these data.

Run	Num	Begins	Days	Duty cycle	Distribution to Co-Is		Main objective
					Seismo	Exo	
IRa01	3	31/01/2007	62	90,9%	10/12/2007	10/12/2007	HD 49933 solar, HD 49434 gam dor Good exo field
SRc01	4	11/04/2007	29	91,0%	17/03/2008	01/04/2008	Delta Scuti 175726
LRc01	5	11/05/2007	158	90,8%	15/02/2008	15/02/2008	HD 180420 B, HD 181555 Delta scuti, Good exofield
LRa01	6	18/10/2007	138	89,0%	24/07/2008	29/10/2008	HD 49933 Good exo field
SRa01	7	4/03/2008	28	90,7%	06/11/2008	04/09/2008	Young cluster NGC-2264
LRc02	8	11/04/2008	150	90,8%	03/06/2009	12/02/2009	172189, 171834 Good exo field
SRc02	9	9/09/2008	28	88,7%	30/03/2010	18/11/2009	
SRa02	10	8/10/2008	36	90,5%	17/03/2009	19/05/2009	HD 47345 star with planet
LRa02	11	13/11/2008	119	89,0%	05/08/2009	15/12/2009	HD 52655 With planet
LRc03	12	1/04/2009	93	89,8%	18/11/2009	18/11/2009	Exo field
LRc04	13	4/07/2009	88	90,7%	26/04/2010	14/04/2010	Exo field
LRa03	14	1/10/2009	151	89,7%	15/07/2010	06/09/2010	HD 43587
SRa03	15	2/03/2010	28	90,4%	16/08/2010	04/10/2010	SdB
LRc05	16	6/04/2010	91	90,4%	17/11/2010	22/12/2010	170 580
LRc06	17	7/07/2010	80	90,6%	20/01/2011	10/03/2011	170 580 rot exo
LRa04	18	28/09/2010	80	89,4%	08/04/2011	23/06/2011	426218
LRa05	19	17/12/2010	96	90,3%	14/12/2011	18/11/2011	42618 rot exo
LRc07	20	6/04/2011	84	90,6%	31/01/2012	17/01/2012	EXO
SRc03	21	1/07/2011	5	91,0%	31/01/2012	04/08/2011	Re-observation of CoRot-9
LRc08	22	6/07/2011	88	90,8%	15/02/2012	31/01/2012	Exo
SRa04	23	4/10/2011	56	90,5%	12/03/2012	30/03/2012	Hg Mn
SRa05	24	29/11/2011	41		30/03/2012	12/03/2012	Re-observation NGC-2264
LRa06	25	10/01/2012					Reobservation of CoRoT-7

***Table 3** lists the runs, the dates of the beginning of the observation, the duration in days of the observation, the duty cycle, the date of delivery of the data for each field, and then some hints on the scientific priorities*

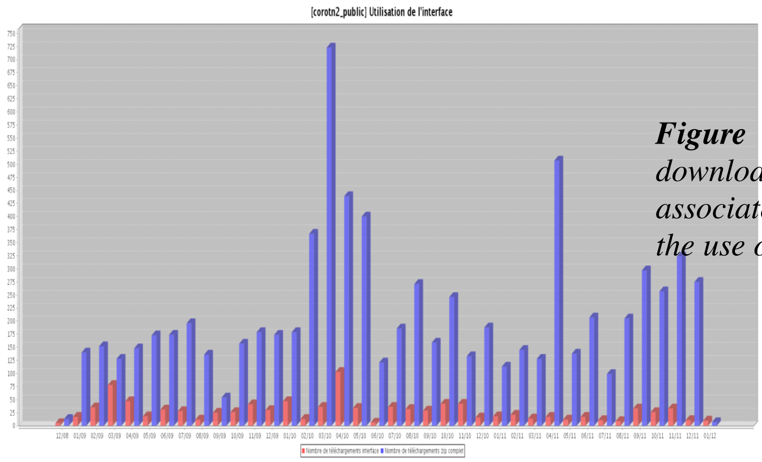


Figure 14 *: Variation of the number of downloads versus time. The blue color is associated to zip-file downloads, the red to the use of the interface.*

The number of zip-file downloads varies between 200 and 700 per month.
More important, this number seems to (slightly) increase with time, showing a growing interest for CoRoT data from outside the "CoRoT community".

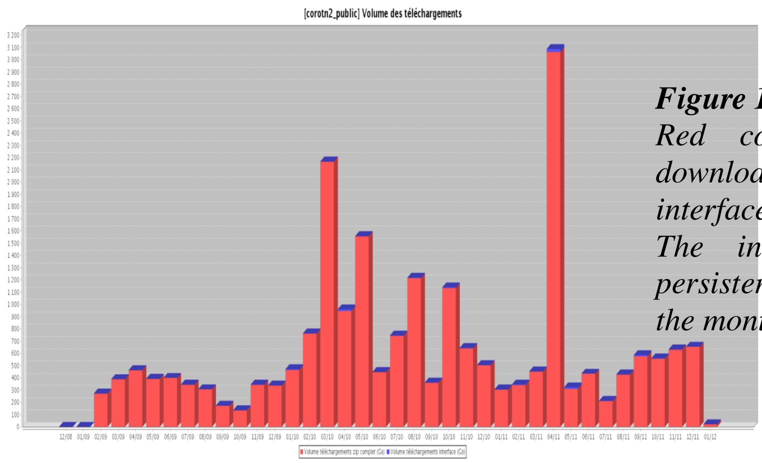


Figure 15 *: Volume of downloaded data. Red color is associated to zip-file downloads and blue color to the use of the interface.*
The interest for Corot data seems persistent, reaching up to 3 Terabytes for the month April 2011.

3.5 International impact of CoRoT

We present here a few « indicators » which can give an idea of the resonance of the CoRoT data in the world, concerning both the scientific community and also some outreach initiatives.

3.5.1 Data Requests

The requests come from all over the world.
USA and France, with respectively 1273 and 962 distinct origin of connection, are at the top of the list.
They are followed by UK (337), Germany (325), Spain (175), Italy (156), China (154), Brazil (124), Belgium (83)...

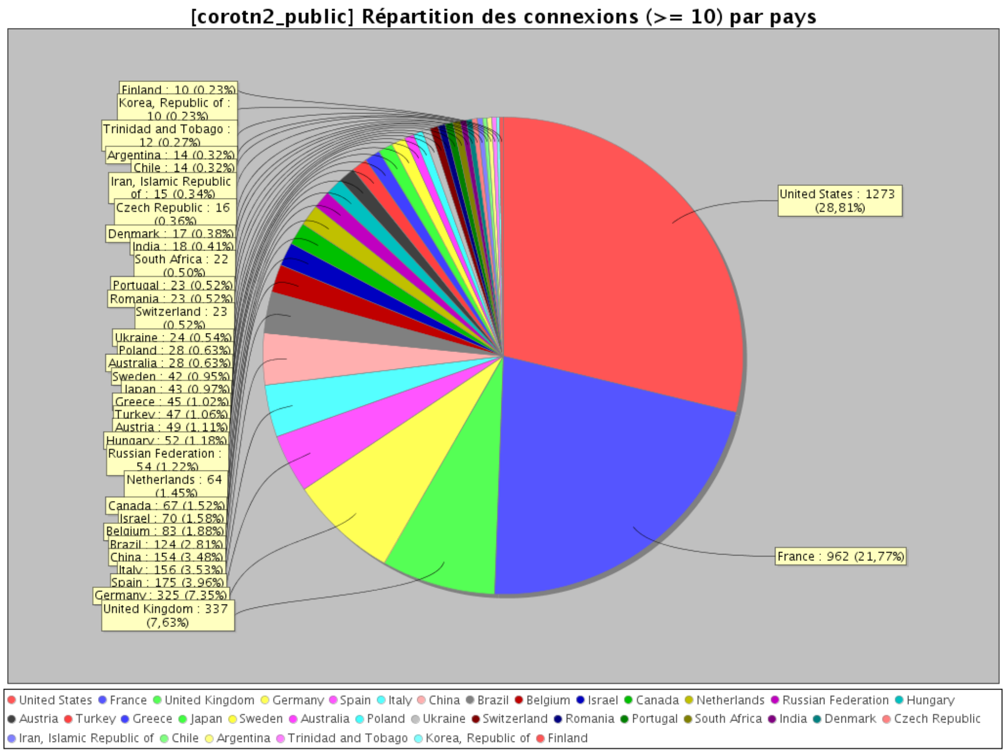


Figure 16 *: Geographic repartition of the requests of the public mission archive*

3.5.2 CoRoT Symposia

The first CoRoT Symposium held in Paris, on February 2009, at Cité Universitaire, gathered approximately 250 participants from the contributing countries but also from USA and different countries over the world ; India, China, Argentina….

The contributions, transformed in papers were all submitted to Astronomy and Astrophysics, through the classical refering procedure and assembled in the special volume n° 506 of this review (573 pages).

The second CoRoT Symposium, held in Marseille, on June 2011 had a comparable audience.
There has been 66 invited talks and oral presentations and 94 posters.
Proceedings are being published at Paris Observatory Press (350 pages) ; readers are encouraged to consult the published and refered papers on the same subject in scientific journal

The Chairpersons of the 2nd Symposium

3.5.3 Publications

In refered scientific journals, the total number of papers using CoRoT data and published reaches now more than 400.
An ADS query counts around 600 entries with CoRoT in the title or in the abstract.

A list representative of papers, review and proceedings based on CoRoT data or stimulated by them, since the end of 2007, inside the CoRoT community but also beyond, is presented in Annex .
Papers cited in the text can be found in this list.

In Meetings and Conferences, the CoRoT Team is generally invited to give presentations of the results, on a topic depending of the conference.
For instance Claire Moutou presented the CoRoT results at the first Kepler conference in December and Annie Baglin the highlights in stellar physics at the Hakone Symposium.

3.5.4 Outreach activities and visibility

These activities are quite developed and the list below is far from exhaustive.

CoRoT is generally presented in all the public events in France as Science en fête, journées du patrimoine,

Based on demands from the editors, papers on CoRoT are present in different types of journals. Let's cite a few of them :

* Scientific American (e.g.http://www.scientificamerican.com/article.cfm?id=dangling-a-corot)
* New Scientist (e.g.http://www.newscientist.com/article/dn10870-corot-to-scout-for-rocky-planets-around-other-stars.html)
* Nature (e.g.http://www.newscientist.com/article/dn10870-corot-to-scout-for-rocky-planets-around-other-stars.html)
* Sky & Telescope (e.g.http://www.skyandtelescope.com/news/38820797.html)
*Images de la Physique 2011, CNRS Annual magazine (pages)
* L'Astronomie
* Compte-rendus de l'Académie des Sciences

* Science
* Pour la science

The CoRoT team contributes to different TV series, as for instance

Du big bang au vivant :Canadian television serie, chain Discover

Des etoiles ple n les yeux, Paul de Brem, CNRS Images

Towards the young people and the public more generally

Exposition sur les métiers de la Recherche pour adolescents

CoRoT : une mission, des métiers

Exhibit on the extrasolar planets in Marseille

Contributions and various activities at

La fête de la science

Les journées du patrinmoine

Partnership with elementary schools and colleges

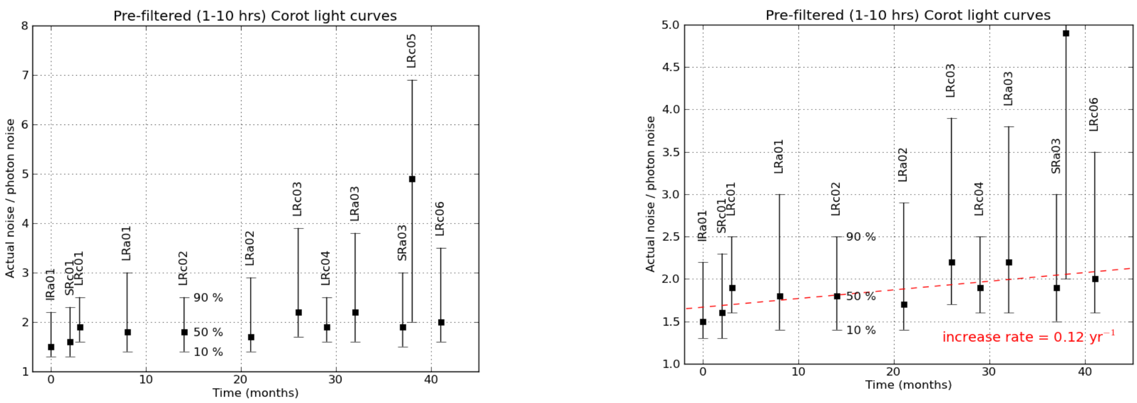
4 The quality of the instrument

As described in details in Auvergne et al. (2009), all the scientific specifications were fulfilled at the beginning of the mission, and are still the same.

4.1 The photometric accuracy

4.1.1 Standard Exoplanet channel

The evolution of the performance has been computed by P. Bordé for all the runs between January 2007 and July 2010. It's an « average » signal noise to photon noise ratio after a filtering of the light curves (LC). The LC used are LC delivered to scientists, all corrections being done. The ratio signal noise to photon noise is slightly increasing ; the rate of the increase computed on the data is 0.12 per year. An extrapolation to the end of mission (8 years) gives a typical ratio of 2.5 .



Fiureg 17 *: Average of the ratio actual noise to photon noise of planet search light curve for all runs between IRa01 and LRc06 (January 2007 to September 2010).*

The measured noise is the noise in the interval 1 to 10 hours (typical duration of a transit)

4.1.2 Photometry from the « imagettes » of the exoplanet field

The photometry obtained on imagettes (generally bright stars of the exoplanet channel) shows that most of LC have a noise ratio less than 3 comparable with the same quantity on the LC, as evaluated by P. Bordé. Most of saturated stars (R < 11) show quite a high ratio (>= 3). This effect is not well understood to day.

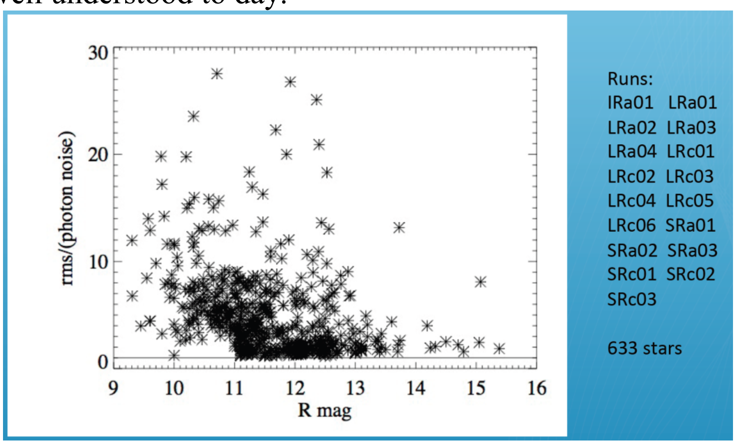


Figure 18 *: Ratio of the noise measured on LC obtained from imagettes to the photon noise. Most of the LC obtained from « imagettes » have a ratio less than 3 (credit S. Barros).*

4.1.3 Seismology channel

A similar work has been done by P. Boumier on the seismology channel. On figure 19 the ratio between the observed noise at high frequency (computed on corrected LC) and the photons noise has been plotted (ratio versus star magnitude). This ratio must be greater than or equal to 1. The time dependance is given by the color code (2007 black, 2009 blue, 2011 red).

We can see that for the brightest stars (V < 7) the ratio is very close to 1 and that there is no significant time dependance. This means that the performance has not significantly evolved from the beginning of the mission.

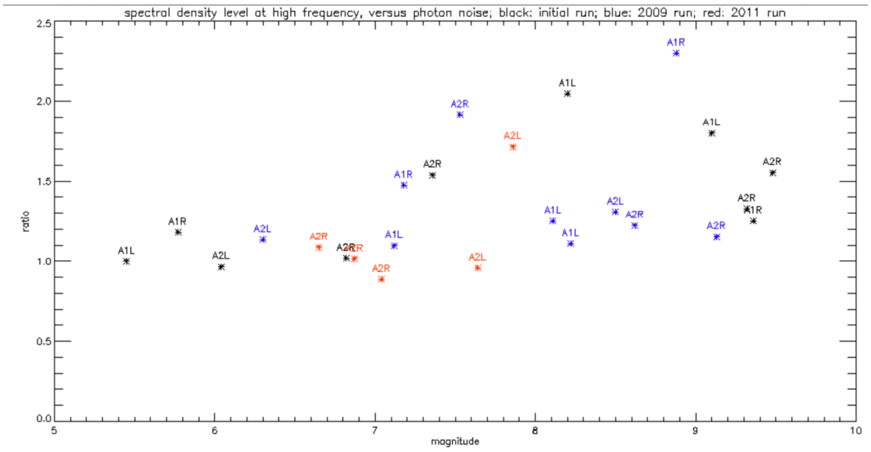


Figure 19 *: Ratio of the observed noise level to photons noise as a function of V magnitude. The time dependance can be evaluated with the color code (see text above)*

There is also a small dependance of this ratio on the magnitude. The larger dispersion for fainter stars can be understood as the faintest stars are more sensitive to instrumental fluctuations like pointing fluctuations and background fluctuations.
This means that we stay close to the initial specification. Light curves are dominated by photon noise for V = 6, and for fainter stars the ratio remains smaller than 2 up to V= 9.5.

4.1.4 Conclusions about the performances

For the two channels there is no significant degradation of the performances up to now, and it should remain so for years. But nobody is sheltered from an unexpected event !

4.2 Status of the detectors

4.2.1 Number of hot pixels (HP)

The evolution and probable increase of the number of HP could be a matter of concern, as the satellite crosses in the average four times a day the South Atlantic Anomaly.
This number is computed in the following way.
In a first step all pixels with an intensity threshold of 1000 e- (rather arbitrary value) are recorded to avoid the detection of background pixels. In a second step each group of contiguous bright pixels are sorted to eliminate bright pixels group with more than 3 pixels (considered as possible stars). The resulting number of HP in underestimated by approximately 10%, which is the surface occupied by stars (Figure 20).

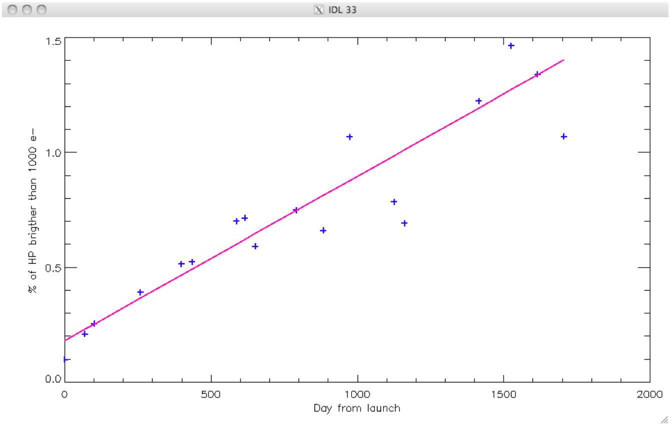


Figure 20 *: Percentage of HP as a function of time.*

The HP intensity being temperature (increasing intensity with temperature) dependant we correct for each run the threshold of the CCDs temperature, the reference point being at -40 C. The HP percentage shows a saturation with time, and even though this is not completely understood, it is a very important result for a possible extension (Figure 21).

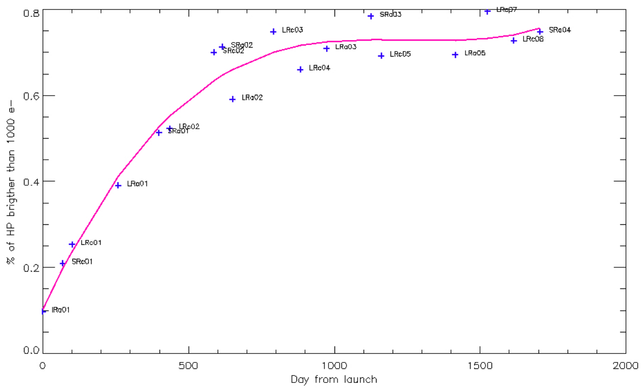


Figure 21 *: Percentage of HP assuming a temperature of -40°C for all images.*

4.2.2 Evolution of the charge transfer efficiency (CTE).

A low degradation of the CTE can be seen for the brightest stars of the seismology channel, both in the CCD image and memory zone and in the register (Figure 22 and 23). This effect is not detected on the exoplanet search channel as the stars are fainter The photometric mask being computed specifically for each star this effect has no consequence on the photometry.

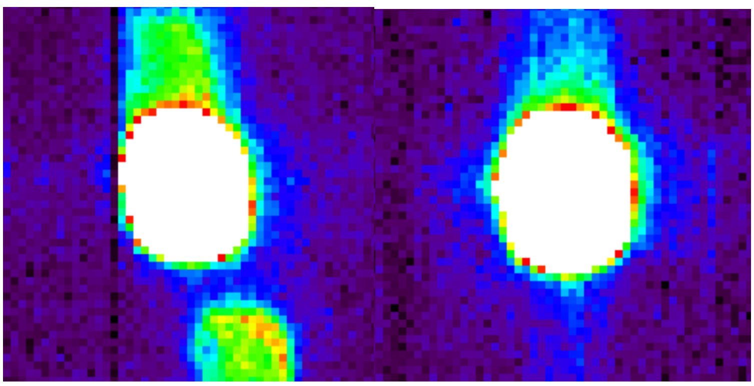


Figure 22 *: Charges are spread outside the PSF area. Transfer of lines in the image and memory zone. Images cover aproximately 50x50 pixels.*

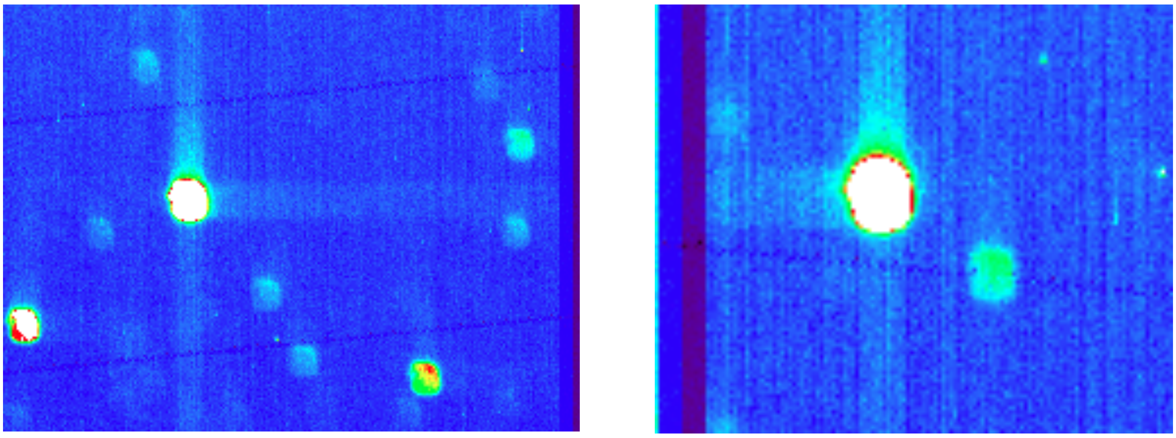


***Figure 23** : CTE degradation in the register, visible only for bright stars close to the CCD column center. The horizontal spreading of the charge depends on the direction of charges transfer in the register. The center columns (xc = 1024) can be seen in the two images, respectively on the right and left of the two windows. Images cover aproximately 50x50 pixels.*

4.2.3 Black pixels.

Two new black columns (due to traps) have been recently detected on the seismology channel (see for instance Figure 23). The number of targets being small it is quite easy to avoid those columns. On the planet search CCD E2, we have not yet found such degraded columns.

4.2.4 Long term evolution of the photons detection efficiency.

The flux decrease has been computed on « constant » stars of the two channels. A decrease close to 6.4 E-5 per day was measured in 2010. We add new measurements on stars of 2011 summer runs (green crosses in Figure 24). We cannot see any significant evolution.

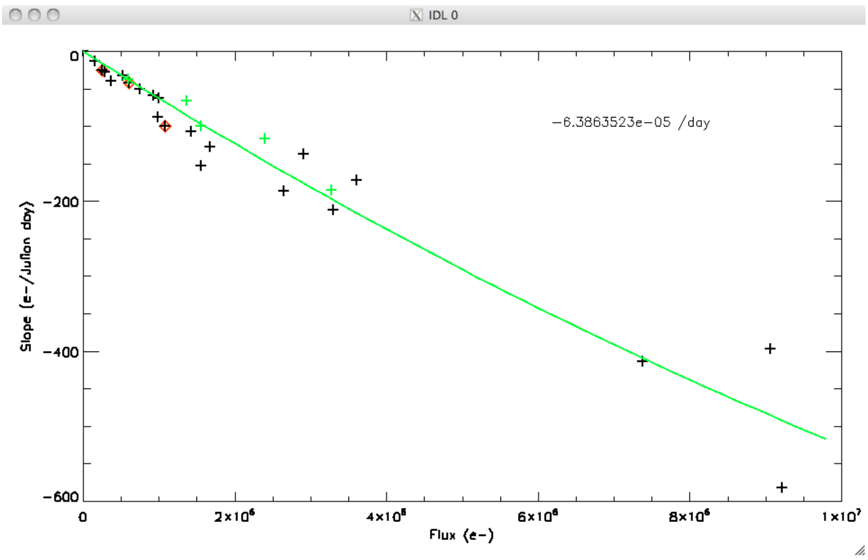


***Figure 24** : Measurements made on LC during the summer 2011 (green crosses) don't show any significant variations of the long term flux decrease.*

4.3 Evolution of the onboard software

Some serious improvements could be obtained, implying a modification of the onboard software, and are being seriously considered.

4.3.1 Modification of the templates in the exoplanet field

The present evolution of the observing strategy, as well as a better knowledge of the attribution mechanism lead to consider seriously a redefinition of the set of templates.

4.3.2 Barycenter measurement in the exoplanet field.

The difficulty is that the fluctuations of the barycenter of the exoplanet targets are dominated by the pointing fluctuations. But quantity can be measured precisely through the pointing fluctuations of the bright stars of the seismology channel.

The required accuracy of 4 10^{-4} pixels could be reached. As seen on Figure 24b, the correlation between the horizontal (X) and vertical (Y) displacement on the detector, of two stars of run LRa03, is very good.

More work is needed to assess this preliminary positive indication.

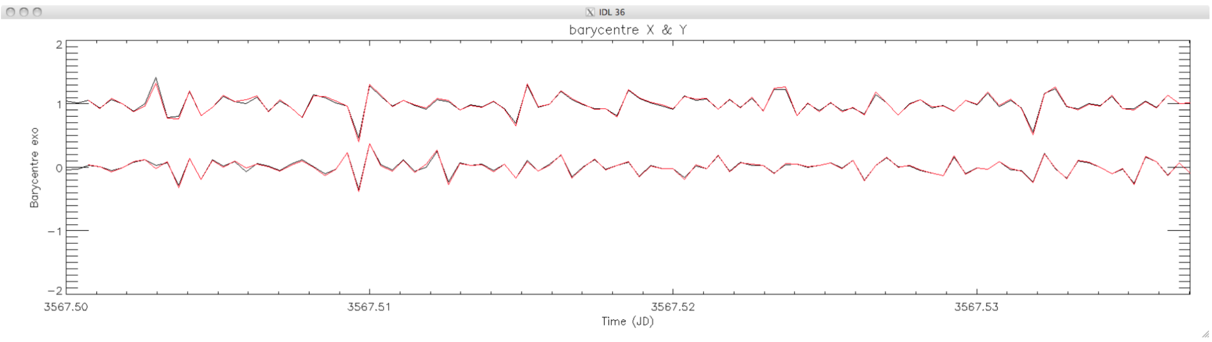


***Figure 24b**: Barycentre X and Y (1 pixel added to Y for clarity) for a planet star (R= 12.62, black curve) and a seismology star (V= 5.7, red curve). In both cases, the barycentre is computed on 32 sec. integration time" imagettes"*

4.4 Extension of the field of view

In order to increase the number of potentially interesting targets, we will probably be able to extend the "CoRoT eyes" to a radius of 15 degrees (10 degrees today).

Two quantities will be affected by an increase of the distance to the eyes center: scattered light from the earth and the CCD temperature.

* Preliminary measurements in orbit show that the level of straylight remains smaller than expected through modeling before launch, due to the excellent quality of the baffle. An extension of the maximum acceptable angle from 10 to14 or 15 degrees seems acceptable.

More precise measurements will be done in early spring, just after the reversal of the satellite….

The temperature of the CCD increases with increasing declination; checks will be needed to validate such observations, if necessary.

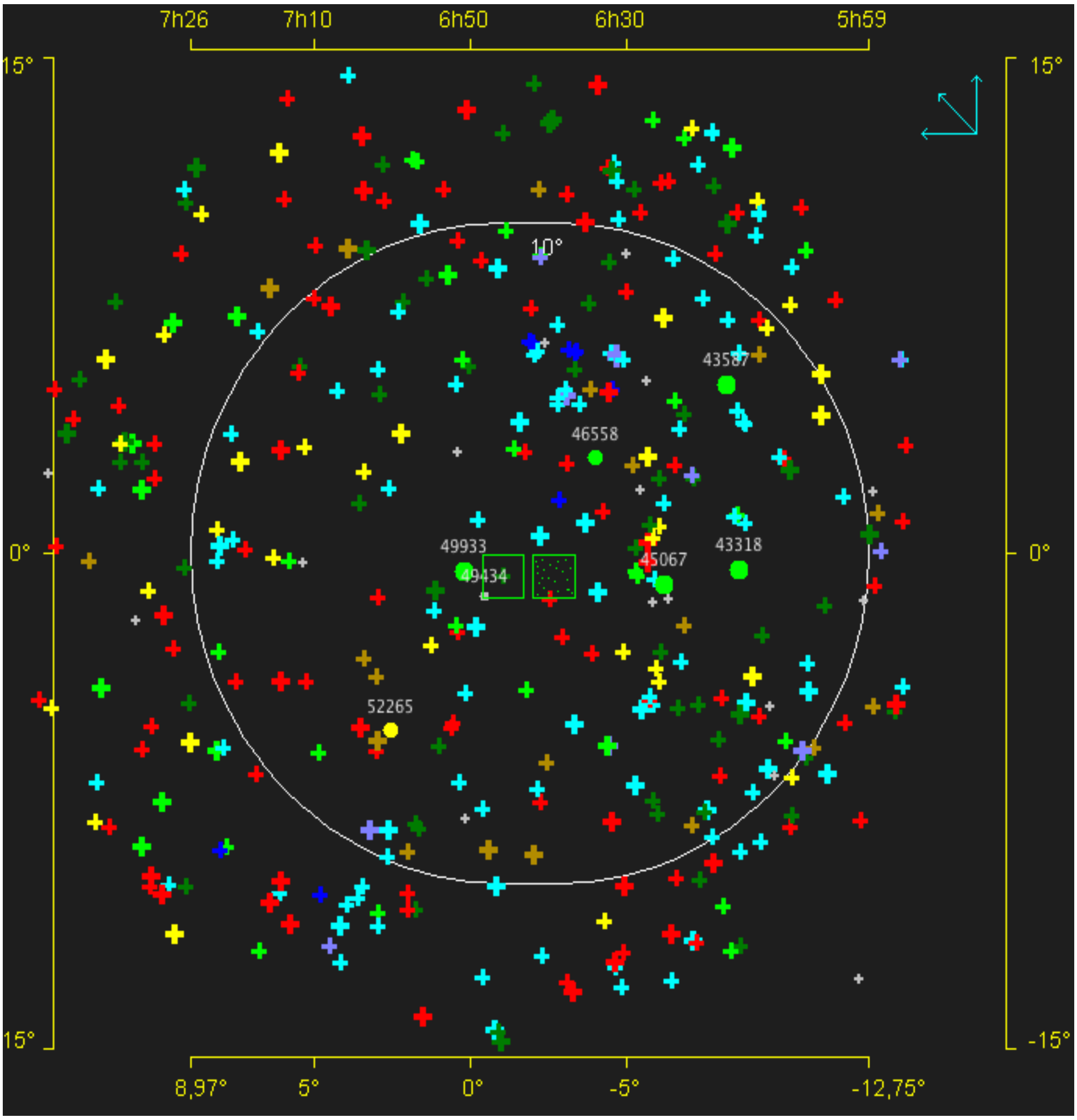


***Figure 25** : Stars brighter than V= 7 in the anticentre field of view of CoRoT, from the CoRoTsky Data base.*

The white circle corresponds to a 10° radius, an extension to 14 to 15 degrees is foreseen.

5 The scientific programme for a 3 year extension

5.1 Context

We have now entered the period of data interpretation.
Data are now used extensively and will be used for years to interpret in terms of physical processes the behavior of the interiors of stars and planets but also to understand the global system and the interaction between all the bodies, planets, stars and with their environment.

Kepler, the CoRoT big brother, a much more expensive mission, is a kind of second generation mission with respect to CoRoT. It has been lauched 3 years ago and produces an enormous amount of data of extremely good quality.
In the exoplanet domain, it is focussed on the discovery of earth like habitable planets.
It observes in a unique direction for at least 4 years.
CoRoT cannot reach such long durations, but observes in different directions of the sky.
It is also able to detect planets in the domain of parameters where CoRoT is adapted to, complementing the CoRoT statistics in his field of view. Clearly Kepler is better designed for planet detection down to Earth analogs and the candidates specificities have clearly demonstrated how well the instrument matches its specifications.
Kepler is also doing asteroseismology via the KASC consortium, and tight cooperations with the CoRoT seismology working group are already operating and efficient.

Then the major differences between the two missions are:
- CoRoT is a pionner small mission, and Kepler a second generation project
- CoRoT being first has developped methodologies, and understood the major difficulties
- CoRoT observes in different regions of the sky, populated by differrent stellar populations
- CoRoT is doing seismology on bright stars that Kepler will not do
- Kepler may detect Earth-like habitable planets and other long period objetcs that CoRoT cannot reach.

	CoRoT	Kepler
FOV sq deg	1.96 per pointing	105
Accessible FOV sq deg	1400	105
Duration of a run	up to 180 days	3.5 years
nb of cool dwarfs & subgiants	12 324 m_V=14.0	25 000 m_V=13.6
Photometric precision (ppm/√hr)	700	80
nb of candidates	663	2326
nb of confirmed planets	27	33
nb of confirmed planets with measured mass	25	

Table 4 *: Comparison of the two space photometric missions that are currently detecting planets.*

CoRoT presents interesting specificities:

- CoRoT is probing different fields in different regions of the Galaxy, the CoRoT viewing zones being indeed in the Galactic plane. Different stellar population are thus expected with different ages and metallicities, a difference which is interesting in both programmes
- CoRoT planets could be characterized in great details, thanks to the accompanying follow-up observations. For small mass planets, the limited number of promising candidates allows us to dedicate more telescope time for spectroscopic characterization. A good characterization of the planets is really mandatory in order to better understand the physical properties and their formation. Another interesting outcome of this huge observational effort is a better evaluation of the false positive rate of the CoRoT candidates. This has also allowed to re-asses the false positive rate of Kepler candidates in the giant domain on better basis than a simple stellar population statistics.

CoRoT seismology field is able to probe young stellar regions and in particular hot and massive stars, absent from the Kepler field.

This evolving context has lead the Scientific Committee to define four major directions :

* Extension and continuation of the exoplanet programme but focused on bright stars,
* Observations of bright star hosting planets in the seismology field
* Exploration of specific CoRoT niches in stellar physics,
* Development of Galactic astronomy integrating seismic indexes.

5.2 The exoplanet programme

The CoRoT discoveries proved the instrument capability to explore the domain of extra-solar planets at short orbital periods and detect planets over a wide range of size and properties. Continuous observations over long time spans also demonstrate their potential to probe different aspects of the planetary systems with, for example, the search for planet - host stars interactions. Another important asset of the CoRoT exoplanet program is the accompanying follow-up process. It allows not only to filter out stellar systems that mimic planet transit but mainly to characterize the planet. Getting the mass and the eccentricity of the planet in addition to its radius is of prime interest to discern its internal structure and to better understand the planet formation process. This, however, requires a huge observational effort with about 30 nights of telescope time per semester on the largest facilities devoted to the CoRoT follow-up program.

The exoplanet program proposed for this second extension is in line with the current program, that is the exploration and characterization of the close-in planet population from super-Earth sized ones to giants. For the mission extension, we propose however to optimize the strategy as follows.

5.2.1 Characterizing planets in the sub-Saturn regime.

As shown rpreceedingly, super-Earth size planets can be discovered in the light curves of stars brighter than $R \approx 14$ only and are definitely out of CoRoT's reach for fainter stars. The detection of these small size planets is however only a first step, especially considering the high number of Kepler candidates in this range of size. What is yet required is to measure both the planet's size and mass so that their internal structure could be modeled and their formation and evolution better understood. As illustrated by CoRoT-7b and more recently CoRoT-22b, but also by Kepler 10b, characterizing the physical nature of small mass planets is very demanding in terms of follow-up observations.

At the faint end of the CoRoT magnitude range, only hot-Jupiter like planets could be detected. Even for massive planets, their characterization for faint host stars requires large size telescopes and nevertheless, it remains problematic. In the case of CoRoT-16b (V= 15.6) and CoRoT-21b (V=16) which are Jupiter-like planets in a few days orbit, even with a few tens of radial velocity measurements performed with HIRES and HARPS, the value of the orbit eccentricity could not be constrained. This directly impacts our knowledge of the physical and dynamical properties of the systems and weakens the scientific interest of the planet.

By focusing on stars brighter than V = 15 in the exoplanet channel, our objectives are :

- To lighten the load on both the detection and the follow-up processes and concentrate the observational effort on the most promising candidates. In particular this would allow to increase the observational time devoted to radial velocity measurements of small mass planets so that their mass could be accurately measured and their physical properties better constrained.
- To use the telemetry that would be made available by cutting off nearly one half of the targets in order to increase the number of imagettes in the exoplanet channel. The advantage is that from imagettes, we would benefit from obtaining the centroid curve, that is the center of light distribution as a function of time. This is a powerful mean to check for false positives due to background eclipsing binaries by comparing the behavior of centroids during and

outside transits. Indeed a background eclipsing binary diluting the target's light causes a significant displacement of the centroid during the transit events. As a consequence of this additional screening of false positives, we expect to reduce significantly the number of candidates listed for follow-up observations. This will allow to concentrate the telescope time on the most promising candidates.

In summary, the objective of this requested extension will be the search for Neptune-size and Super-Earth planets around bright stars and the detailed characterization of hot-Jupiter planets.

5.2.2 Detect and study transiting planets around stars with known planets.

Another objective of the program is the detection of transiting planets around stars with known planets observed with the asteroseismology CCD. While the number of targets observed in the asteroseismology channel is not sufficient to carry out a program dedicated to the detection of transiting planets, observations of some planetary systems has a high scientific interest.
Kepler observations have indeed revealed that transiting multi-planetary systems are quite common and account for ~ 20% of the Kepler candidates. The chance of detecting a new transiting planet in a system with already known planet(s) is thus higher than just probing the sky for new planets.
In addition, it would be possible to characterize the host star via asteroseismolgy and further accurately infer the planet's parameters as already done in the cases of HD 52265b (Gizon et al. 2011) and HD 46375b (Gaulme et al. 2010).

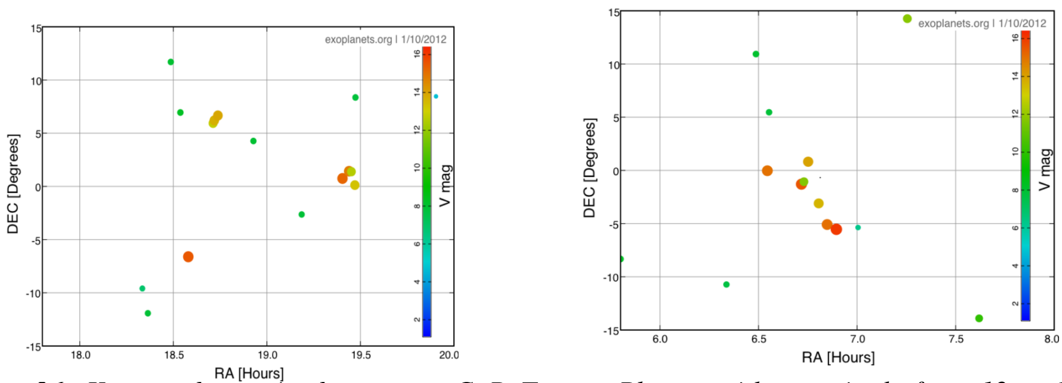


Figure 26: *Known planets in the present CoRoT eyes. Planets with magnitude from 12 to 16 have been discovered in the CoRoT exoplanet channel*

Besides the CoRoT discoveries, there are 27 stars with known planets within CoRoT eyes of an extended radius of 20 degrees (resp. there are 20 planets within radii of just over 16 degrees). Five of them have short periods around 50 days or less (see Table 3) but most have longer periods, up to 2000 days. The chance that these planets are transiting their host star is very low, e.g. less than 1%. However, our main objective would be not to detect their transits but to find additional low-mass and short-periodic transiting companions. The detection of even a single new planet in any of these systems would be very valuable as these host stars have magnitudes in the range of V=7 to 9. It would thus allow a deep characterization of these systems by complementary observations for their physical properties. Indeed, detailed planet characterization needs planets transiting sufficiently bright stars so that they can be studied spectroscopically. Small size planets orbiting bright solar type stars, with both their mass and radius measured, remain rare (Figure 26) as they require photometric precision which can be achieve from space-based observations only and radial velocity measurements in the m/s domain. These bright targets are out of reach of CoRoT/Exoplanet and Kepler surveys but can be easily photometrically monitored in the CoRoT asteroseismology channel.

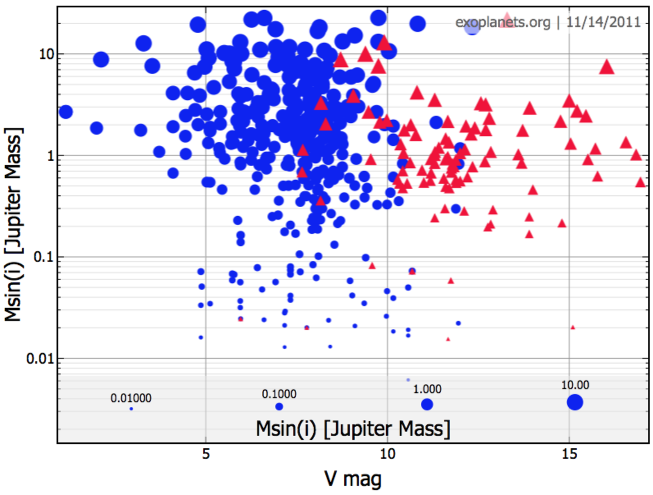


***Figure 27**: planets detected by radial velocity (blue dots) and transits (red triangles). The domain of small size planets orbiting bright targets is barely filled by transiting planets.*

5.2.3 Detection of giant planets on wide orbits

The planet radius /vs semi-major axis diagramme for giant planets (Schneider et al. 2011) shows that the (few) transiting planets on wide orbits have "regular" radii as predicted by models, contrary to hot Jupiters which are anomalously inflated.
The re-observation of mono- and bi-transits already detected by CoRoT could extend the statistics of transiting planets with periods larger than ~75 days. This statistics could help to improve the planet radius /vs orbite size correlation and therefore constrain models of planet inflation. It would also provide a few targets for transmission spectroscopy for JWST to understand the physics of temperate Jupiter atmospheres.

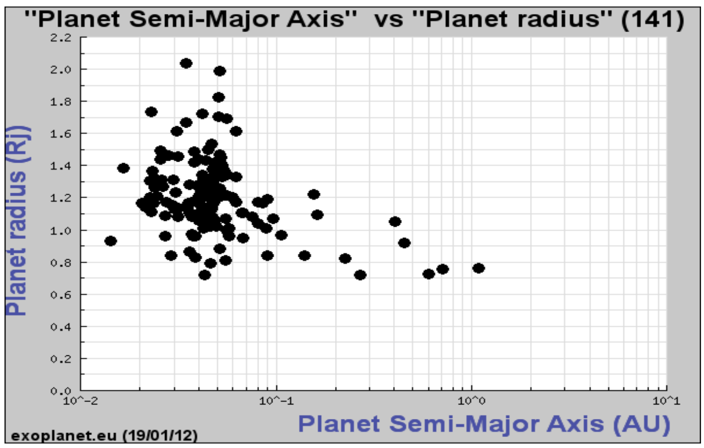


***Figure 27b** : The planet radius versus semi-major axis (from the Planet Encyclopedia)*

Table 5: *Planets in extended r=20deg CoRoT Eyes. Data from exoplanet.eu in January 2012.*

planet	orb. period (day)	mass (Mjup)	orbital eccentricty	Vmag	distance* (deg)	star spec. type	comment
			Center-Eye				
HD 175541 b	297.3	0.61	0.33	8.03	4.5	G8IV	
HD 179079 b	14.48	0.08	0.12	7.95	5.9	G5IV	to be observed summer 2012
HD 171028 b	550	1.98	0.59	8.31	8.2	G0	
HD 164509 b	282.4	0.48	0.26	8.24	12.1	G5V	
HD 168443 b	58.11	7.66	0.53	6.92	12.2	G5	
HD 168443 c	1749.83	17.19	0.21	6.92	12.2	G5	
HD 183263 b	626.5	3.67	0.36	7.86	12.7	G2IV	
HD 183263 c	2950	3.82	0.25	7.86	12.7	G2IV	
HD 170469 b	1145	0.67	0.11	8.21	12.8	G5IV	
HD 168746 b	6.4	0.23	0.08	7.95	13.8	G5	
nu Oph b	536	22.3	0.13	3.33	16.1	G9III	bright sub-giant
nu Oph c	3169	24.5	0.18	3.33	16.1	G9III	
ksi Aql b	136.75	2.8	0	4.72	18.2	G9IIIb	
HD 231701 b	141.6	1.08	0.1	8.97	19.5	F8V	
			Anticenter-Eye				
HD 52265 b	119.6	1.05	0.35	6.3	6	G0 V	
HD 46375 b	3.02	0.25	0.04	7.94	6.9	K1 IV	in Sra02; reobservation proposed
HD 45652 b	43.6	0.47	0.38	8.1	12.1	G8-K0	
HD 44219 b	472.3	0.58	0.61	7.69	13.1	G2V	
HAT-P-24 b	3.36	0.69	0.07	11.82	15.6	F8	transiting planet; exo-channel
HD 38529 b	14.31	0.78	0.25	5.94	15.9	G4 IV	
HD 38529 c	2134.76	17.7	0.36	5.94	15.9	G4 IV	
HD 38858 b	407.15	0.1	0.27	5.97	15.9	G4V	
HD 38801 b	696.3	10.7	0	8.26	17.6	K0IV	
NGC 2423-3b	714.3	10.6	0.21	9.45	18.2		in open cluster
HD 66428 b	1973	2.82	0.47	8.25	18.4	G5	
HD 37605 b	55.23	2.84	0.74	8.69	18.5	K0V	
7 CMa b	763	2.6	0.14	3.96	19.5	K1 III	

* Distance from the middle of the Center (18h 50m, ±0deg) resp. the Anticenter Eye (6h 50m, ±0deg). Planets are sorted by this distance.

5.3 The Stellar physics programme

The fruitfull 5 years experience associated with the numerous observational and interpretation results presented herebefore allows to propose ambitious updated priority lines for the extension of the scientific program. These priority lines are more focused than initial ones because our experience of the instrument performances, of the expected stellar signal and of the global problematics is more mature. They also include our experience of the Kepler performances and specificities to determine aspects where CoRoT is best suited to make crucial contributions.
The results already obtained from CoRoT data have shown that this mission is able to document many aspects of stars, by revealing their microvariability at the level of several ppm. They have also confirmed the interest to merge this information in interpretation work to produce an optimal output.
There is clearly more than oscillations to be characterized from these light curves and there is more than seismology to be adressed with these data. This is why the programme has changed his name from *Seismology* to *Stellar Physics*, and covers data from both fields.

5.3.1 Going further with solar analogs

5.3.1.1 The stellar-solar connection

The first objective of CoRoT considering solar-type pulsators was to observe and characterize oscillations in stars significantly hotter or more evolved than the Sun. This has been achieved rapidly, allowing first quantitative comparison with theoretical expectations and opening a rich interpretation activity still going on. Then, gradually, we have considered targets in intermediate range of mass or evolution stage, to complete and refine the study. An important next step was to observe stars close enough to the Sun in terms of global parameters (mass, metallicity, age) in order to strengthen the link between the stars and the Solar case. In this respect, both CoRoT and Kepler first years observations have revealed the difficulty to find suitable targets very close to the Sun in terms of global parameters (Mass, metallicity, age). For CoRoT however, a few candidates existed, though a bit faint (mV~6.9) considering that intrinsic amplitudes of these objects are the lowest ones CoRoT has been dimensioned to measure with precision.

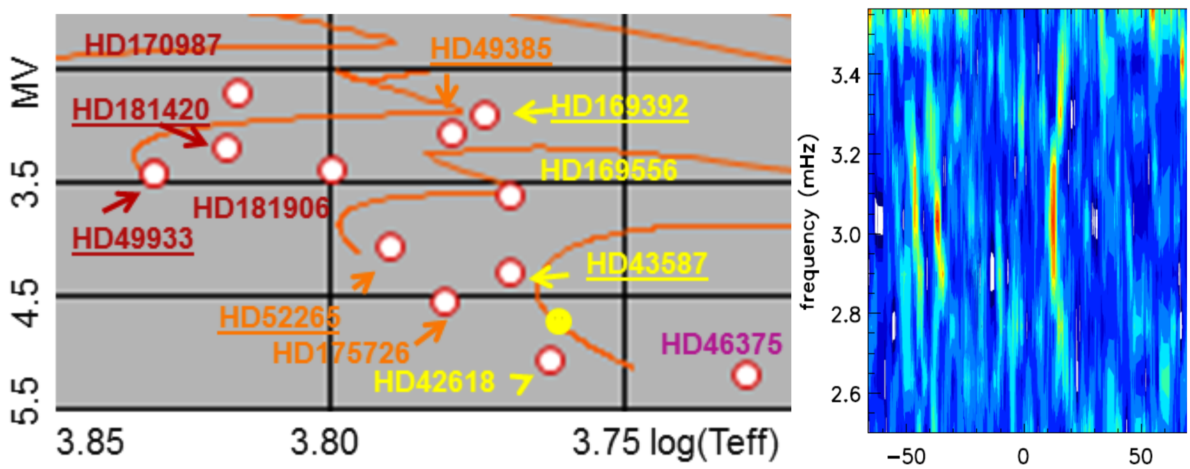


Figure 28. *HD 42618:* ***left****: position in the HR diagramme compared with early CoRoT targets (red), more re cent targets (orange) and latest ones (yellow);* ***right****: echelle diagram showing the three ridges associated with l=0,1 and 2 modes.*

The observational success of the detection of solar like oscillations in HD 42618 (mV~6.7) confirms that we have with CoRoT a unique opportunity to observe these objects. HD 42618, with a large separation Δν=141μHz, Teff=5800K is the star closest to the Sun with a rich oscillation spectrum measured from space.
Kepler can also obtain comparable data on such objects, but, we are talking about necessarily 'bright enough' objects (for both CoRoT and Kepler) which number is limited in a restricted field of 100sq degrees as for Kepler (RQ for CoRoT, accessible field is ~ 2 times 300 sq degrees in the initial 10deg eyes, and becomes ~ 2 times 700 sq degrees in the perspective of 15deg eyes …)
And thus, CoRoT is in a good position to address this topic of main sequence cool solar-like pulsators.

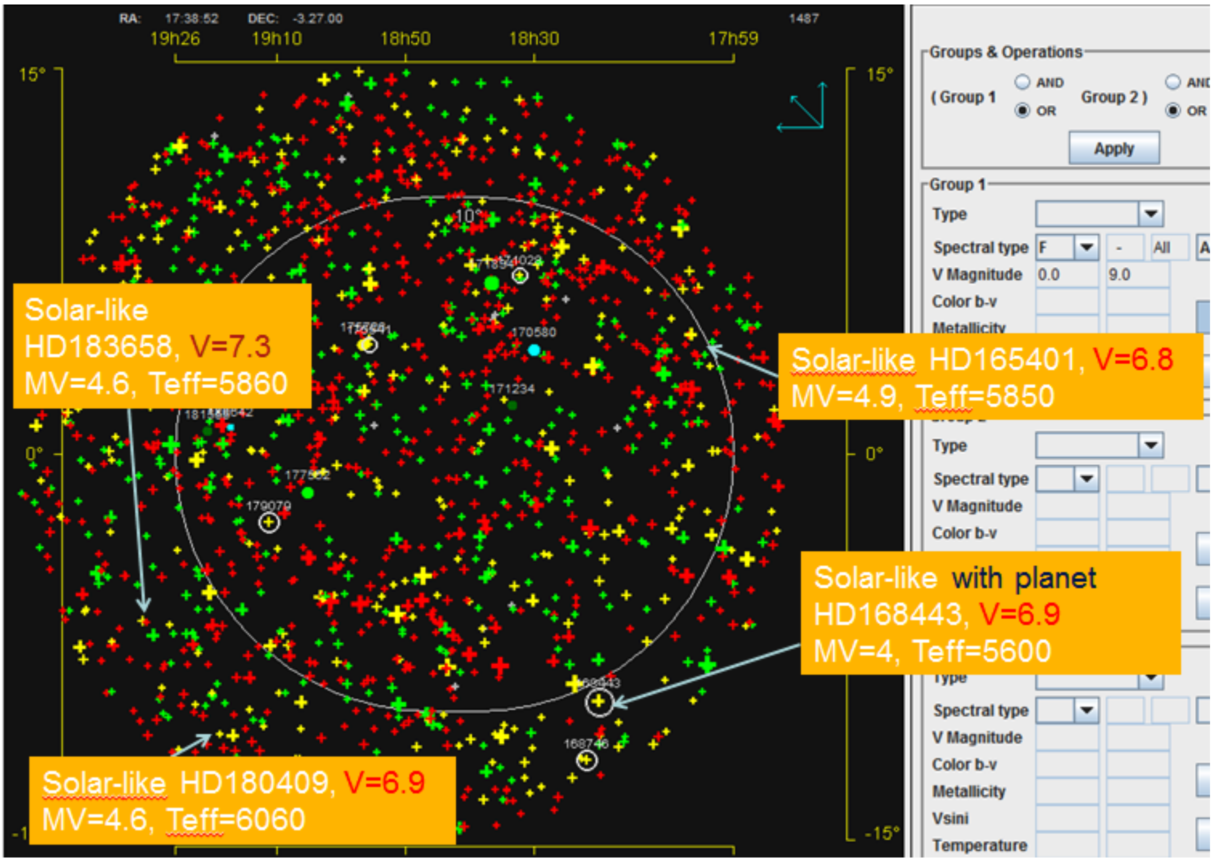


Figure 29. *Possible new targets (in the perspective of a 15 deg extension of CoRoT eyes) with global properties close to the Sun and bright enough to obtain individual modes characterization. Note HD168443 which is known to host planets detected in radial velocity.*

5.3.1.2 Planet host stars.

The interest for seismic characterization of stars known to host planets has been very much discussed over the past few years ((see also § 5.2.2), when it became clear that one of the main uncertainty factor for planet characterization comes from the uncertainties on the associated star.
It also became clear that mutual interaction (as e.g. chemical enrichment of the stellar outer layers by infalling planets) suggested that the star-planets system globally is probably a sensible level to consider stars and planets formation and evolution. Among the bright stars observable with CoRoT, some are known to have planets around. This is the case of HD52265 which has been observed successfully and for which the seismic characterization of

the central star is under progress. Among the results already obtained, a better determination of the mass and a seismic determination of the inclinaison angle allowed to better characterize the star planet system and the planet mass.

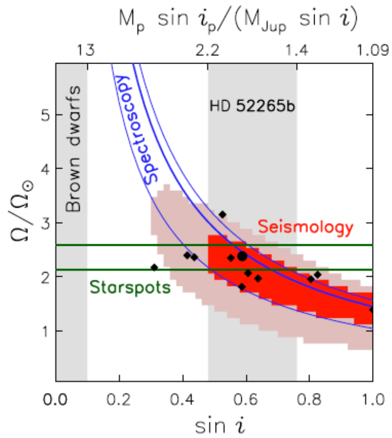


Figure 30: *HD52265: constraints on the estimate of absolute rotation rate and inclination obtained from the CoRoT data: seismology (red) and starspots (green), combined with spectroscopic Vsini determination (Gizon et al. in prep).*

Several other systems exist in the CoRoT field, including bright ones when extending the CoRoT eyes to 15 degrees as considered now. For some of them, a chance even exists to reveal an eclipse of a close-in planet which would not have been detected in radial velocity measurements. This would be a major advance compared with what has been achieved in this domain by CoRoT and Kepler so far (see § 5.2.2)

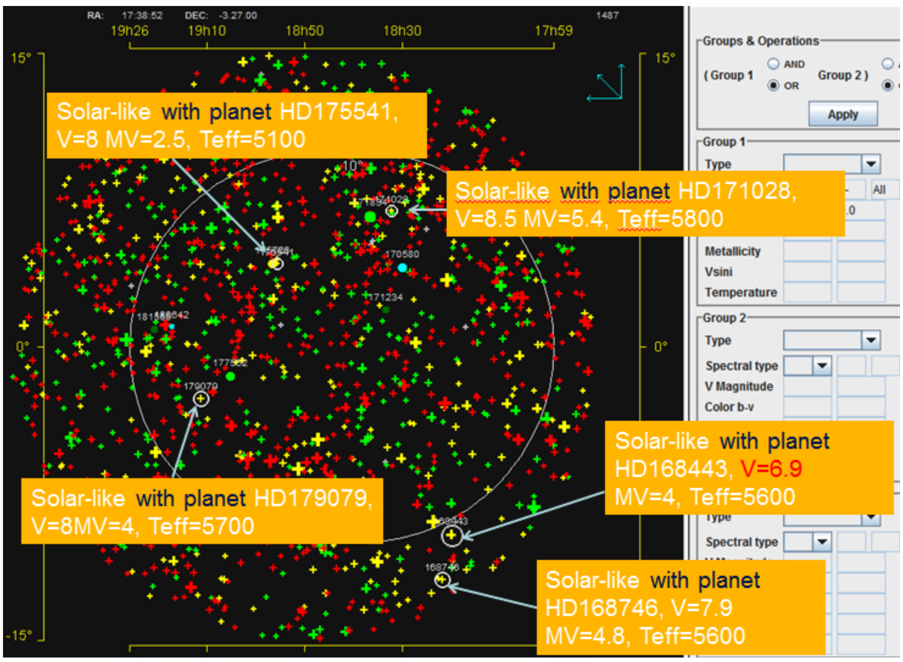


Figure 31*: Some solar-type pulsators candidates with known radial velocity planets in the center direction. For the faintest ones presented here, we expect at least seismic indexes (large separation, ν_{max},…) to characterize the central star. Such candidates exist also in the anticenter direction (see also Table 5, for an exhaustive list)*

5.3.1.3 Magnetic cycles

The discovery with CoRoT of a magnetic activity cycle signature in frequencies and mode linewidth of HD49933 (thanks to its reobservation) opened new perspective. Such a detection has not been repeated so far on other objects observed at most 5 months. This encourages reobservation of more solar-type pulsators after a few years. This can be coupled with reobservation of other types of pulsators, to look for possible changes in modes amplitudes and/or on activity and granulation over a few years. In this respect, compared to Kepler, CoRoT can address longer time scales. It also deals with brighter targets more easily followed in spectroscopy.

5.3.2 A CoRoT niche: the hot and massive stars

No competitor to CoRoT exists for the seismology of hot stars. The NASA Kepler satellite observes one single field of view, which contains an old population of stars and therefore no O stars, no early-B stars, no early-type supergiants, and only 3 dozens of late B stars including only one late Be star in its entire field. The Canadian satellite MOST can observe almost anywhere in the sky and did successfully observe a few hot stars but it is limited to very bright stars and thus has a very limited access to specific hot stars chosen to address theoretical questions and stellar physics in general. In addition MOST can only observe continuously for very short period of times (typically 2 weeks).
The first results obtained on hot stars with CoRoT allow us to update the problematic associated with these objects and propose several guidelines to investigate with CoRoT during its new extension.

5.3.2.1 Oscillations, granulation and the outer convective shell of hot stars

The existence and extension of the outer convective shell very near the surface in hot stars (early B and O stars) is a subject of debate. The CoRoT results revealed solar-like oscillations in two stars (one B, one O star), which could be explained by a convective shell more efficient than thought before, but also by the convective core. Such oscillation modes are searched in other hot stars but have not been found so far. On the other hand, CoRoT results also revealed in the few O stars observed so far the existence of a strong low frequency contribution in the power spectra which could be associated with a phenomenon like granulation induced by the outer convective zone mentioned previously.
CoRoT represents a unique opportunity to obtain long term observations on a representative set of hot stars (so far, O stars have been observed in a short run only).

5.3.2.2 Correlation between stellar pulsation and mass loss

Mass loss is considered as a crucial phenomenon in the evolution of massive stars and thus indirectly on the chemical enrichment of the Universe. The CoRoT observations have shown for the first time the evolution of oscillation behavior in a Be stars during an outburst (event of mass ejection) as seen on figure 32. Thanks to these data, the sequence of events during an outburst has recently been analyzed theoretically and modeled, and a new scenario emerged. Reobservation of such a phenomenon in the same star and/or in other Be stars would help to confirm and refine this scenario. The probability of re-observing an outburst with CoRoT in HD 49330 for instance is very high since this Be star is very hot (B0) and undergoes outbursts about every 10 months.
Another link between stellar pulsations and mass loss could come from the excitation of strange modes which have very short amplification timescales and which are predicted to be excited in stars presenting rather large mass loss rates. First evidence of periodic mass-loss

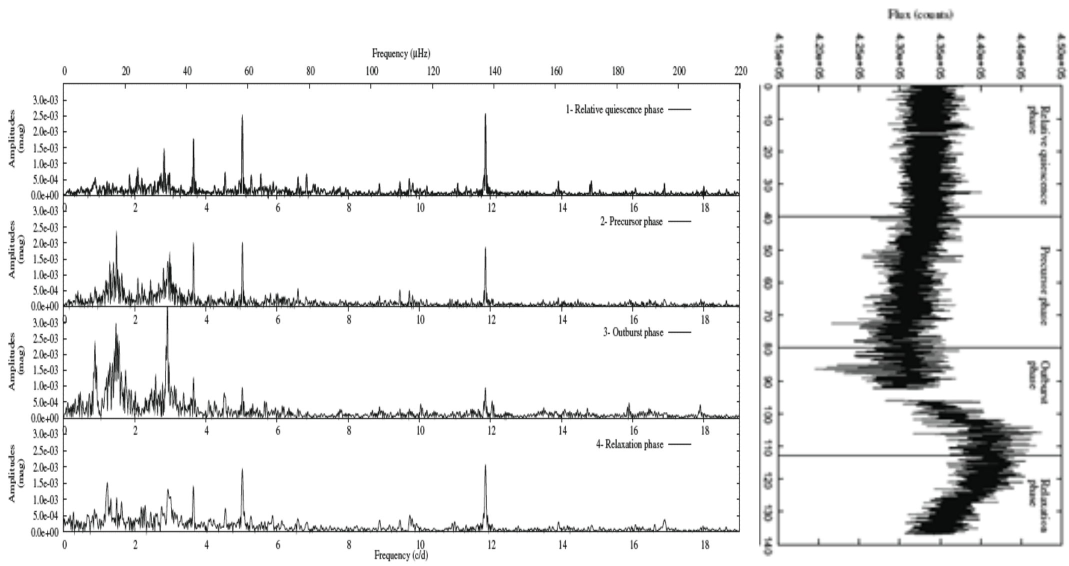


***Figure 32**: Outburst observed in HD 49330 with CoRoT: right: light curve at different stages of the outburst; left: pulsation spectrum at these specific stages, showing changes in the pulsation behavior of the star (Huat et al. 2009).*

episodes due to an oscillation mode with variable amplitude has been found in CoRoT observation of a hot mid-B supergiant (Aerts et al., 2010). Meanwhile, a later-type B supergiant has been observed with similar behavior, but unfortunately the length of this CoRoT time series is insufficient to deduce if any mass-loss episodes are connected with the photometric outburst-type light curve.

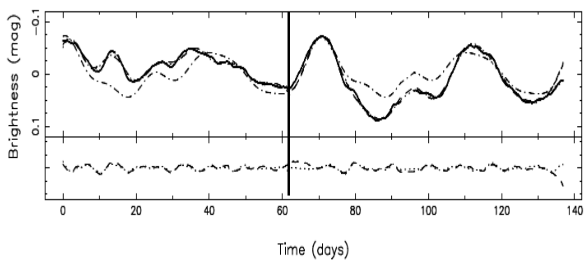


***Figure 33**: HD 50064 a hot (B) supergiant star ~45Mo showing a 37d variation attributed to strange modes and a change in amplitude at day 60 (Aerts et al. 2010).*

5.3.2.3 Mixed core extension

The extension of the mixed core beyond the formal convective limit is a central problem for stellar evolution of all stars with mass above the solar one. This problem is clearly identified as the primordial factor of uncertainty on stellar age determinations and is considered as a top priority in the stellar physics scientific programme. We need observational constraints for a large range of masses, evolution stages, rotation… to progress in our understanding and description of this phenomenon.

CoRoT data have been used already to address this problem in various type of stars, including a few hot stars. The measurement (for the first time, Degroote et al. 2010) of a periodic deviation from the mean period spacing of g-modes is the signature of a "sharp" feature within the deep internal structure of the star, namely the chemical profile left by the receeding convective core during the main sequence phase (Miglio et al. 2008). This study suggests the

existence of a relatively large extension of the mixed core during the evolution of this slow rotating star. The question is also being addressed in two (fast rotating) Be stars already (Neiner et al.2011), suggesting a large extension of the mixed core. This is detected also in a slow rotating β Cephei (Aerts et al. 2011), where classical interpretations favor a small extension of the mixed core.
The extension of the set of stars, including as much as possible hybrid pulsators like HD50230 showing p and g modes is obviously foreseen to progress with this problem.

5.3.2.4 Effects of magnetic fields on stellar pulsations, structure and evolution

Magnetic field is a topic with renewed interest partly because of the recent progresses of spectropolarimetry. It is suspected to play an important role in stellar structure and evolution. In the last decade about 30 magnetic massive (non-Bp) stars have been discovered and this number is progressing rapidly. Two magnetic massive stars are in the CoRoT field: HD 47777 is a magnetic Herbig star, i.e. a progenitor of a future Ap star, and V2052 Oph is one of the very rare magnetic β Cephei star. Their observations would allow to explore the possibility to put additional constraints on seismic modeling since the magnetic field directly impacts the splitting of the pulsation modes. It would also allow to compare magnetic stars versus non-magnetic stars, with the prospect to address the long standing debate between theories on the origin of this magnetic field: fossile versus dynamo field thoeries.

5.3.3 Another CoRot niche : the Young clusters

CoRoT has the possibility to look at star formation regions, in the anticentre direction.
The preceeding topic on hot stars is also a consequence of this interesting direction.
The young open Clusters are also particularly interesting, as members of Open Clusters were born at about the same time, from the same molecular cloud and therefore have similar chemical composition, if the cloud was homogeneous, and members usually have similar ages. Equally important, the distance of a member can be estimated from cluster properties without knowing a parallax. Open clusters allow therefore to test models of stellar structure and evolution in a much more stringent way than is possible with an isolated star.

The long standing problem of the coexistence of pulsational instability and stability for stars apparently analogous, is completely renewed. CoRoT with its exquisite precision, revealed stars showing no oscillation at the ppm level in a domain of parameter where they were suspected to be variable. The occurrence in the instability strip of such stars, in which helium responsible for triggering the oscillations would have sunk and the link between this and rotation is also a long standing question and CoRoT, by lowering the detection level a few hundred times, is starting to shed a new light on it.
After two years CoRoT has observed about 40 of those objects, half of them in long runs. Even if this number could seem quite high, it has to be increased again, as the number of processes at stake is important, as attested by the variety of behaviours of the variability in this domain.
By increasing significantly this sample, in regions of the sky were such objects are frequent the extention of the mission will allow to investigate further which differences in structure between these different types of objects and distentangle the effects of the global parameters (rotation, metallicity,magnetic field,...) responsible for them.

Within its field of view of ~1.3 square degrees, COROT is most suitable for observing some nearby clusters, which allows for complementary measurements (e.g., spectroscopy) without the need of heavily oversubscribed 8m-plus telescopes.
In the foreseeable future COROT will be the only space telescope capable to observe young

clusters. The KEPLER field-of-view on the other hand is located high above the galactic plane where no young clusters can be found. Hence, the KEPLER mission is not suited for such objects.

Several open clusters are visible in the current eyes of COROT: 14+/-3 in the center direction and 41+/-4 in the anticenter direction.
Five of the clusters in the anticenter direction are younger than 10 million years allowing thus to observe stars that were recently born, that still contract towards the main sequence and have not yet started hydrogen burning.

Among those are the two clusters that were already observed by COROT with much success: Dolidze 25, which was observed as additional target during one of the long runs, and NGC 2264, which was driving the selection of a short run (SRa01) ; see § 2.2.5.
This run (though very short) illustrates the breadth of science which can be addressed with open clusters. The "NGC 2264 team" consists of ~70 scientists from the COROT community which study the interaction of young stellar objects with their circumstellar matter, investigate the rotation and activity properties of cluster members, probe the interiors of pre-main sequence stars using asteroseismology and search for planetary and stellar eclipses around young stars. At least 4 papers have already been published.
The insterst for this kind of subject is demonstrated once more by a coordinated campaign, just finishing, implying, CoRoT for more thn 1500 members of the cluster, MOST for the very bright stars, Spitzer in IR and Chandra in X, as well as spectroscopic observations at VLT and several 2m telescopes.

5.3.4 Stellar systems with great physical interest : Eclipsing binairies

Eclipsing binaries (EB) are the most numerous sample among the regular variables observed by CoRoT. The large majority of EBs is found in the exoplanet programme Archives. A handful of interesting EBs are present as well in the seismo sample, because of intentional choice or thanks to serendipitous discovery.

The well known asset of eclipsing binaries, of great interest for stellar physics, is the possibility of deriving absolute stellar parameters (masses, radii) with a purely geometrical method and with accuracy which can be better than 1 %. This, together with the constraints of coevality and of same chemical composition of the components, has been often used to tests the assumptions of stellar evolutive models (e.g. overshooting, treatment of convection), (see for instance Torres et al. 2010, Claret 2009, Schroeder et al. 1997).
The discrepancy between low mass MS binary components radii and temperatures with respect to evolutionary models and its correlation with magnetic activity levels provides, for instance, indications of the role of magnetic fields in modifying the stellar structure (Morales et al. 2008).

To get however accurate stellar parameters high dispersion and phase resolved spectroscopy have to be combined with the CoRoT photometry.
This is needed to achieve an optimal resolution in radial velocity and to allow a reliable determination of the atmospheric parameters and chemical composition.
It is an easy task for the seismo targets but is feasible only for the brightest fraction of the exofield with intermediate class telescopes which are typically those available for such relatively time demanding programs .

Therefore the two samples are naturally suited for different types of studies: while the seismo-EBs allow in depth case studies of individual objects, the exo planet EBs can especially contribute, with its numerous fainter targets, to improve the EB statistics and the knowledge of binary formation processes and evolution.

Though binaries were not among the priorities of the first phases of the mission, CoRoT has proven its ability to contribute significantly to the advance of the knowledge of these objects, as described in § 2.2.4. So th
More attention will be given to them in the future, as promissing issues are foreseen.

5.3.5 Pulsations in binaries

Binarity is an additional opportunity for asteroseismic analysis, because of the important constrain on mass and radius, which reduces the degeneracy of solution of pulsational analysis. It has been shown by previous results, that disentangling of binary signal
from pulsations is feasible, and that the complexity added to the analysis is more than balanced by what can be derived from binarity.
For instance, a test of the scaling relation of solar-type pulsators (and Red Giants) providing stellar masses and radii, could be performed by comparing the values from pulsational analysis with the independent ones from binarity (from eclipsing or interferometric binaries).
The best approach is, for solar type pulsators, to select seismo targets in (non-interacting) EB systems, while in the case of RG components also exo field targets might be suitable (larger amplitude of pulsation). A few possible bright binary targets are already known in the CoRoT eyes but require further characterization (mainly by ground based spectroscopy, as most are from ground based photometric surveys and little is known on their characteristics).
Long monitoring (LR) will be necessary essentially for the asteroseismic analysis, to cover a few orbital periods.

5.3.5.1 Study of tidal interaction in close binaries, particularly in hot stars.

This effect can be detected through the detection and analysis of tidally induced pulsation. CoRoT, at variance with Kepler, observes as well hot stars (such as HD 174884), therefore these should be the preferred type of targets. Long runs will be the best to improve frequency accuracy and separation of intrinsic and tidally induced pulsations.

5.3.5.2 Beaming binaries in CoRoT

The beaming effect was predicted to be measurable in CoRoT targets by Zucker et al. (2007). It was first detected in Kepler targets (Bloemen et al. 2010) and, then in CoRoT-3 (Mazeh & Faigler, 2010).
Beaming effect is best observed in systems with components of very different spectral characteristic (the contribution of the two components are of opposite sign and cancel out for identical stars). The beaming effect is dominant with respect to other proximity effects in late type systems with P~10d or longer , and it can be disentangled from other effects because of its exact periodicity.
Beaming, in suitable systems, provides from photometry alone information similar to that from the radial velocity curve (the system does not even need to be eclipsing). The same orbital parameters normally derivable for single lined spectroscopic binaries can be obtained for a much larger sample of systems, which have good photometry but are too faint for spectroscopic follow up, dramatically increasing the sample for statistical studies.

5.3.5.3 Enrichment of the CoRoT exoplanet EB samples

This will allow the comparison with Kepler EBs (i.e. systems at different galactic latitudes) also for different subsamples selected on the basis of suitable color combinations.

5.4 Galactic astronomy: the Red Giants programme

The detection of solar-like oscillations in G-K red giants has provided the most surprising results with a great and unexpected impact on other astrophysical domains. Although stochastic oscillations in red giant stars were already suspected from ground-based observations, their non-radial character was definitely proven by CoRoT observations (De Ridder et al. 2009), leading to a revision of previous accepted ideas concerning solar-like oscillations in this kind of objects.
CoRoT gathers data on these objects on both fields. In the seismo field, on bright members, the internal structure can be studied in details and the pulsation properties can be calibrated as a function of the global parameters. Then, in the exoplanet field, thousands of objects are observed simultaneously and galactic structure is questionned.

5.4.1 Scaling laws in the seismofield

5.4.1.1 Oscillation driving and transport processes

The comparison of the mass and radius distributions with the predictions from stellar synthesis populations are very encouraging concerning the validity of the scaling relations used in population studies (see § 2.2.7) and the perspectives of ``ensemble'' asteroseismology. Different studies (i.e., Stello et al. 2010, Basu et al. 2011, Miglio et al. 2011a) suggest a precision of respectively 10% and 5% for mass and radius. A check of these relations is however needed.
The CoRoT seismo-field can contribute to the calibration of these scaling laws by observing red giant stars for which independent estimates of mass and/or radius are (or may be) available. For instance red giants in binary systems, bright stars with good parallax and possible interferometric radius measurements, or red giants in clusters.
Moreover, observing bright Red Giants will allow a contemporaneous ground-based spectroscopic follow-up aimed at answering the debated question concerning the relationship between luminosity and radial-velocity amplitudes of solar like oscillations. Mesauring abundances of individual chemical elements, parallax, rotation velocity, etc…. will allow a complete study to test theoretical models with standard and non-standard physics.

5.4.1.2 Seismic sounding of HeII ionization zone

As described in § 2.2.2 , the frequency differences of the p-modes can be used to mesure the depth of the He II ionization zone also in red giants. The oscillation of the second difference as a function of frequency is directly related to the acoustic depth of this region with strong gradients (see Figure 5, Right).

5.4.1.3 Stellar populations and Galactic history in the exoplanet field

There are several aspects of red giant stars solar-like oscillations that makes of the high precision photometric light curves in CoRoT-exofield a gold mine for the study of stellar populations, formation and chemical evolution of the Galaxy. First of all, it has been shown that basic features of red giant oscillation spectra, such as the frequency at maximum power (ν_{max}) and the frequency separation between consecutive radial modes ($\Delta\nu$), when complemented by information on the effective temperature, can provide (using scaling relations) stellar masses and radii for several hundreds of red giants, as was already done for the first two CoRoT long runs (Hekker et al. 2009, Miglio et al. 2009, Mosser et al. 2010). Such a large number of model-independent stellar parameters for single stars has no precedent. An obvious but surprising consequence is the possibility of deriving distances once reddening corrections are applied, and therefore, locate these red giants in a 3D image of the Galaxy (Figs. 34 and 235). Note that given the high intrinsic luminosity of red giants compared to dwarfs, these data allow us to see quite far in the Galaxy, up to about 10kpc (Fig. 3, LRc01), whereas Hipparcos precise parallaxes are available only up to 100pc.

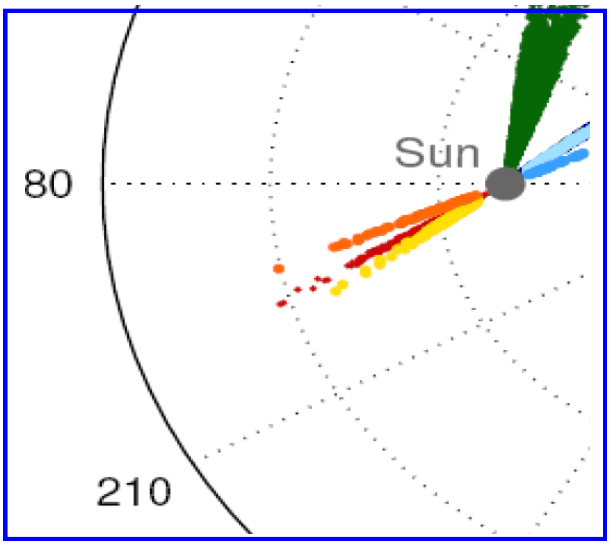


Figure 34. *Distribution on the galactic plane of the red giants with asteroseismic characterization from the light curves obtained in the CoRoT exofield for six long runs and in the Kepler field. LRa01 (red), LRa02 (yellow), LRa03 (orange), LRc01 (dark-blue), LRc02 (middle-blue), LRc03 (light-blue), Kepler (green). (From Miglio et al. 2011b)*

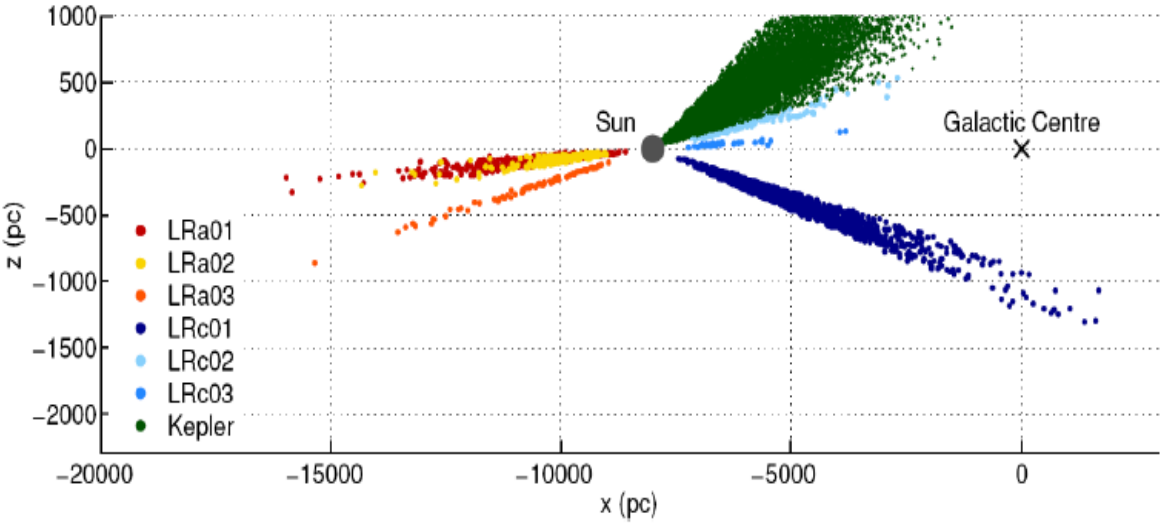


Figure 35. *Vertical coordinate with respect to the galactic plane of red giants in Fig. 1 (From Miglio et al. 2011b)*

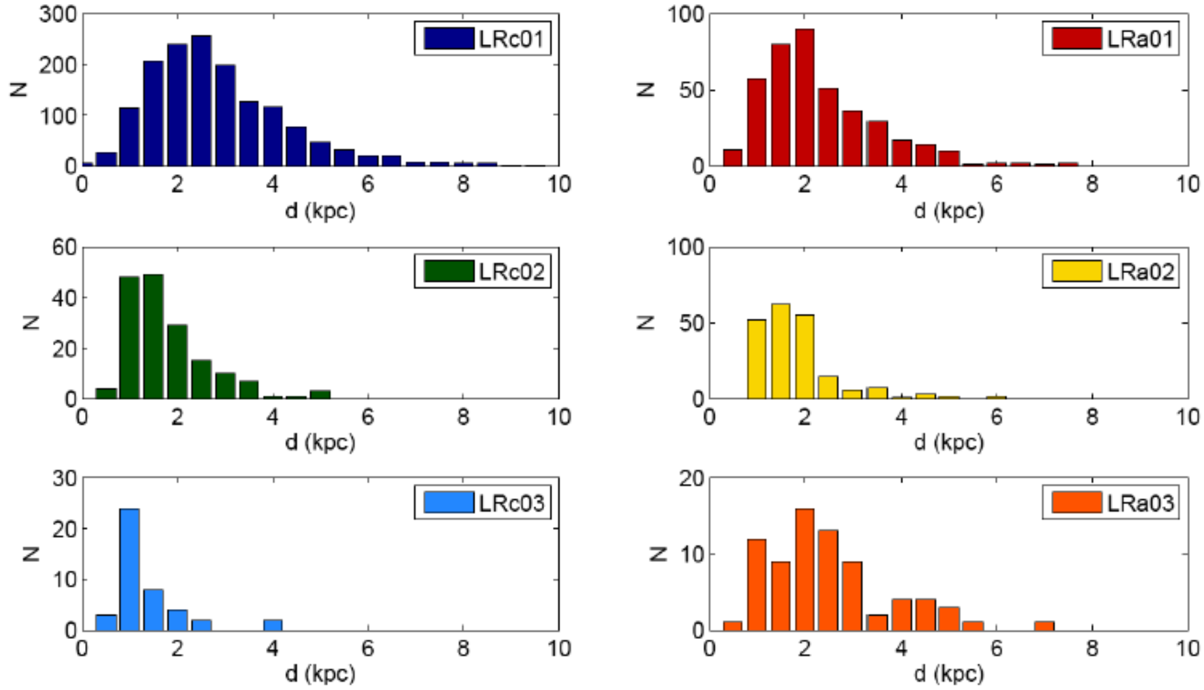


Figure 36. *Histograms of number of red giants as a function of the distance to the Sun for the six CoRoT long runs in Figures 34 and 35*.

Moreover, even if not completely free from stellar modeling, the mass of a red giant star, given its evolution rate, is a good proxy of its age. In addition, oscillation spectra also allow one to distinguish between H-shell burning and central He-burning phases (Bedding et al. 2011, Mosser et al. 2011). So, once the chemical composition is known, asteroseismology can provide stellar ages within a 15% uncertainty, while classical methods such as isochrones may be uncertain by a factor two. It is worth mentioning here that while stellar modeling uncertainties such as the size of the extra-mixing region around the convective core can affect by 20% the age of A-F dwarfs (Lebreton et al. 1995), in the red giant phase this uncertainty is reduced to 5%. The reason is that a larger mixed region in main sequence (MS) models also implies a quicker sub-giant phase, partially balancing in this way the longer MS lifetime.
The chemical enrichment of the Universe is one of the main thrusts of modern astrophysics and the Milky Way can be seen as the Rosetta stone of this evolution. European research is currently at the forefront in the field of Galactic Archeology (ESO/ESA report on *Galactic Populations, Chemistry and Dynamics*, 2008 and Roadmap/ASTRONET 2008), i.e. the study of the motion and composition of stars of different ages, which encode the origin and subsequent evolution of the Milky Way (MW). The European Gaia satellite will create a 3-D map of stars throughout our Galaxy, hence providing an observational test bench to theoretical predictions on the origin, structure and evolutionary history of our Galaxy. Additional crucial information both, on velocities and chemical abundances, will come even earlier (already in 2011-2012) from several ongoing/planed spectroscopic surveys such as SEGUE-2, APOGEE and the Gaia-ESO surveys. In addition, it is in the MW halo that the oldest and most metal-poor stars in the Universe are observable, born at times or equivalent redshifts still out of reach for the deepest surveys of primordial galaxies. These stars retain the memory of the unique nucleosynthesis in the *First Stars*, as revealed by their striking abundance patterns observed at very low metallicities (Chiappini et al. 2006).

A serious obstacle to discriminate between different scenarios of formation and evolution of the Galaxy components (halo, thin and thick disk and bulge) is the difficulty of measuring distances and ages for individual field stars. That is the reason why leaders in these research fields have shown a great interest in adding asteroseismology characterized red giants to their ongoing and future large spectroscopic surveys aimed at constraining the Galaxy assembly history (i.e. Freeman 2011; Chiappini 2011 in "Red Giants as Probes of the Structure and Evolution of the Milky Way").

Many are the proposed scenarios for the formation of the thick disk of the Milky Way, going from the merger with smaller galaxies to fast gas accretion in the early Universe. Crucial information on which was the dominant mechanism for the formation of the thick disk and other Galactic components is encoded in the chemical properties and age dispersions of their stars. Without an age information, the adopted approach has been to compare the chemical properties of bulge, thick and thin disk stars, and use “chemical clocks”. In this way one can address the question of which, among the competing processes of dissipation, satellite accretion and radial migration, play the dominant role in the formation of the different Galactic components. Star formation and accretion histories of the distinct Galactic components can in principle be inferred by a comparison of predicted and observed abundance patterns in each of these components. However, for this approach to be powerful, detailed chemical information is needed. This is however, currently available only at the solar vicinity. CoRoT could revolutionize the study of the MW formation by getting distances and ages to stars spanning a larger volume of our galaxy.

In this respect, CoRoT plays a crucial role and its observations will be complementary to those from the satellite Kepler. While Kepler observes a fixed field above the Galactic plane (b=7-20°) in the region of Cygnus-Lyra, CoRoT covers different regions of the Milky Way, alternating each 5 months observation fields close to the Galactic plane in the direction of the Galactic center and of the anti-center. Hence Kepler will contribute to the study of the galactic halo, and partly to the disk, while ***only CoRoT will be able to provide asteroseismic data of red giants of the Bulge and to study different stellar populations inside the galactic disk.***
Crucial ingredients to study evolutionary processes in the **disk** are the age-metallicity and age-velocity dispersion relations, and that in different directions and at different galactic radii and heights from the plane. The combination of chemical composition from spectroscopic surveys with distance and ages from CoRoT seismic data will allow for the first time the study of chemical gradients and their time evolution in different directions, close to the galactic plane. It will provide information on the metallicity distribution of thick and thin disk stars at different positions in the galaxy, and their time evolution. In addition, the evolution of the stellar velocity dispersions in the disk can be studied. All of these crucial constraints will allow us to quantify for the first time the importance of the stellar radial migration in the formation of the Milky Way, otherwise difficult to be quantified from first principles. This will represent an invaluable information not only for the formation of our Galaxy, but also for the formation of spiral galaxies in general.

Furthermore, asteroseismic ages of red giants in the **bulge** and in the adjacent **disk** will allow to test scenarios of bulge formation. Asteroseismology could constrain the chemical evolution timescales by providing independent age estimates for the most metal-poor bulge stars ([Fe/H]~-1), with CoRoT, and for the very metal-poor halo stars ([Fe/H] <= -3), with Kepler. If their ages are found to be similar (as recently suggested by Chiappini et al. 2011), that will mean that the inner parts of the Galaxy were enriched faster than its outskirts. Furthermore, this would confirm that oldest stars are not necessarily the most metal-poor stars in the

Galaxy, and that bulge stars with one-tenth the solar metallicity can also provide key information on the First Stars. Currently, only CoRot has the potential to provide an (independent) age estimate to the most metal-poor bulge giants (if in the figure it was also possible to have a bulge field).

Data from first two CoRoT long runs have been already used to study the population of red giants observed in two opposite directions on the galactic disk (Miglio et al. 2009, Hekker et al. 2009, Mosser et al., 2010, 2011). These preliminary works have shown the enormous potential of red giant seismology. They have provided mass and radii distribution in two different directions of the galactic disk. From the comparison with theoretical predictions from stellar synthesis population models it was found the sample of CoRoT red giants to be dominated by red clump stars. This comparison also suggested that a recent star formation burst is not supported by the observed distributions, though a detailed analysis of observational biases at nmax >40 μHz has to be carried out to make quantitative inferences on the recent star formation rate of the local disk. The capability of seismic data to derive individual stellar ages has also been explored (Figs. 4 and 5, Miglio 2011), and these first attempts indicate a clear vertical gradient in the ages of disk red giant stars.
Even larger impact results are to be expected once the above data will be complemented with spectroscopic information (this will happen soon thanks to the already approved large spectroscopic GAIA-ESO survey, on VLT, which agreed to observe some of the CoRoT targets, and to a proposal already sent to AAO-Australia). Other proposals will be submitted soon to obtain spectroscopic information also for the other CoRoT runs.

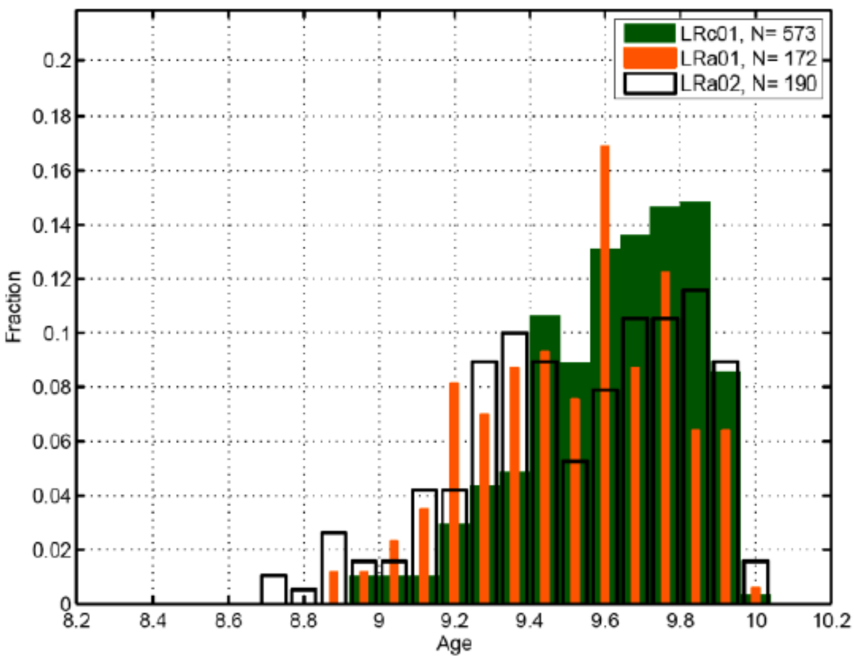


Figure 37. *Distribution of ages derived for the red giants in the three first long runs. Age estimated done by using asteroseismic data together with the tool PARAM from Trilegal stellar models data base.*

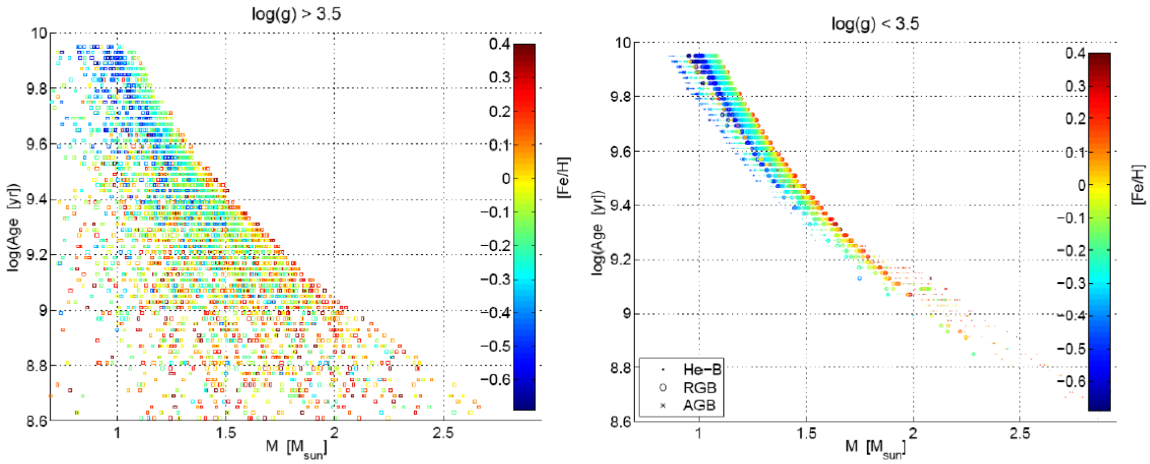


***Figure 38**. Age-mass-metallicity relation for main-sequence stars (*upper panel*) and red giants (*lower panel*) in a synthetic population representative of thin-disk stars observed by CoRoT in the LRc01 field. The evolutionary state of giants is marked with a different symbol: dots (stars in the core-Helium-burning phase), crosses (Asymptotic-Giant- Branch stars), and open circles (stars on theRed Giant Branch). The fraction of AGB stars in the population of giants shown here is ~ 4%. (From Miglio 2011, in "Red Giants as Probes of the Structure and Evolution of the Milky Way").*

How to increase the CoRoT impact on the field of Galactic Archaeology?
While the first two long runs, in the center and anti-center, contained a number of red giants large enough for population studies, i.e. with a significant sample at different distances (both radial and vertical), the selection criteria used for the following runs have led to a dramatic decrease of red giant targets (up to a factor 10). This reduction in the number of red giant targets leads to not only a very poor statistics in the stars sampling the first 2 kpc from us, but essentially to zero stars above that distance (see Fig. 3, especially in the case of LRc03, LRa02 and LRa03). This data can still be used (although the statistic will be very low) to try to infer the age-metallicity and age-velocity relations close to the solar vicinity, but does not give any information outside this small region.
Moreover, fields such as LRc01 and LRa01 have a number of targets which is the minimum requested by stellar population studies. In fact, although LRc01 has a larger number of targets than LRa01, this field includes also a non-negligible number of stars above the galactic plane, hence mixing populations of the thin and thick disk along the radius. This is the reason why despite of the existence of an abundance gradient in the thin disk, the metallicity distributions of the "center" and "anti-center" LR first fields of CoRoT may be very similar. To follow the metallicity and age distribution of thin & thick disk stars along the galactocentric distance (a crucial constraint for galaxy formation models!) one needs at least around 300-400 points, per each 2kpc radial bin, at different Z heights from the plane. Assuming just four 2kpc-bins in radial distances (e.g. 0-2, 2-4, 4-6, and 6-8 kpc) and 3 bins in Z (0-0.3, 0.3-6, 0.6-1.0 kpc). It is easy to see that the number of targets required in order to effectively measure the properties of the thick and thin disk is above 5000 targets (or more to guarantee that the furthermost bins have also enough statistics – which is currently now the case even for LRc01 at distances > 4kpc). Such a number of targets, even at one single pointing, would be of a unique value to the field of galactic archaeology. ESO-ESA Working groups Report #4 on Galactic populations, Chemistry and Dynamics (Turon et al. 2008) was requested by ESO and ESA to consider projects that would complement the Gaia mission. In page 148 the authors did the following recommendation to ESA :
"*Asteroseismology: this is a major tool to complement Gaia with respect to age determinations. ESA should encourage the community to prepare for a next-generation mission, which would sample the different populations of the Galaxy much more widely than*

CNES-ESA's Corot (50 targets, mainly main-sequence stars with a metallicity close to solar) and NASA's Kepler (mainly main-sequence stars, some giants and pulsating stars)".

Thus, it is clear that CoRoT can play a crucial role in the study of stellar populations in the Milky Way, but for that a large number of red-giant targets is an imperative requirement. Given the recent decision of ESA concerning the mission PLATO, CoRoT is now the only mission that could satisfy in the next future these European Community need. This will be possible if during the CoRoT extension a large number of targets is observed in a few selected directions of the disk (and hopefully also to the bulge), allowing for asteroseismic characterization of a large number red giants in the exo-field.

5.5 Evolution of the Mission Archive

The extension in time of CoRoT will allow important changes in the distribution of data, in particular by opening their access to wider and new communities. This is based on the scientific interpretation of previous data sets that brought new views about the objects observed by CoRoT.
Such an example was already provided with the "Variability Classification": CoRoT, thanks to its level of variability detection, showed that many stars expected to be non-variable shows in reality small luminosity variations. The origin of variation can be diverse (low amplitude pulsation, magnetic activity, etc...) and lead to a classification of the different kinds of variability. This classification was included in the CoRoT archive and interface to allow users to select targets showing the variability they aim at, with sometimes a number of targets much larger than expected, and opening unexpected possibilities of analysis (a large number of pulsating B stars for example, see De Groote et al.).
The same kind of developement is expected in a close future since the origin of most of CoRoT signal are now understood. For example, the unexpected observations of pulsating red giants opened a new field for stellar seismology that is about to produce large catalogs of red giants (with possibly their seismic characteristics from which their mass and radius can easily be derived). Such a catalog will be included in the CoRoT archive/interface during the extension period, allowing studies on large samples of red giants, reaching farther than the community interested in evolved stars, such as the community studying the long term evolution of the galaxy. Another example of developement (however less mature) is a classification of the magnetic activity level of stars. This has important consequences for the detecttion of exo-planet since magnetic activity is a source of noise for exo-planet search. But it is also a very interesting signal for the community involved in stellar magnetism, more familiar with other kind of data (spectro-polarimetric data for example) but potentially interested by CoRoT data.

In addition to these developements, the cross-use of the CoRoT data archive at IAS with the Exodat base at LAM will be deepened. This cross-use is already effective, taking the opportunity of the improvements of the SiTools software, but this approach will be actively pursued. The possibilities of cross-use will be exploited in order to allow the user to get an even richer data sets about his favourite targets.

We believe that allowing new scientists to use CoRoT data requires an easy and efficient access and selection of the data. This is achieved by combining a scientific approach of the archive contents and selection criteria (based on messages from the scientific community) with a technical know-how acquired at IDOC-IAS from former CoRoT and other space mission data archiving.

5.6 International meetings and workshops

As now the field covered by CoRoT and Kepler has become very wide, and the scientific community working on it too, we propose in this new period to give prioirties to thematic meetings and workshop, centered on specific topics.
A few (2 or 3) workshops each year is probably a reasonnable pace, hosted in the different french labortories but also in the different participating countries.

6 Outreach and visibility projects

The outreach activities will continue as well. Let's cite just a few of them.

6.1 Seismic indexes and global parameters: beyond the stellar community.

Seismic indexes are values characterizing specific features of the stellar oscillation spectrum which can be related with global parameters of the stars and used to characterize them. The so-called mean 'large separation' ($\Delta\nu$) for example, is known to be closely linked to the stellar mean density, while the 'frequency at maximum' (νmax), has been shown to be related to stellar surface gravity and effective temperature. Their existence in solar-type pulsators and potential interest has been mentioned long ago already (Christensen-Dalsgaard 1988), but their use has so far remained limited due to the lack of data. With CoRoT (and Kepler), more and more seismic indices are being found characterizing various aspects of a growing number of stars. More than 10000 stars have already been analyzed and attributed such seismic indices, mostly red giants, sub-giants and main sequence solar-type pulsators so far, but this may evolve further, as this type of pulsation is already claimed in several massive stars with mass from 2 to 8Msol and regularities are also claimed in oscillation spectra of other type of pulsators.
With the knowledge of those seismic indexes together with effective temperatures, it is now possible to provide estimates of surface gravity but also model-independent masses and radii for large samples of stars in different regions of our Galaxy, allowing to address problems of Galactic structure and evolution.
This clearly suggests that the potential interest of these indexes and relations extends beyond the stellar and solar community and that they should be made available in a useable form to a broad scientific community. We plan to develop a dedicated and comprehensive database in which the scientific community can access the desired data, without prior knowledge on stellar seismology. This will definitively represent a strong scientific return from CoRoT and Kepler. We have proposed this project in the framework of a FP7 Space-Inn proposal, in coordination with groups involved in CoRoT and Kepler seismic programs.

6.2 The Planet Hunter initiative

In a near future, the CoRoT light curves will be inserted in the "Planet Hunter" website developed in the US for the Kepler data (see http://www.planethunters.org/). This is a very nice example of participative science, and crowned by success since more than 50000 persons have already been involved. Two shallow transit candidates were found in Kepler lightcurves, that were not earlier found by the pipeline.

The cultural influence of CoRoT science in the public will be greatly enhanced by this initiative, foreseen for 2012.

7 Annex: List of references

List representative of papers, review and proceedings based on CoRoT data or stimulated by them, since the end of 2007, inside the CoRoT community but also beyond. Total~400 references.

Source ADS, Period: 01/01/2008-17/01/2012),
criteria: 'CoRoT' in the Title AND ('star' OR 'planet' in the abstract)
+ a few specific references added.

Aerts, C., Briquet, M., Degroote, P., Thoul, A., van Hoolst, T., 2011, Seismic modelling of the β Cephei star HD 180642 (V1449 Aquilae), Astronomy and Astrophysics, 534, A98

Aerts, C., and 17 colleagues, 2010, Periodic mass-loss episodes due to an oscillation mode with variable amplitude in the hot supergiant HD 50064, Astronomy and Astrophysics, 513, L11

Aerts, C., and 11 colleagues, 2009, Discovery of New Hot Pulsators in the CoRoT Exoplanet Database and Their Potential for Asteroseismology, Solar-Stellar Dynamos as Revealed by Helio- and Asteroseismology: GONG 2008/SOHO 21, 416, 401

Affer, L., Micela, G., Favata, R., Flaccomio, E., 2009, Analysis of rotation and stochastic variability of CoRoT dwarf stars, American Institute of Physics Conference Series, 1094, 341

Aigrain, S., Barge, P., Deleuil, M., Fressin, F., Moutou, C., Queloz, D., Auvergne, M., Baglin, A., 2008, The CoRoT Exoplanet Programme: Exploring the Gas-Giant/Terrestrial Planet Transition, 14th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun, 384, 270

Aigrain, S., and 34 colleagues, 2008, Transiting exoplanets from the CoRoT space mission. IV. CoRoT-Exo-4b: a transiting planet in a 9.2 day synchronous orbit, Astronomy and Astrophysics, 488, L43

Aigrain, S., and 32 colleagues, 2009, Noise properties of the CoRoT data. A planet-finding perspective, Astronomy and Astrophysics, 506, 425

Alecian, G., Gebran, M., Auvergne, M., Richard, O., Samadi, R., Weiss, W.~W., Baglin, A., 2009, Looking for pulsations in HgMn stars through CoRoT lightcurves, Astronomy and Astrophysics, 506, 69

Alecian, G., 2010, Will COROT satellite tell us whether HgMn stars pulsate or not?, Evolution of Cosmic Objects through their Physical Activity, 55

Alencar, S.~H.~P., and 8 colleagues, 2010, Accretion dynamics and disk evolution in NGC 2264: a study based on CoRoT photometric observations, Astronomy and Astrophysics, 519, A88

Alibert, Y., Pont, F., Baraffe, I., Reylé, C., Mordasini, C., Queloz, D., Benz, W., Udry, S., 2009, Planet formation by nucleated-instability: comparison with the two first CoRoT runs, Astronomy and Astrophysics, 506, 391

Almenara, J.~M., and 49 colleagues, 2009, Rate and nature of false positives in the CoRoT exoplanet search, Astronomy and Astrophysics, 506, 337

Almenara, J.~M., Deeg, H.~J., Lazaro, C., Arévalo, M.~J., 2009, An algorithm for the detection of transits of planets around eclipsing binaries in CoRoT, IAU Symposium, 253, 382

Alonso, R., and 35 colleagues, 2009, The secondary eclipse of CoRoT-1b, Astronomy and Astrophysics, 506, 353

Alonso, R., and 42 colleagues, 2008, Transiting exoplanets from the CoRoT space mission. II. CoRoT-Exo-2b: a transiting planet around an active G star, Astronomy and Astrophysics, 482, L21

Alonso, R., Deeg, H.~J., Kabath, P., Rabus, M., 2010, Ground-based Near-infrared Observations of the Secondary Eclipse of CoRoT-2b, The Astronomical Journal, 139, 1481

Alonso, R., Guillot, T., Mazeh, T., Aigrain, S., Alapini, A., Barge, P., Hatzes, A., Pont, F., 2010, The secondary eclipse of the transiting exoplanet CoRoT-2b (Corrigendum), Astronomy and Astrophysics, 512, 1

Alonso, R., Guillot, T., Mazeh, T., Aigrain, S., Alapini, A., Barge, P., Hatzes, A., Pont, F., 2009, The secondary eclipse of the transiting exoplanet CoRoT-2b, Astronomy and Astrophysics, 501, L23

Alonso, R., Aigrain, S., Pont, F., Mazeh, T., The CoRoT Exoplanet Science Team, 2009, Searching for the secondary eclipse of CoRoT-Exo-2b and its transit timing variations, IAU Symposium, 253, 91

Alvarez, M., and 11 colleagues, 2009, On the variability of HD 170699 - a possible COROT Target, Revista Mexicana de Astronomia y Astrofisica Conference Series, 35, 148

Appourchaux, T., and 21 colleagues, 2008, CoRoT sounds the stars: p-mode parameters of Sun-like oscillations on HD 49933, Astronomy and Astrophysics, 488, 705

Appourchaux, T., Samadi, R., Dupret, M.-A., 2009, On posterior probability and significance level: application to the power spectrum of HD 49 933 observed by CoRoT, Astronomy and Astrophysics, 506, 1

Auvergne, M., and 109 colleagues, 2009, The CoRoT satellite in flight: description and performance, Astronomy and Astrophysics, 506, 411

Baglin, A., 2010, Highlights of the CoRoT Mission: Extrasolar Planets, Stellar Structure and Activity, American Astronomical Society Meeting Abstracts \#216, 216, \#107.01

Baglin, A., Auvergne, M., Barge, P., Deleuil, M., Michel, E., The CoRoT Exoplanet Science Team, 2009, CoRoT: Description of the Mission and Early Results, IAU Symposium, 253, 71

Baglin, A., Miglio, A., Michel, E., Auvergne, M., 2009, Seismic Landscape as Seen From CoRoT, American Institute of Physics Conference Series, 1170,310

Ballot, J., and 29 colleagues, 2011, Accurate p-mode measurements of the G0V metal-rich CoRoT target HD 52265, Astronomy and Astrophysics, 530,A97

Barban, C., and 9 colleagues, 2010, Frequency spacings of p-modes in red giants observed by CoRoT, Astronomische Nachrichten, 331, 1016

Barban, C., and 20 colleagues, 2009, Solar-like oscillations in HD 181420: data analysis of 156 days of CoRoT data, Astronomy and Astrophysics, 506, 51

Barge, P., and 37 colleagues, 2008, Transiting exoplanets from the CoRoT space mission. I. CoRoT-Exo-1b: a low-density short-period planet around a G0V star, Astronomy andAstrophysics, 482, L17

Barge, P., and 36 colleagues, 2008, CoRoT space mission. I, VizieR Online Data Catalog, 348, 29017

Barge, P., Baglin, A., Auvergne, M., the CoRoT team, 2008, CoRoT: pioneer space mission for exoplanet transit search, IAU Symposium, 249, 3

Barge, P., the CoRoT Exoplanet Science Team, 2009, The first planets discovered from space with the CoRoT mission, IAU Symposium, 253, 83

Barnes, R., Raymond, S.~N., Greenberg, R., Jackson, B., Kaib, N.~A., 2010, CoRoT-7 b: Super-Earth or Super-Io?, Bulletin of the American Astronomical Society, 42, 339.04

Barnes, R., Raymond, S.~N., Greenberg, R., Jackson, B., Kaib, N.~A., 2010,CoRoT-7b: Super-Earth or Super-Io?, The Astrophysical Journal, 709, L95

Baudin, F., and 14 colleagues, 2011, Amplitudes and lifetimes of solar-like oscillations observed by CoRoT. Red-giant versus main-sequence stars, Astronomy and Astrophysics, 535, 1

Baudin, F., and 14 colleagues, 2011, Amplitudes and lifetimes of solar-like oscillations observed by CoRoT. Red-giant versus main-sequence stars, Astronomy and Astrophysics, 529, A84

Baudin, F., and 17 colleagues, 2011, Modelling a high-mass red giant observed by CoRoT, ArXiv e-prints, arXiv:1111.6543

Bean, J.~L., 2009, An analysis of the transit times of CoRoT-1b, Astronomy and Astrophysics, 506, 369

Belkacem, Kévin; Samadi, Réza; Goupil, Marie-Jo; Lefèvre, Laure; Baudin, Fréderic; et al. 2009, Solar-Like Oscillations in a Massive Star, Science 324,1540

Benomar, O., and 20 colleagues, 2009, A fresh look at the seismic spectrum of HD49933: analysis of 180 days of CoRoT photometry, Astronomy and Astrophysics, 507, L13

Benomar, O., Baudin, F., Marques, J.~P., Goupil, M.~J., Lebreton, Y., Deheuvels, S., 2010, Spectrum analysis and seismic interpretation of a solar-like pulsator (HD 49933) observed by CoRoT, Astronomische Nachrichten, 331, 956

Bigot, L., and 23 colleagues, 2011, The diameter of the CoRoT target HD 49933. Combining the 3D limb darkening, asteroseismology, and interferometry, Astronomy and Astrophysics, 534, L3

Blomme, R., and 28 colleagues, 2011, CoRoT observations of O stars: diverse origins of variability, ArXiv e-prints, arXiv:1109.1999

Blomme, R., and 17 colleagues, 2011, Variability in the CoRoT photometry of three hot O-type stars. HD 46223, HD 46150, and HD 46966, Astronomy and Astrophysics, 533, A4

Blomme, R., and 17 colleagues, 2011, CoRoT photometry of three O-type stars ,VizieR Online Data Catalog, 353, 39004

Bocsa, G., 2008, The study of the dynamics of HD 180642 area, from the CoRoT Programme, American Institute of Physics Conference Series, 1043, 435

Bonomo, A.~S., Chabaud, P.-Y., Deleuil, M., Moutou, C., Bord{\'e}, P., 2011, Detection of small-size planetary candidates with CoRoT data, Detection and Dynamics of Transiting Exoplanets, St.~Michel l'Observatoire,
France, Edited by F.~Bouchy; R.~D{\'{\i}}az; C.~Moutou; EPJ Web of Conferences, Volume 11, 1005

Bonomo, A.~S., and 49 colleagues, 2010, CoRoT-10b: a giant planet in a 13.24 day eccentric orbit, ArXiv e-prints, arXiv:1006.2949

Bonomo, A.~S., and 49 colleagues, 2010, Transiting exoplanets from the CoRoT space mission. X. CoRoT-10b: a giant planet in a 13.24 day eccentric orbit, Astronomy and Astrophysics, 520, A65

Bonomo, A.~S., Chabaud, P.-Y., Deleuil, M., Moutou, C., Bordé, P., 2011, Detection of small-size planetary candidates with CoRoT data, IAU Symposium, 276, 523

Bord{\'e}, P., and 49 colleagues, 2010, Transiting exoplanets from the CoRoT space mission. XI. CoRoT-8b: a hot and dense sub-Saturn around a K1 dwarf, Astronomy and Astrophysics, 520, A66

Borde, P., and 49 colleagues, 2010, CoRoT-8b light and RV curves (Borde+, 2010), VizieR Online Data Catalog, 352, 9066

Borsa, F., Poretti, E., 2011, REM photometry of the exoplanetary system CoRoT-2b, Memorie della Societa Astronomica Italiana Supplementi, 16, 80

Bouchy, F., and 48 colleagues, 2011, Transiting exoplanets from the CoRoT space mission. XV. CoRoT-15b: a brown-dwarf transiting companion, Astronomy and Astrophysics, 525, A68

Bouchy, F., Moutou, C., Queloz, D. 2009 in IAU Symp. 253, ed. F. Pont et.al.

Bouchy, F., and 36 colleagues, 2008, Transiting exoplanets from the CoRoT space mission. III. The spectroscopic transit of CoRoT-Exo-2b with SOPHIE and HARPS, Astronomy and Astrophysics, 482, L25

Briquet, M., and 15 colleagues, 2011, An asteroseismic study of the O9V star HD 46202 from CoRoT space-based photometry, Astronomy and Astrophysics, 527, A112

Briquet, M., and 20 colleagues, 2009, Ground-based observations of the beta Cephei CoRoT main target HD 180642, Communications in Asteroseismology, 158, 292

Briquet, M., and 22 colleagues, 2009, Ground-based observations of the β Cephei CoRoT main target HD 180 642: abundance analysis and mode identification, Astronomy and Astrophysics, 506, 269

Briquet, M., and 22 colleagues, 2009, An asteroseismic study of the β Cephei CoRoT main target HD 180642: results from the ground-based campaign, American Institute of Physics Conference Series, 1170, 394

Bruntt, H., 2009, Accurate fundamental parameters of CoRoT asteroseismic targets. The solar-like stars HD 49933, HD 175726, HD 181420, and HD 181906, Astronomy and Astrophysics, 506, 235

Bruntt, H., and 8 colleagues, 2010, Improved stellar parameters of CoRoT-7. A star hosting two super Earths, Astronomy and Astrophysics, 519, A51

Bruntt, H., and 8 colleagues, 2010, Improved stellar parameters of CoRoT-7, ArXiv e-prints, arXiv:1005.3208

Cabrera, J., 2011, Factors influencing the yield of detections in CoRoT, Detection and Dynamics of Transiting Exoplanets, St.~Michel l'Observatoire, France, Edited by F.~Bouchy; R.~Diaz; C.~Moutou; EPJ Web of Conferences, Volume 11, 1007

Cabrera, J., and 47 colleagues, 2010, Transiting exoplanets from the CoRoT space mission . XIII. CoRoT-13b: a dense hot Jupiter in transit around a star with solar metallicity and super-solar lithium content, Astronomy and Astrophysics, 522, A110

Cabrera, J., and 54 colleagues, 2009, Planetary transit candidates in CoRoT-LRc01 field, Astronomy and Astrophysics, 506, 501

Cabrera, J., Rauer, H., Erikson, A., Csizmadia, S., 2011, The Transit Detection Algorithm DST and its application to CoRoT and Kepler data, EPSC-DPS Joint Meeting 2011, held 2-7 October 2011 in Nantes, France.~<A href="http://meetings.copernicus.org/epsc-dps2011", 1033

Campante, T.~L., Grigahc{\`e}ne, A., Su{\'a}rez, J.~C., Monteiro, M.~J.~P.~F.~G., 2010, Might intermediate-order g modes observed in the CoRoT hybrid gamma Doradus/delta Scuti star HD 49434 be stochastically excited?, ArXiv e-prints, arXiv:1003.4427

Carone, L., and 72 colleagues, 2011, Planetary transit candidates in the CoRoT LRa01 field, ArXiv e-prints, arXiv:1110.2384

Carone, L., P{\"a}tzold, M., 2009, Tidal forces in CoRoT planetary systems, European Planetary Science Congress 2009, 506

Carone, L., P{\"a}tzold, M., Grziwa, S., 2010, The search for multitransits in CoRoT lightcurves, 38th COSPAR Scientific Assembly, 38, 2512

Carpano, S., and 37 colleagues, 2009, Planetary transit candidates in Corot-IRa01 field, Astronomy and Astrophysics, 506, 491

Carpano, S., and 37 colleagues, 2010, Planetary transit candidates in Corot-IRa01 field., VizieR Online Data Catalog, 350, 60491

Carpano, S., 2010, Results from the CoRoT light curve analysis, 38th COSPAR Scientific Assembly, 38, 2510

Carrier, F., and 15 colleagues, 2010, Non-radial oscillations in the red giant HR 7349 measured by CoRoT, Astronomy and Astrophysics, 509, A73

Carrier, F., and 21 colleagues, 2010, The red-giant CoRoT target HR 7349, Astrophysics and Space Science, 328, 83

Catala, C., Goupil, M.~J., Michel, E., Baglin, A., de Medeiros, J.~R., Gondoin, P., 2009, Stellar Rotation: New Insight from CoRoT, American Institute of Physics Conference Series, 1094, 87

Cavarroc, C., and 49 colleagues, 2011, Transiting exoplanets from the CoRoT space mission Resolving the nature of transit candidates for the LRa03 and SRa03 fields, Astrophysics and Space Science, 687

Cavarroc, C., Samuel, B., L{\'e}ger, A., 2010, Characterizing Corot-7b planet atmosphere with the instrument MIRI of the JWST, In the Spirit of Lyot 2010, Chabaud, P.-Y., Agneray, F., Meunier, J.-C., Guterman, P., Cautain, R., Surace, C., Deleui, M., 2011, Overview of CeSAM Tools and Services for the CoRoT Mission, Astronomical Data Analysis Software and Systems XX, 442, 339

Chadid, M., and 11 colleagues, 2009, First RR Lyrae Light Curve from CoRoT Big Challenge and Constraint to the Theoretical Models, American Institute of Physics Conference Series, 1170, 235

Chadid, M., and 16 colleagues, 2010, First CoRoT light curves of RR Lyrae stars. Complex multiplet structure and non-radial pulsation detections in V1127 Aquilae, Astronomy and Astrophysics, 510, A39

Chadid, M., and 16 colleagues, 2009, CoRoT light curves of V1127 Aql (Chadid+, 2010), VizieR Online Data Catalog, 351, 9039

Chadid, M., Perini, C., Bono, G., Auvergne, M., Baglin, A., Weiss, W.~W., Deboscher, J., 2011, CoRoT light curves of Blazhko RR Lyrae stars. Evidence of a strong correlation between phase and amplitude modulations of CoRoT ID 0105288363, Astronomy and Astrophysics, 527, A146

Chadid, M., Perini, C., Bono, G., Auvergne, M., Baglin, A., Weiss, W.~W., Deboscher, J., 2011, CoRoT 0105288363 light curves (Chadid+, 2011), VizieR Online Data Catalog, 352, 79146

Chapellier, E., Bouabid, M.-P., Le Contel, D., Rodriguez, E., Mathias, P., 2009, A Search of the Intrinsic Frequencies in the γ Dor COROT Target HD 49434, American Institute of Physics Conference Series, 1170, 472

Chapellier, E., and 20 colleagues, 2011, The γ Doradus CoRoT target HD 49434. II. Frequency analysis of the CoRoT data, Astronomy and Astrophysics, 525, A23

Charpinet, S., and 12 colleagues, 2010, CoRoT opens a new era in hot B subdwarf asteroseismology. Detection of multiple g-mode oscillations in KPD 0629-0016, Astronomy and Astrophysics, 516, L6

Chavero, C., de La Reza, R., Domingos, R.~C., Drake, N.~A., Pereira, C.~B., Winter, O.~C., 2010, Distribution of refractory and volatile elements in CoRoT exoplanet host stars, Astronomy and Astrophysics, 517, A40

Chavero, C., de la Reza, R., Domingos, R.~C., Drake, N.~A., Pereira, C.~B., Winter, O.~C., 2010, Distribution of refractory and volatile elements in CoRoT planet host stars, IAU Symposium, 265, 424

Christensen-Dalsgaard, J., Thompson, M.~J., 2011, Stellar hydrodynamics caught in the act: Asteroseismology with CoRoT and Kepler, IAU Symposium, 271, 32

Claret, A., Bloemen, S., 2011, Gravity and limb-darkening coefficients for the Kepler, CoRoT, Spitzer, uvby, UBVRIJHK, and Sloan photometric systems, Astronomy and Astrophysics, 529, A75

Col{\'o}n, K.~D., Ford, E.~B., 2009, Benefits of Ground-Based Photometric Follow-Up for Transiting Extrasolar Planets Discovered with Kepler and CoRoT, The Astrophysical Journal, 703, 1086

COROT Team, 2010, CoRoT observation log Release 7 (CoRoT, 2011), VizieR Online Data Catalog, 1, 2028

Cowan, N., Deming, D., Gillon, M., Knutson, H., Madhusudhan, N., Rauscher, E., 2011, Phase Variations, Transits and Eclipses of the Misfit CoRoT-2b, Spitzer Proposal ID \#80044, 80044

Csizmadia, S., Pasternacki, T., Bord{\'e}, P., 2011, A homogeneous analysis of the transit light curves of the CoRoT exoplanets, EPSC-DPS Joint Meeting 2011, held 2-7 October 2011 in Nantes, France.~<A href="http://meetings.copernicus.org/epscdps2011">http://meetings.copernicus.org/epsc-dps2011</A>, p.1362, 1362

Csizmadia, S., and 51 colleagues, 2011, Transiting exoplanets from the CoRoT space mission. XVII. The hot Jupiter CoRoT-17b: a very old planet, Astronomy and Astrophysics, 531, A41

Csizmadia, S., and 35 colleagues, 2010, Transit timing analysis of CoRoT-1b, Astronomy and Astrophysics, 510, A94

D{\'{\i}}az, R.~F., Almenara, J.~M., Bonomo, A., Bouchy, F., Deleuil, M., H{\'e}brard, G., Moutou, C., Santerne, A., 2011, The False Positive probability of CoRoT and Kepler planetary candidates., EPSC-DPS Joint
Meeting 2011, held 2-7 October 2011 in Nantes, France.~<A ://meetings.copernicus.org/epscdps2011">, 1243

da Silva, R., Silva-Valio, A., 2011, A Method to Identify and Characterize Binary Candidates-A Study of CoRoT Data, Publications of the Astronomical Society of the Pacific, 123, 536

Da Silva, R., Silva-Valio, A., 2011, A method to identify and characterise binary candidates - a study of CoRoT data, ArXiv e-prints, arXiv:1103.5042

Da Silva, R., Silva-Valio, A., 2010, Selection of most promising CoRoT candidates for radial-velocity follow-up, Highlights of Astronomy, 15, 690 de Freitas, D.~B., C.~de Leao, I., Martins, B.~L.~C., Do Nascimento, J.~D., de Medeiros, J.~R., 2010, Wavelet Analysis of Stellar Rotation and Other Periodicities:. from the Sun to Corot, Astronomy and Relativistic Astrophysics.~ New Phenomena and New States of Matter in the Universe, 147

Debosscher, J., Sarro, L.~M., L{\'o}pez, M., Aerts, C., 2008, Methodology for Automated Supervised Classification of Light Curves in the CoRoT Exoplanet Database, American Institute of Physics Conference Series, 1082, 245

Debosscher, J., and 29 colleagues, 2009, Automated supervised classification of variable stars in the CoRoT programme. Method and application to the first four exoplanet fields, Astronomy and Astrophysics,
506, 519

Debosscher, J., and 29 colleagues, 2009, Supervised classification of CoRoT variables (Debosscher+, 2009), VizieR Online Data Catalog, 350, 60519

Deeg, H.~J., and 25 colleagues, 2009, Ground-based photometry of space-based transit detections: photometric follow-up of the CoRoT mission, Astronomy and Astrophysics, 506, 343

Deeg, H. J., Moutou, C., Erikson, A. et al. 2010, : A transiting giant planet with a temperature between 250 K and 430 K, Nature, 464, 384

Degroote, P., and 13 colleagues, 2011, CoRoT's view on variable B8/9 stars: spots versus pulsations. Evidence for differential rotation in HD 174648, Astronomy and Astrophysics, 536, A82

Degroote, P., and 20 colleagues, 2009, CoRoT's view of newly discovered B-star pulsators: results for 358 candidate B pulsators from the initial run's exoplanet field data, Astronomy and Astrophysics, 506, 471

Degroote, P., and 20 colleagues, 2009, CoRot B star frequency analysis (Degroote+, 2009), VizieR Online Data Catalog, 350, 60471

Degroote, Pieter; Aerts, Conny; Baglin, Annie; Miglio, Andrea; Briquet, Maryline; Noels, Arlette;et al. 2010, Deviations from a uniform period spacing of gravity modes in a massive star, Nature 464,259

Degroote, P., and 9 colleagues, 2010, Asteroseismology of OB stars with CoRoT, Astronomische Nachrichten, 331, 1065

Degroote, P., and 17 colleagues, 2010, Detection of frequency spacings in the young O-type binary HD 46149 from CoRoT photometry, Astronomy and Astrophysics, 519, A38

Degroote, P., and 10 colleagues, 2009, Evidence for nonlinear resonant mode coupling in the β Cephei star HD 180642 (V1449 Aquilae) from CoRoT photometry, Astronomy and Astrophysics, 506, 111

Degroote, P., and 22 colleagues, 2009, Space observations of B stars with CoRoT, Communications in Asteroseismology, 158, 167

Deheuvels, S.; Michel, E. 2011, Constraints on the structure of the core of subgiants via mixed modes: the case of HD 49385, A&A 535,91

Deheuvels, S., and 18 colleagues, 2010, Seismic and spectroscopic characterization of the solar-like pulsating CoRoT target HD 49385, Astronomy and Astrophysics, 515, A87

Deheuvels, S., Michel, E., 2010, New insights on the interior of solar-like pulsators thanks to CoRoT: the case of HD 49385, Astrophysics and Space Science, 328, 259

Deheuvels, S., Michel, E., Mosser, B., 2008, HARPS seismic data of the F type star HD49933 revisited in the light of CoRoT results, Communications in Asteroseismology, 157, 297

Deleuil, M., Baglin, A., 2008, News and Preliminary Results of the CoRoT Space Mission, Extreme Solar Systems, 398, 109

Deleuil, M., and 45 colleagues, 2011, XX. CoRoT-20b: A very high density, high eccentricity transiting giant planet, ArXiv e-prints, arXiv:1109.3203

Deleuil, M., and 41 colleagues, 2008, Transiting exoplanets from the CoRoT space mission . VI. CoRoT-Exo-3b: the first secure inhabitant of the brown-dwarf desert, Astronomy and Astrophysics, 491, 889

Deleuil, M., and 41 colleagues, 2009, CoRoT-Exo-3b observations (Deleuil+, 2008), VizieR Online Data Catalog, 349, 10889

Deleuil, M., and 11 colleagues, 2009, Exo-Dat: An Information System in Support of the CoRoT/Exoplanet Science, The Astronomical Journal, 138, 649

Deleuil, M., Moutou, C., Bordé, P., 2011, The CoRoT Exoplanet program: status & results, Detection and Dynamics of Transiting Exoplanets, St.~Michel l'Observatoire, France, Edited by F.~Bouchy; R.~D{\'{\i}}az; C.~Moutou; EPJ Web of Conferences, Volume 11,1001

Deleuil, M., Moutou, C., The COROT Exoplanet Science Team, 2010, News of the CoRoT space mission and first results, EAS Publications Series, 41,85

Deleuil, M., Bord{\'e}, P., Moutou, C., 2011, CoRoT mission highlights, IAU Symposium, 276, 44

Deleuil, M.~A.-M., CoRoT/Exoplanet Science Team, 2008, Transit Detections From Space : The Corot Mission, Bulletin of the American Astronomical Society, 40, 463

Deming, D., and 11 colleagues, 2011, Warm Spitzer Photometry of the Transiting Exoplanets CoRoT-1 and CoRoT-2 at Secondary Eclipse, The Astrophysical Journal, 726, 95

De Ridder, Joris; Barban, Caroline; Baudin, Frédéric; Carrier, Fabien; Hatzes, Artie P.; Hekker, Saskia; et al. 2009, Non-radial oscillation modes with long lifetimes in giant stars, Nature, 459,398

Desmet, M., and 17 colleagues, 2010, CoRoT photometry and high-resolution spectroscopy of the interacting eclipsing binary AU Monocerotis, Monthly Notices of the Royal Astronomical Society, 401, 418

Diago, P.~D., 2011, Asteroseismology and mass loss in Be stars. Study with CoRoT, Ph.D.~Thesis,

Diago, P.~D., and 24 colleagues, 2009, Pulsations in the late-type Be star HD 50 209 detected by CoRoT, Astronomy and Astrophysics, 506, 125

Diago, P.~D., Gutierrez-Soto, J., Fabregat, J., Suso, J., The COROT Be Team, 2011, The study of Be stars with the CoRoT satellite, Highlights of Spanish Astrophysics VI, 531

Dolez, N., and 15 colleagues, 2009, HD 51106 and HD 50747: an ellipsoidal binary and a triple system observed with CoRoT, Astronomy and Astrophysics, 506, 159

Drummond, R., Lapeyrere, V., Auvergne, M., Vandenbussche, B., Aerts, C., Samadi, R., Costa, J.~E.~S., 2008, Correcting for background changes in CoRoT exoplanet data, Astronomy and Astrophysics, 487, 1209

Dvorak, R., Schneider, J., Eybl, V., 2010, On the mutually inclined orbits of planets in the CoRoT-7 extrasolar planetary system, ArXiv e-prints, arXiv:1004.4129

Dvorak, R., Schneider, J., Lammer, H., Barge, P., Wuchterl, G., 2011, CoRoT's first seven planets: An overview, Research, Science and Technology of Brown Dwarfs and Exoplanets: Proceedings of an International Conference held in Shangai on Occasion of a Total Eclipse of the Sun, Shangai, China, Edited by E.L.~Martin; J.~Ge; W.~Lin; EPJ Web of Conferences, Volume 16,, 1001

Dvorak, R., Schneider, J., Lammer, H., Barge, P., Wuchterl, G., the CoRoT team, 2009, CoRoT's first seven planets: An overview, ArXiv e-prints, arXiv:0912.4655

El Fady Morcos, A., 2010, CoRot and Kepler Data to Quantize Some Extrasolar Orbits, 38th COSPAR Scientific Assembly, 38, 2526

Emilio, M., and 18 colleagues, 2010, Photometric variability of the Be star CoRoT-ID 102761769, Astronomy and Astrophysics, 522, A43

Faigler, S., Mazeh, T., 2011, Photometric detection of non-transiting short-period low-mass companions through the beaming, ellipsoidal and reflection effects in Kepler and CoRoT light curves, Monthly Notices of the Royal Astronomical Society, 415, 3921

Favata, F., Micela, G., Alencar, S., Aigrain, S., Zwintz, K., 2010, Stellar rotation at young ages: new results from Corot's monitoring NGC 2264, Highlights of Astronomy, 15, 752

Ferraz-Mello, S., Tadeu Dos Santos, M., Beaug{\'e}, C., Michtchenko, T.~A., Rodr{\'{\i}}guez, A., 2011, On the mass determination of super-Earths orbiting active stars: the CoRoT-7 system, Astronomy and Astrophysics, 531, A161

Ferraz-Mello, S., Tadeu dos Santos, M., Beaug{\'e}, C., Michtchenko, T.~A., 2010, Self-consistent Determination of the Mass of the Super-Earth CoRoT-7b, Bulletin of the American Astronomical Society, 42, 928

Floquet, M., and 22 colleagues, 2009, The B0.5 IVe CoRoT target HD 49330. II. Spectroscopic ground-based observations, Astronomy and Astrophysics, 506, 103

Ford, E.~B., Col{\'o}n, K.~D., 2009, Characterizing the Eccentricities of Transiting Extrasolar Planets with Kepler and CoRoT,IAU Symposium,253,111

Fortney, J.~J., Marley, M.~S., Saumon, D., Lodders, K., Freedman, R., 2008, Optical Flux from Hot Jupiters: Application to Kepler and CoRoT, Bulletin of the American Astronomical Society, 40, 401

Fr{\"o}hlich, H.-E., K{\"u}ker, M., Hatzes, A.~P., Strassmeier, K.~G., 2009, On the differential rotation of CoRoT-2a, Astronomy and Astrophysics, 506, 263

Fressin, F., and 9 colleagues, 2009, CoRoT-Exo-7b: Confirming the first transiting rocky planet, Spitzer Proposal ID \#534, 534

Fressin, F., and 10 colleagues, 2012, Spitzer Infrared Observations and Independent Validation of the Transiting Super-Earth CoRoT-7 b, The Astrophysical Journal, 745, 81

Fridlund, C.~V.~M., 2008, Planetary transits from CoRoT—Europe and exoplanets, Physica Scripta Volume T, 130, 014009

Fridlund, C., CoRoT Co-Investigator Team, 2010, The Status Of The Corot Space Mission, Bulletin of the American Astronomical Society, 36, \#601.02

Fridlund, M., 2008, Exoplanets from CoRoT to PLATO, European Planetary Science Congress 2008, Proceedings of the conference held 21-25 September, 2008 in M{\"u}nster, Germany.~Online at "http://meetings.copernicus.org/epsc2008">http, 868

Fridlund, M., and 47 colleagues, 2010, Transiting exoplanets from the CoRoT space mission. IX. CoRoT-6b: a transiting ``hot Jupiter'' planet in an 8.9d orbit around a low-metallicity star, Astronomy and Astrophysics, 512, A14

Gandolfi, D., and 54 colleagues, 2010, Transiting exoplanets from the CoRoT space mission. XIV. CoRoT-11b: a transiting massive ``hot-Jupiter'' in a prograde orbit around a rapidly rotating F-type star, Astronomy and Astrophysics, 524, A55

Gandolfi, D., Lanza, A.~F., Damiani, C., 2011, The transiting exoplanet CoRoT-11b and its peculiar tidal evolution, Detection and Dynamics of Transiting Exoplanets, St.~Michel l'Observatoire, France, Edited by F.~Bouchy; R.~D{\'{\i}}az; C.~Moutou; EPJ Web of Conferences, Volume 11, 5006

Garc{\'{\i}}a Hern{\'a}ndez, A., and 15 colleagues, 2009, Asteroseismic analysis of the CoRoT δ Scuti star <ASTROBJ>HD 174936</ASTROBJ>, Astronomy and Astrophysics, 506, 79

Garc{\'{\i}}a, R.~A., and 25 colleagues, 2009, Solar-like oscillations with low amplitude in the CoRoT target HD 181906, Astronomy and Astrophysics, 506, 41

Garc{\'{\i}}a, R.~A., Mathur, S., Salabert, D., Ballot, J., R{\'e}gulo, C., Metcalfe, T.~S., Baglin, A., 2010, CoRoT Reveals a Magnetic Activity Cycle in a Sun-Like Star, Science, 329, 1032

Garcia, R.~A., 2011, Stellar pulsations of solar-like oscillators with CoRoT and Kepler, Highlights of Spanish Astrophysics VI, 403

Garcia, R.~A., and 9 colleagues, 2008, Solar-like stars as seen by CoRoT, Communications in Asteroseismology, 157, 288

Garcia, R.~A., Ballot, J., Mathur, S., Salabert, D., Regulo, C., 2010, Signature of a magnetic activity cycle in HD49933 observed by CoRoT, ArXiv e-prints, arXiv:1012.0494

Gaulme, P., Appourchaux, T., Boumier, P., 2009, Mode width fitting with a simple Bayesian approach. Application to CoRoT targets HD 181420 and HD 49933, Astronomy and Astrophysics, 506, 7

Gaulme, P., and 21 colleagues, 2010, Possible detection of phase changes from the non-transiting planet HD 46375b by CoRoT, Astronomy and Astrophysics, 518, L153

Gazzano, J.-C., and 9 colleagues, 2010, Stellar characterization of CoRoT/Exoplanet fields with MATISSE, Astronomy and Astrophysics, 523, A91

Gazzano, J.-C., and 8 colleagues, 2010, Massive spectroscopic analysis of the stellar populations in three of the CoRoT/Exoplanet fields, SF2A-2010: Proceedings of the Annual meeting of the French Society of Astronomy and Astrophysics, 349

Gillon, M., and 9 colleagues, 2009, VLT transit and occultation photometry for the bloated planet CoRoT-1b, Astronomy and Astrophysics, 506, 359

Gillon, M., and 9 colleagues, 2009, FORS2 and HAWKI photometry of CoRoT-1 (Gillon+, 2009), VizieR Online Data Catalog, 350, 60359

Gillon, M., and 52 colleagues, 2010, Transiting exoplanets from the CoRoT space mission. XII. CoRoT-12b: a short-period low-density planet transiting a solar analog star, Astronomy and Astrophysics, 520, A97

Gillon, M., and 18 colleagues, 2010, The thermal emission of the young and massive planet CoRoT-2b at 4.5 and 8 μm, Astronomy and Astrophysics, 511, A3

Gillon, M., and 18 colleagues, 2009, Light curves of CoRoT-2 in z-band, 4.5um and 8um (Gillon+, 2010), VizieR Online Data Catalog, 351, 19003

Gillon, M., Deleuil, M., Demory, B.-O., Harrington, J., Queloz, D., Schneider, J., 2008, First atmospheric study of the young massive planet CoRoT-Exo-2b, Spitzer Proposal ID \#486, 486

Gondoin, P., Fridlund, M., Gandolfi, D., G{\"u}enter, E., 2010, Differential rotation on active late-type stars observed with Corot, IAU Symposium, 264, 60

Gondoin, P., and 18 colleagues, 2009, CoRot observations of active giants: preliminary results, American Institute of Physics Conference Series, 1094, 864

Goupil, M.~J., 2008, Concluding remarks and perspectives on the evolution and seismic tools activity (ESTA) of the CoRoT community, Astrophysics and Space Science, 316, 251

Greaves, J., 2010, New Suspected Variable (NSV) Stars in the Galactic Open Cluster NGC 2264. Periodic Variables: A CoRoT View, Peremennye Zvezdy Prilozhenie, 10, 8

Grziwa, S., Korth, J., P{\"a}tzold, M., 2011, Detecting planets in Kepler lightcurves using methods developed for CoRoT., EPSC-DPS Joint Meeting 2011, held 2-7 October 2011 in Nantes, France. "http://meetings.copernicus.org/epscdps2011">http://meetings.copernicus.org/epsc-dps2011</A>, p.1409, 1409

Grziwa, S., P{\"a}tzold, M., 2011, Simulation of stellar binary systems: improving the detection of transits in CoRoT lightcurves., EPSC-DPS Joint Meeting 2011, held 2-7 October 2011 in Nantes, France.~<A href="http://meetings.copernicus.org/epscdps2011", p.1066

Grziwa, S., P{\"a}tzold, M., Carone, L., 2011, The needle in thehaystack: searching for transiting extrasolar planets in CoRoT stellar light curves, Monthly Notices of the Royal Astronomical Society, 2143

Guenther, E.~W., and 10 colleagues, 2011, Constraints on the exosphere of CoRoT-7b, Astronomy and Astrophysics, 525, A24

Guenther, E.~W., and 53 colleagues, 2011, Transiting exoplanets from the CoRoT space mission XXI. CoRoT-19b: A low density planet orbiting an old inactive F9V-star, ArXiv e-prints, arXiv:1112.1035

Guggenberger, E., Kolenberg, K., Chapellier, E., Poretti, E., Szab{\'o}, R., Benk{\H o}, J.~M., Papar{\'o}, M., 2011, The CoRoT star 105288363: strong cycle-to-cycle changes of the Blazhko modulation, Monthly Notices of the Royal Astronomical Society, 415, 1577

Guillot, T., Havel, M., 2011, An analysis of the CoRoT-2 system: a young spotted star and its inflated giant planet, Astronomy and Astrophysics, 527, A20

Guillot, T., Havel, M., 2009, CoRoT-2b: a Tidally Inflated, Young Exoplanet?, AAS/Division for Planetary Sciences Meeting Abstracts \#41, 41, \#08.04

Guti{\'e}rrez-Soto, J., and 16 colleagues, 2009, Low-amplitude variations detected by CoRoT in the late type Be star HD 175869, Communications in Asteroseismology, 158, 208

Guti{\'e}rrez-Soto, J., and 22 colleagues, 2009, Low-amplitude variations detected by CoRoT in the B8IIIe star HD 175869, Astronomy and Astrophysics, 506, 133

Guti{\'e}rrez-Soto, J., and 16 colleagues, 2008, First results on Be stars with CoRoT, SF2A-2008, 475

Guti{\'e}rrez-Soto, J., Semaan, T., Garrido, R., Baudin, F., Hubert, A.~-., Neiner, C., 2010, Amplitude variations of the CoRoT Be star 102719279, ArXiv e-prints, arXiv:1010.1910

Guti{\'e}rrez-Soto, J., Neiner, C., Fabregat, J., Lanza, A.~F., Semaan, T., Rainer, M., Poretti, E., 2011, Short-term variations in Be stars observed by the CoRoT and Kepler space missions, IAU Symposium, 272, 451

Gutierrez-Soto, J., and 15 colleagues, 2008, First results on the Be stars observed with the CoRoT satellite, Communications in Asteroseismology, 157, 70

H{\'e}brard, G., and 46 colleagues, 2011, Transiting exoplanets from the CoRoT space mission. XVIII. CoRoT-18b: a massive hot Jupiter on a prograde, nearly aligned orbit, Astronomy and Astrophysics, 533, A130

Hareter, M., and 9 colleagues, 2010, Gamma Dor and Gamma Dor - Delta Sct Hybrid Stars In The CoRoT LRa01, ArXiv e-prints, arXiv:1007.3176

Hatzes, A.~P., and 8 colleagues, 2010, An investigation into the radial velocity variations of CoRoT-7, Astronomy and Astrophysics, 520, A93

Hatzes, A.~P., and 32 colleagues, 2011, The Mass of CoRoT-7b, The Astrophysical Journal, 743, 75

Hebrard, G., and 9 colleagues, 2010, Search for rings and satellites around the temperate exoplanet CoRoT-9b (continued), Spitzer Proposal ID \#70031, 70031

Hekker, S., Barban, C., Baudin, F., De Ridder, J., Kallinger, T., Morel, T., Chaplin, W.~J., Elsworth, Y., 2010, Oscillation mode lifetimes of red giants observed during the initial and first anticentre long run of CoRoT, Astronomy and Astrophysics, 520, A60

Hekker, S., Barban, C., Kallinger, T., Weiss, W., De Ridder, J., Hatzes, A., COROT Team, 2008, Solar-like oscillations in red giants in the CoRoT exofield, Communications in Asteroseismology, 157, 319

Hekker, S., de Ridded, J., Baudin, F., Barban, C., Carrier, F., Hatzes, A.~P., Kallinger, T., Weiss, W.~W., 2009, Red Giants observed with CoRoT, American Institute of Physics Conference Series, 1170, 127

Hekker, S., De Ridder, J., Baudin, F., Barban, C., Carrier, F., Hatzes, A.~P., Kallinger, T., Weiss, W.~W., 2010, Red Giants observed with CoRoT, ArXiv e-prints, arXiv:1001.4543

Hekker, S., and 8 colleagues, 2009, Characteristics of solar-like oscillations in red giants observed in the CoRoT exoplanet field, Astronomy and Astrophysics, 506, 465

Hekker, S., Morel, T., Mazumdar, A., Baudin, F., Poretti, E., Rainer, M., 2011, Investigation of three red giants observed in the CoRoT seismo field, ArXiv e-prints, arXiv:1109.0148

Howell, S.~B., Horch, E., Sherry, W., Ciardi, D., 2010, Speckle Imaging of Kepler and CoRoT Exo-planet Transit Candidate Stars, NOAO Proposal ID \#2010B-0241, 241

Huat, A.-L., and 21 colleagues, 2009, The B0.5IVe CoRoT target HD 49330. I. Photometric analysis from CoRoT data, Astronomy and Astrophysics, 506, 95

Huat, A.-L., and 21 colleagues, 2009, Fourier analysis of HD 49330 CoRoT light curve (Huat+, 2009), VizieR Online Data Catalog, 350, 60095

Huat, A.-L., Hubert, A.-M., Floquet, M., Neiner, C., Saio, H., Lovekin, C., Baudin, F., 2009, Correlation Between a Light Outburst and Pulsations in a CoRoT Be Star: HD 49330, American Institute of Physics Conference Series, 1170, 382

Huber, K.~F., Czesla, S., Wolter, U., Schmitt, J.~H.~M.~M., 2010, Planetary eclipse mapping of CoRoT-2a. Evolution, differential rotation, and spot migration, Astronomy and Astrophysics, 514, A39

Huber, K.~F., Czesla, S., Wolter, U., Schmitt, J.~H.~M.~M., 2009, A planetary eclipse map of CoRoT-2a. Comprehensive lightcurve modeling combining rotational-modulation and transits, Astronomy and Astrophysics, 508, 901

Hulot, J.~C., Baudin, F., Samadi, R., Goupil, M.~J., 2011, A quantitative analysis of stellar activity based on CoRoT photometric data, ArXiv e-prints, arXiv:1104.2185

Jackson, B., Barnes, R., Raymond, S.~N., Fortney, J., Greenberg, R., 2010, Is CoRoT-7 B the Remnant Core of an Evaporated Gas Giant?, Bulletin of the American Astronomical Society, 42, \#339.05

Jackson, B., Miller, N., Barnes, R., Raymond, S.~N., Fortney, J.~J., Greenberg, R., 2010, The roles of tidal evolution and evaporative mass loss in the origin of CoRoT-7 b, Monthly Notices of the Royal Astronomical Society, 407, 910

Kabath, P., and 8 colleagues, 2008, Characterization of CoRoT Target Fields with the Berlin Exoplanet Search Telescope: Identification of Periodic Variable Stars in the LRa1 Field, The Astronomical Journal, 136, 654

Kabath, P., and 10 colleagues, 2009, Periodic variable stars in CoRoT field LRa02 observed with BEST II, Astronomy and Astrophysics, 506, 569

Kabath, P., and 10 colleagues, 2009, BEST II CoRoT LRa02 field periodic variables (Kabath+, 2009), VizieR Online Data Catalog, 350, 60569

Kabath, P., and 10 colleagues, 2009, Characterization of CoRoT Target Fields With Berlin Exoplanet Search Telescope. II. Identification of Periodic Variable Stars in the LRc2 Field, The Astronomical Journal, 137, 3911

Kaiser, A., Weiss, W., Guenther, E., Balaguer, L., Maceroni, C., Ribas, I., 2009, The Domain of δ Scuti Stars: First CoRoT IRa01 Results, American Institute of Physics Conference Series, 1170, 432

Kallinger, T., Gruberbauer, M., Guenther, D.~B., Fossati, L., Weiss, W.~W., 2010, The nature of p-modes and granulation in HD 49933 observed by CoRoT, Astronomy and Astrophysics, 510, A106

Kallinger, T., Gruberbauer, M., Guenther, D.~B., Fossati, L., Weiss, W.~W., 2008, The nature of p-modes and granulation in HD 49933 observed by CoRoT, ArXiv e-prints, arXiv:0811.4686

Kallinger, T., and 12 colleagues, 2010, Oscillating red giants in the CoRoT exofield: asteroseismic mass and radius determination, Astronomy and Astrophysics, 509, A77

Kallinger, T., Weiss, W.~W., De Ridder, J., Hekker, S., Barban, C., 2009, Oscillating Red Giants in the CoRoT Exo-field: An Asteroseismic Radius and Mass Determination, The Eighth Pacific Rim Conference on Stellar
Astrophysics: A Tribute to Kam-Ching Leung, 404, 307

Leger, A., and 25 colleagues, 2011, The extreme physical properties of the CoRoT-7b super-Earth, Icarus, 213, 1

L{\'e}ger, A., and 160 colleagues, 2009, Transiting exoplanets from the CoRoT space mission. VIII. CoRoT-7b: the first super-Earth with measured radius, Astronomy and Astrophysics, 506, 287

L{\'o}pez Del Fresno, M., Solano M{\'a}rquez, E., Sarro Baro, L.~M., 2011, Data mining in the Spanish Virtual Observatory. Applications to Corot and Gaia, Highlights of Spanish Astrophysics VI, 721

L{\"u}ftinger, T., and 17 colleagues, 2010, Surface structure of the CoRoT CP2 target star HD 50773, Astronomy and Astrophysics, 509, A43

Lammer, H., and 64 colleagues, 2010, Exoplanet discoveries with the CoRoT space observatory, Solar System Research, 44, 520

Lanza, A.~F., 2011, Searching for star-planet magnetic interaction in CoRoT observations, Astrophysics and Space Science, 336, 303

Lanza, A.~F., and 14 colleagues, 2009, Photospheric activity and rotation of the planet-hosting star CoRoT-4a, Astronomy and Astrophysics, 506, 255

Lanza, A.~F., and 13 colleagues, 2010, Photospheric activity, rotation, and radial velocity variations of the planet-hosting star CoRoT-7, Astronomy and Astrophysics, 520, A53

Lanza, A.~F., and 15 colleagues, 2011, Photospheric activity, rotation, and star-planet interaction of the planet-hosting star CoRoT-6, Astronomy and Astrophysics, 525, A14

Lanza, A.~F., Damiani, C., Gandolfi, D., 2011, Constraining tidal dissipation in F-type main-sequence stars: the case of CoRoT-11, Astronomy and Astrophysics, 529, A50

Lanza, A.~F., and 20 colleagues, 2009, Magnetic activity in the photosphere of CoRoT-Exo-2a. Active longitudes and short-term spot cycle in a young Sun-like star, Astronomy and Astrophysics, 493, 193

Lanza, A.~F., Pagano, I., Leto, G., Messina, S., Barge, P., Baglin, A., 2009, CoRoT and stellar activity: preliminary results from the modelling of CoRoT-Exo-2a, American Institute of Physics Conference Series, 1094, 684

Lebreton, Y., Montalb{\'a}n, J., Christensen-Dalsgaard, J., Roxburgh,
I.~W., Weiss, A., 2008, CoRoT/ESTA TASK 1 and TASK 3 comparison of the internal structure and seismic properties of representative stellar models. Comparisons between the ASTEC, CESAM, CLES, GARSTEC and STAROX codes, Astrophysics and Space Science, 316, 187

Lebzelter, T., 2011, Long-period variables in the CoRoT fields, Astronomy and Astrophysics, 530, A35

Lecavelier, A., and 8 colleagues, 2010, Search for rings and satellites around the temperate exoplanet CoRoT-9b, Spitzer Proposal ID \#546, 546

Leconte, J., Baraffe, I., Chabrier, G., Barman, T., Levrard, B., 2009, Structure and evolution of the first CoRoT exoplanets: probing the brown dwarf/planet overlapping mass regime, Astronomy and Astrophysics, 506, 385

Lef{\`e}vre, L., and 13 colleagues, 2009, Instability domains of δ Scuti and Slowly Pulsating B stars : How will the CoRoT satellite help to determine the limits ?, Communications in Asteroseismology, 158, 189

Lef{\`e}vre, L., and 13 colleagues, 2008, Blue edge of the δ Scuti stars versus red edge of the SPB stars. How will CoRoT data help ?, SF2A-2008, 489

Lefever, K., Puls, J., Morel, T., Aerts, C., Decin, L., Briquet, M., 2010, Spectroscopic determination of the fundamental parameters of 66 B-type stars in the field-of-view of the CoRoT satellite, Astronomy and Astrophysics, 515, A74

Leitzinger, M., and 12 colleagues, 2011, Could CoRoT-7b and Kepler-10b be remnants of evaporated gas or ice giants?, Planetary and Space Science,59, 1472

Liu, C.-Y., Doressoundiram, A., Roques, F., Auvergne, M., Chang, H.-K., 2011, Search For Small Trans-Neptunian Objects Using COROT Asteroseismology Lightcurves, EPSC-DPS Joint Meeting 2011, held 2-7 October 2011 in Nantes, France.~<A >http://meetings.copernicus.org/epsc-dps2011</A>, p.614,.

Loeillet, B., and 10 colleagues, 2008, Doppler search for exoplanet candidates and binary stars in a CoRoT field using a multi-fiber spectrograph. I. Global analysis and first results, Astronomy and Astrophysics, 479, 865

Loeillet, B., and 10 colleagues, 2008, CoRoT exoplanet candidates (Loeillet+, 2008), VizieR Online Data Catalog, 347, 90865

Lovekin, C., Neiner, C., Saio, H., Mathis, S., Guti{\'e}rrez-Soto, J., 2010, Modelling results for two late Be stars observed by CoRoT, Astronomische Nachrichten, 331, 1061

Ludwig, H.-G., and 8 colleagues, 2009, Hydrodynamical simulations of convection-related stellar micro-variability. II. The enigmatic granulation background of the CoRoT target HD 49933, Astronomy and Astrophysics, 506, 167

Maceroni, C., 2010, CoRoT Light Curves: A Goldmine for Binary Star Research, Binaries - Key to Comprehension of the Universe, 435, 5

Maceroni, C., Cardini, D., Damiani, C., Gandolfi, D., Debosscher, J., Hatzes, A., Guenther, E.~W., Aerts, C., 2010, Eclipsing binaries with pulsating components: CoRoT 102918586, ArXiv e-prints, arXiv:1004.1525

Maceroni, C., and 14 colleagues, 2009, HD 174884: a strongly eccentric, short-period early-type binary system discovered by CoRoT, Astronomy and Astrophysics, 508, 1375

Magali Deleuil, P., 2010, Results and status of the CoRoT exoplanet survey, 38th COSPAR Scientific Assembly, 38, 2509

Mahy, L., and 15 colleagues, 2011, Plaskett's star: analysis of the CoRoT photometric data, Astronomy and Astrophysics, 525, A101

Marconi, M., Degl'Innocenti, S., Prada Moroni, P.~G., Ruoppo, A., 2008, FRANEC versus CESAM predictions for selected CoRoT ESTA task 1 models, Astrophysics and Space Science, 316, 215

Mathias, P., and 8 colleagues, 2009, γ Doradus stars in the COROT exoplanets fields: first inspection, American Institute of Physics Conference Series, 1170, 486

Mathur, S., and 24 colleagues, 2010, The solar-like CoRoT target HD 170987: spectroscopic and seismic observations, Astronomy and Astrophysics, 518, A53

Mathur, S., Garcia, R.~A., Regulo, C., Creevey, O.~L., Ballot, J., Salabert, D., 2010, An automatic pipeline analysing solar-like oscillating targets tested on CoRoT and simulated data, ArXiv e-prints, arXiv:1003.4749

Mathur, S., Salabert, D., Garcia, R.~A., Metcalfe, T.~S., Regulo, C., Ballot, J., 2011, Investigating stellar activity with CoRoT data and complementary ground-based observations, ArXiv e-prints, arXiv:1110.0137

Mathur, S., Salabert, D., Garcia, R.~A., Regulo, C., Ballot, J., Metcalfe, T.~S., 2011, Investigating stellar activity with CoRoT observations, ArXiv e-prints, arXiv:1110.0875

Mathur, S., Garc{\'{\i}}a, R.~A., Salabert, D., Ballot, J., R{\'e}gulo, C., Metcalfe, T.~S., Baglin, A., 2011, Unveiling stellar magnetic activity using CoRoT seismic observations, Journal of Physics Conference Series, 271, 012045

Mazeh, T., Faigler, S., 2010, Detection of the ellipsoidal and the relativistic beaming effects in the CoRoT-3 lightcurve, Astronomy and Astrophysics, 521, L59

Mazeh, T., and 33 colleagues, 2009, Removing systematics from the CoRoT light curves. I. Magnitude-dependent zero point, Astronomy and Astrophysics, 506, 431

Mazumdar, Anwesh; Michel, Eric 2010, Model-independent determination of sharp features inside a star from its oscillation frequencies, 2010arXiv1004.2739M

Meunier, J.~C., Granet, Y., Agneray, F., Deleuil, M., Surace, C., Moutou, C., 2009, EXODAT - The Exoplanets Database from the COROT Project : Evolution and Updates, Astronomical Data Analysis Software and Systems XVIII, 411, 454

Michel, E., Baglin, A., The COROT Team, 2008, CoRoT first results - looking inside the stars, SF2A-2008, 517

Michel, E., and 66 colleagues, 2008, First asteroseismic results from CoRoT, Communications in Asteroseismology, 156, 73

Michel, E., and 22 colleagues, 2008, First asteroseismic results from CoRoT, Communications in Asteroseismology, 157, 69

Michel, E., Samadi, R., Baudin, F., Barban, C., Appourchaux, T., Auvergne, M., 2009, Intrinsic photometric characterisation of stellar oscillations and granulation. Solar reference values and CoRoT response functions, Astronomy and Astrophysics, 495, 979

Michel, E., and 43 colleagues, 2008, CoRoT Measures Solar-Like Oscillations and Granulation in Stars Hotter Than the Sun, Science, 322, 558

Miglio, A., and 8 colleagues, 2009, Probing populations of red giants in the galactic disk with CoRoT, Astronomy and Astrophysics, 503, L21

Miglio, A., Montalb{\'a}n, J., Eggenberger, P., Hekker, S., Noels, A., 2009, Asteroseismology of red-clump stars with CoRoT and Kepler, American Institute of Physics Conference Series, 1170, 132

Miglio, A.; Montalbán, J.; Carrier, F.; De Ridder, J.; Mosser, B.; Eggenberger, P.; Scuflaire, R.; et al. 2010, Evidence for a sharp structure variation inside a red-giant star, A&A 520, 6

Miglio, A., Morel, T., Barbieri, M., Mosser, B., Girardi, L., Montalban, J., Valentini, M., 2011, Solar-like pulsating stars as distance indicators: G-K giants in the CoRoT and Kepler fields, ArXiv e-prints, arXiv:1111.4366

Mislis, D., Schmitt, J.~H.~M.~M., Carone, L., Guenther, E.~W., P{\"a}tzold, M., 2010, An algorithm for correcting CoRoT raw light curves, Astronomy and Astrophysics, 522, A86

Mosser, B., and 17 colleagues, 2011, Mixed modes in red-giant stars observed with CoRoT, Astronomy and Astrophysics, 532, A86

Mosser, B., Baudin, F., Lanza, A.~F., Hulot, J.~C., Catala, C., Baglin, A., Auvergne, M., 2009, Short-lived spots in solar-like stars as observed by CoRoT, Astronomy and Astrophysics, 506, 245

Mosser, B., and 14 colleagues, 2011, The universal red-giant oscillation pattern. An automated determination with CoRoT data, Astronomy and Astrophysics, 525, L9

Mosser, B., and 12 colleagues, 2010, Red-giant seismic properties analyzed with CoRoT, Astronomy and Astrophysics, 517, A22

Mosser, B., and 19 colleagues, 2009, The CoRoT target HD 175726: an active star with weak solar-like oscillations, Astronomy and Astrophysics, 506, 33

Moutou, C., and 44 colleagues, 2008, Transiting exoplanets from the CoRoT space mission. V. CoRoT-Exo-4b: stellar and planetary parameters, Astronomy and Astrophysics, 488, L47

Moutou, C., Deleuil, M., Alonso, R., Bouchy, F., 2011, CoRoT Highlights in exoplanetology, EPSC-DPS Joint Meeting 2011, held 2-7 October 2011 in Nantes, France.~<A href="http://meetings.copernicus.org/epsc-dps2011">http://meetings.copernicus.org/epsc-dps2011</A>, p.1419, 1419

Moutou, C., and 47 colleagues, 2009, Planetary transit candidates in the CoRoT initial run: resolving their nature, Astronomy and Astrophysics, 506,321

Moutou, C., Pont, F., Bouchy, F., Deleuil, M., Almenara, J.M. et al., : Resolving the nature of transit candidates for the Initial Run 2009, A&A 506, 321

Moya, A., Rodr{\'{\i}}guez-L{\'o}pez, C., 2010, Has a Star Enough Energy to Excite the Thousand of Modes Observed with CoRoT?, The Astrophysical Journal, 710, L7

Mura, A., and 13 colleagues, 2011, Comet-like tail-formation of exospheres of hot rocky exoplanets: Possible implications for CoRoT-7b, Icarus, 211, 1

Neiner, C., Floquet, M., 2011, Pulsation modes detected by CoRoT in the hot Be star HD 51452, SF2A-2011: Proceedings of the Annual meeting of the French Society of Astronomy and Astrophysics, 231

Neiner, C., and 27 colleagues, 2009, The pulsations of the B5IVe star HD 181231 observed with CoRoT and ground-based spectroscopy, Astronomy and Astrophysics, 506, 143

Neiner, C., and 15 colleagues, 2009, Preliminary results on the pulsations of Be stars with CoRoT, Communications in Asteroseismology, 158, 319

Neiner, C., and 14 colleagues, 2008, The pulsations of the B5IVe star HD181231 revealed by CoRoT, Communications in Asteroseismology, 157, 349

Niemczura, E., Morel, T., Aerts, C., 2009, Abundance analysis of prime B-type targets for asteroseismology. II. B6-B9.5 stars in the field of view of the CoRoT satellite, Astronomy and Astrophysics, 506, 213

Noack, L., Stamenkovic, V., Wagner, F.~W., Sohl, F., Breuer, D., 2010, CoRoT-7b: Convection in a Tidally Locked Planet, EGU General Assembly Conference Abstracts, 12, 9759

Ofir, A., Deeg, H.~J., Lacy, C.~H.~S., 2009, Searching for transiting circumbinary planets in CoRoT and ground-based data using CB-BLS, Astronomy and Astrophysics, 506, 445

Ofir, A., and 33 colleagues, 2010, The SARS algorithm: detrending CoRoT light curves with Sysrem using simultaneous external parameters, Monthly Notices of the Royal Astronomical Society, 404, L99

Ollivier, M., Chazelas, B., Bord{\'e}, P., 2008, Characterizing Earth-like planets: from CoRoT to DARWIN/TPF and beyond, Physica Scripta Volume T, 130, 014031

P{\'a}pics, P.~I., and 15 colleagues, 2011, CoRoT high-precision photometry of the B0.5 IV star HD 51756, Astronomy and Astrophysics, 528, A123

P{\"a}tzold, M., Endl, M., Czismadia, S., Gandolfi, D., Jorda, L., Grziwa, S., Carone, L., Pasternacki, T., 2011, Transiting Exoplanets from the Corot Space Mission: Corot-21b - a large Jupiter-like planet around a faint subgiant, EPSC-DPS Joint Meeting 2011, held 2-7 October 2011 in Nantes, France.~<A href="http://meetings.copernicus.org/epsc-dps2011">http://meetings.copernicus.org/epsc-dps2011</A>, p.1192, 1192

Pacheco, E.~J., de Andrade, L.~B.~P., Emilio, M., Su{\'a}rez, J.~C., Jendreieck, A., 2011, Non-radial pulsations in the CoRoT Be Star 102761769, IAU Symposium, 272, 507

Pagano, I., Lanza, A.~F., Leto, G., Messina, S., Barge, P., Baglin, A., 2009, CoRoT-2a Magnetic Activity: Hints for Possible Star-Planet Interaction, Earth Moon and Planets, 105, 373 Papar{\'o}, M., and 10 colleagues, 2011, Periodicity search as a tool for disentangling the contaminated colour light curve of CoRoT 102781750,
Astronomy and Astrophysics, 531, A135

Papar{\'o}, M., Szab{\'o}, R., Benk{\H o}, J.~M., Chadid, M., Poretti, E., Kolenberg, K., Guggenberger, E., Chapellier, E., 2009, Shock Wave and Pulsation Connection in a Monoperiodic CoRoT RR Lyrae Star, American
Institute of Physics Conference Series, 1170, 240

Parviainen, H., Deeg, H., 2011, Detailed Bayesian Analysis of the CoRoT-7 Lightcurve, American Astronomical Society, ESS meeting \#2, \#19.13, 2, 1913

Penz, T., and 11 colleagues, 2008, Mass loss from “Hot Jupiters”—Implications for CoRoT discoveries, Part II: Long time thermal atmospheric evaporation modeling, Planetary and Space Science, 56, 1260

Pinheiro da Silva, L., Rolland, G., Lapeyrere, V., Auvergne, M., 2008, Radiation effects on space-based stellar photometry: theoretical models and empirical results for CoRoT Space Telescope, Monthly Notices of the Royal Astronomical Society, 384, 1337

Pont, F., and 16 colleagues, 2010, The spin-orbit angle of the transiting hot Jupiter CoRoT-1b, Monthly Notices of the Royal Astronomical Society, 402, L1

Pont, F., Aigrain, S., Zucker, S., 2011, Reassessing the radial-velocity evidence for planets around CoRoT-7, Monthly Notices of the Royal Astronomical Society, 411, 1953

Poretti, E., Borsa, F., Rainer, M., Uytterhoeven, K., 2008, The first year of CoRoT in orbit, Memorie della Societa Astronomica Italiana Supplementi, 12, 98

Poretti, E., and 8 colleagues, 2010, Pulsational content and abundance analysis of some δ Scuti stars observed by CoRoT, Astronomische Nachrichten, 331, 1049

Poretti, E., and 21 colleagues, 2009, The tip of the iceberg: the frequency content of the δ Sct star HD 50844 from CoRoT space photometry, American Institute of Physics Conference Series, 1170, 435

Poretti, E., and 23 colleagues, 2009, HD 50844: a new look at δ Scuti stars from CoRoT space photometry, Astronomy and Astrophysics, 506, 85

Poretti, E., and 23 colleagues, 2009, HD 50844 observed by CoRoT (Poretti+, 2009), VizieR Online Data Catalog, 350, 60085

Poretti, E., and 23 colleagues, 2009, HD 50844: the new look of Delta Sct stars from CoRoT space photometry, ArXiv e-prints, arXiv:0906.2628

Poretti, E., and 15 colleagues, 2010, CoRoT light curves of RR Lyrae stars. CoRoT 101128793: long-term changes in the Blazhko effect and excitation of additional modes, Astronomy and Astrophysics, 520, A108

Poretti, E., and 15 colleagues, 2010, CoRoT 101128793 light curves (Poretti+, 2010), VizieR Online Data Catalog, 352, 9108

Poretti, E., and 14 colleagues, 2011, Monitoring a high-amplitude δ Scuti star for 152 days: discovery of 12 additional modes and modulation effects in the light curve of CoRoT 101155310, Astronomy and Astrophysics, 528, A147

Poretti, E., and 14 colleagues, 2011, CoRoT 101155310 light curve (Poretti+, 2011), VizieR Online Data Catalog, 352, 89147

Pricopi, D., Suran, M.~D., 2010, Exploration of Parameter Space for Modeling COROT And Kepler Targets with CESAM Code, Publications de l'Observatoire Astronomique de Beograd, 90, 171

Prsa, A., 2010, Modeling Binary Stars in the Time of Corot and Kepler Missions. (<i>Slovenian Title: Medliranje dvojnci v casu misij Corot in Kepler</i>), Spika, 18, 14

Queloz, D., and 39 colleagues, 2009, The CoRoT-7 planetary system: two orbiting super-Earths, Astronomy and Astrophysics, 506, 303

Queloz, D., and 39 colleagues, 2009, CoRoT-7 radial velocities (Queloz+, 2009), VizieR Online Data Catalog, 350, 60303

R{\'e}gulo, C., Almenara, J.~M., Deeg, H.~J., 2009, Application of the TRUFAS detection algorithm to the first two runs of CoRoT, IAU Symposium, 253, 374

Rauer, H., and 12 colleagues, 2010, Pre-Discovery Observations of CoRoT-1b and CoRoT-2b with the BEST Survey, The Astronomical Journal, 139, 53

Rauer, H., and 45 colleagues, 2009, Transiting exoplanets from the CoRoT space mission. VII. The ``hot-Jupiter''-type planet CoRoT-5b, Astronomy and Astrophysics, 506, 281

Ribeiro, J., 2011, Recent ProAm Campaigns: Be stars, COROT and others, ArXiv e-prints, arXiv:1101.0740

Ripepi, V., and 9 colleagues, 2011, CoRoT 102699796, the first metal-poor Herbig Ae pulsator: a hybrid δ Sct-γ Dor variable?, Monthly Notices of the Royal Astronomical Society, 416, 1535

Ripepi, V., and 29 colleagues, 2010, CoRoT observations of the young open cluster Dolidze 25, Astrophysics and Space Science, 328, 119

Rodriguez, J., Jha, S.~W., Williams, T.~B., 2010, High Time Resolution Observations of the Transiting Planet CoRoT-Exo-1b with SALT, Bulletin of the American Astronomical Society, 42, \#423.04

Rogers, J., Apai, D., Lopez-Morales, M., Sing, D., Burrows, A., Sterzik, M., 2010, Ks-band Detection of Thermal Emission and Color Constraints to the Hot Jupiter CoRoT-1b, Bulletin of the American Astronomical Society, 42, \#328.08

Rogers, J.~C., Apai, D., L{\'o}pez-Morales, M., Sing, D.~K., Burrows, A., 2010, ERRATUM: "Ks-band Detection of Thermal Emission and Color Constraints to CoRoT-1b: A Low-albedo Planet with Inefficient Atmospheric Energy

Redistribution and a Temperature Inversion" <A href="/abs/2009ApJ...707.1707R">(2009, ApJ, 707, 1707)</A>, The Astrophysical Journal, 723, 1825

Rogers, J.~C., Apai, D., L{\'o}pez-Morales, M., Sing, D.~K., Burrows, A., 2009, Ks-Band Detection of Thermal Emission and Color Constraints to CoRoT-1b: A Low-Albedo Planet with Inefficient Atmospheric Energy Redistribution and a Temperature Inversion, The Astrophysical Journal, 707, 1707

Rouan, D., and 10 colleagues, 2010, CoRoT-7b: The First Transiting Super-Earth Fully Characterized in Radius and Mass, Pathways Towards Habitable Planets, 430, 158

Rouan, D., and 42 colleagues, 2012, Transiting exoplanets from the CoRoT space mission . XIX. CoRoT-23b: a dense hot Jupiter on an eccentric orbit, Astronomy and Astrophysics, 537, A54

Rouan, D., 2010, CoRoT : A Mid-Term status Report on the Exoplanets Transit Detection Programme, Bulletin of the American Astronomical Society, 42, 1052

Ryabchikova, T., Fossati, L., Shulyak, D., 2009, Improved fundamental parameters and LTE abundances of the CoRoT solar-type pulsator HD 49933, Astronomy and Astrophysics, 506, 203

Samadi, R., and 9 colleagues, 2010, The CoRoT target HD 49933 . II. Comparison of theoretical mode amplitudes with observations, Astronomy and Astrophysics, 509, A16

Samadi, R., Ludwig, H.-G., Belkacem, K., Goupil, M.~J., Dupret, M.-A., 2010, The CoRoT target HD 49933 . I. Effect of the metal abundance on the mode excitation rates, Astronomy and Astrophysics, 509, A15

Santerne, A., Endl, M., Hatzes, A., Bouchy, F., Moutou, C., Deleuil, M., 2011, Radial velocity follow-up of CoRoT transiting exoplanets, Detection and Dynamics of Transiting Exoplanets, St.~Michel l'Observatoire, France, Edited by F.~Bouchy; R.~D{\'{\i}}az; C.~Moutou; EPJ Web of Conferences, Volume 11, id.02001, 11, 2001

Sarro, L.~M., Debosscher, J., Aerts, C., L{\'o}pez, M., 2009, Comparative clustering analysis of variable stars in the Hipparcos, OGLE Large Magellanic Cloud, and CoRoT exoplanet databases, Astronomy and Astrophysics, 506, 535

Savanov, I.~S., 2010, Magnetic activity of the star Corot-Exo-2a, Astronomy Reports, 54, 437

Schmitt, J., 2009, The active host star of the extrasolar planet COROT-EXO-2b, Chandra Proposal, 2762

Schr{\"o}ter, S., Czesla, S., Wolter, U., M{\"u}ller, H.~M., Huber, K.~F., Schmitt, J.~H.~M.~M., 2011, The corona and companion of CoRoT-2a. Insights from X-rays and optical spectroscopy, Astronomy and Astrophysics, 532, A3

Schwarz, R., Haghighipour, N., Eggl, S., Pilat-Lohinger, E., Funk, B., 2011, Prospects of the detection of circumbinary planets with Kepler and CoRoT using the variations of eclipse timing, Monthly Notices of the Royal Astronomical Society, 414, 2763

Sebastian, D., Guenther, E.~W., 2011, Identifying A Stars in the CoRoT Fields IRa01, LRa01 and LRa02, American Institute of Physics Conference Series, 1331, 329

Sebastian, D., Guenther, E.~W., 2010, Identifying A-stars in the CoRoT-fields IRa01, LRa01 and LRa02, ArXiv e-prints, arXiv:1010.2644

Semaan, T., Neiner, C., Martayan, C., Debosscher, J., Sarro, L.~M., 2009, Giraffe observations of CoRoT variable stars, SF2A-2009: Proceedings of the Annual meeting of the French Society of Astronomy and Astrophysics, 291

Semaan, T., Neiner, C., Martayan, C., Debosscher, J., Sarro, L.~M., Fr{\'e}mat, Y., Aerts, C., 2009, Characterization and parameter determination of CoRoT variable stars with FLAMES, American Institute of Physics Conference Series, 1170, 391

Semaan, T., Martayan, C., Fr{\'e}mat, Y., Hubert, A.-M., Soto, J.~G., Neiner, C., Zorec, J., 2011, Spectral and photometric study of Be Stars in the first exoplanet fields of CoRoT, IAU Symposium, 272, 547

Silva-V{\'a}lio, A., 2009, Starspot detection from planetary transits observed by CoRoT, Revista Mexicana de Astronomia y Astrofisica Conference Series, 35, 13

Silva-Valio, A., Lanza, A.~F., 2011, Time evolution and rotation of starspots on CoRoT-2 from the modelling of transit photometry, Astronomy and Astrophysics, 529, A36

Silva-Valio, A., Lanza, A.~F., Alonso, R., Barge, P., 2010, Properties of starspots on CoRoT-2, Astronomy and Astrophysics, 510, A25

Sing, D.~K., 2010, Stellar limb-darkening coefficients for CoRot and Kepler, Astronomy and Astrophysics, 510, A21

Snellen, I.~A.~G., de Mooij, E.~J.~W., Burrows, A., 2010, Bright optical day-side emission from extrasolar planet CoRoT-2b, Astronomy and Astrophysics, 513, A76

Snellen, I.~A.~G., de Mooij, E.~J.~W., Albrecht, S., 2009, The changing phases of extrasolar planet CoRoT-1b, Nature, 459, 543

Sokolovsky, K., Maceroni, C., Hareter, M., Damiani, C., Balaguer-N{\'u}{\~n}ez, L., Ribas, I., 2010, A new eclipsing binary system with a pulsating component detected by CoRoT, Communications in Asteroseismology, 161, 55

Solano, E., and 24 colleagues, 2009, The LAEX and NASA portals for CoRoT public data, Astronomy and Astrophysics, 506, 455

Soriano, M., Vauclair, S., Vauclair, G., Laymand, M., 2008, Seismic predictions for the CoRoT main target HD 52265, Journal of Physics Conference Series, 118, 012073

Stauffer, J., and 40 colleagues, 2011, YSOVAR II: Mapping YSO Inner Disk Structure in NGC 2264 with Simultaneous Spitzer and CoRoT Time Series Photometry, Spitzer Proposal ID \#80040, 80040

Surace, C., and 8 colleagues, 2008, The oversampling mode for CoRoT exo-field observations, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 7019,

Szab{\'o}, R., Koll{\'a}th, Z., Moln{\'a}r, L., Benk{\H o}, J.~M., Szabados, L., 2009, Strange and Low Amplitude Cepheid Candidates in the CoRoT Observations, American Institute of Physics Conference Series, 1170, 102

Szab{\'o}, R., Papar{\'o}, M., Benk{\H o}, J.~M., Chadid, M., Kolenberg, K., Poretti, E., 2009, Amplitude and Phase Modulation in CoRoT RR Lyrae Stars, American Institute of Physics Conference Series, 1170, 291

Tal-Or, L., and 32 colleagues, 2011, CoRoT LRa02_E2_0121: Neptune-size planet candidate turns into a hierarchical triple system with a giant primary, Astronomy and Astrophysics, 534, A67

Tingley, B., and 48 colleagues, 2011, Transiting exoplanets from the CoRoT space mission. XVI. CoRoT-14b: an unusually dense very hot Jupiter, Astronomy and Astrophysics, 528, A97

Triaud, A.~H.~M.~J., and 15 colleagues, 2009, The Rossiter-McLaughlin effect of CoRoT-3b and HD 189733b, Astronomy and Astrophysics, 506, 377

Uytterhoeven, K., and 17 colleagues, 2011, The variability of the CoRoT target HD171834: gamma Dor pulsations and/or activity?, ArXiv e-prints, arXiv:1111.1840

Uytterhoeven, K., and 24 colleagues, 2008, The γ Doradus CoRoT target HD 49434. I. Results from the ground-based campaign, Astronomy and Astrophysics, 489, 1213

Uytterhoeven, K., and 14 colleagues, 2009, The asteroseismic ground-based observational counterpart of CoRoT, American Institute of Physics Conference Series, 1170, 327

Uytterhoeven, K., and 15 colleagues, 2008, Close-up of primary and secondary asteroseismic CoRoT targets and the ground-based follow-up observations, Journal of Physics Conference Series, 118, 012077

V{\'a}zquez Rami{\'o}, H., Mathur, S., R{\'e}gulo, C., Garc{\'{\i}}a, R.~A., 2011, Effect of line-of-sight inclinations on the observation of solar activity cycle: Lessons for CoRoT & Kepler, Journal of Physics Conference Series, 271, 012056

Valencia, D., Ikoma, M., Guillot, T., Nettelmann, N., 2010, Composition and fate of short-period super-Earths. The case of CoRoT-7b, Astronomy and Astrophysics, 516, A20

Valencia, D., Ikoma, M., Guillot, T., Nettelmann, N., 2009, Composition and Fate of Short-period Super-earths: The Case of CoRoT-7b, AAS/Division for Planetary Sciences Meeting Abstracts \#41, 41, \#08.05

van Grootel, V., Charpinet, S., Fontaine, G., Green, E.~M., Brassard, P., 2010, Structural and core parameters of the hot B subdwarf KPD 0629-0016 from CoRoT g-mode asteroseismology, Astronomy and Astrophysics, 524, A63

Var{\'o}n, C., Alzate, C., Suykens, J.~A.~K., Debosscher, J., 2011, Kernel spectral clustering of time series in the CoRoT exoplanet database, Astronomy and Astrophysics, 531, A156

Velasco Trasmonte, A., Guti{\'e}rrez S{\'a}nchez, R., Solano M{\'a}rquez, E., 2011, COROT and OMC archives, Highlights of Spanish Astrophysics VI, 762

Vere{\v s}, P., Budaj, J., Vil{\'a}gi, J., Gal{\'a}d, A., Korno{\v s}, L., 2009, Relative photometry of transiting exoplanet COROT-Exo-2b, Contributions of the Astronomical Observatory Skalnate Pleso, 39, 34

von Braun, K., and 19 colleagues, 2011, The NStED Periodogram Service and Interface for Public CoRoT Data, ArXiv e-prints, arXiv:1107.1933

Wagner, F.~W., Sohl, F., R{\"u}ckriemen, T., Rauer, H., 2011, Physical state of the deep interior of the CoRoT-7b exoplanet, IAU Symposium, 276, 193

Wagner, F.~W., Sohl, F., Rauer, H., Hussmann, H., Grott, M., 2010, Interior structure models of terrestrial exoplanets and application to CoRoT-7 b, Highlights of Astronomy, 15, 708

Wolter, U., Schmitt, J.~H.~M.~M., Huber, K.~F., Czesla, S., M{\"u}ller, H.~M., Guenther, E.~W., Hatzes, A.~P., 2009, Transit mapping of a starspot on CoRoT-2. Probing a stellar surface with planetary transits, Astronomy and Astrophysics, 504, 561

Wuchterl, G., 2011, A theoretical perspective on the ultra-compact systems of CoRoT and Kepler, EPSC-DPS Joint Meeting 2011, held 2-7 October 2011 in Nantes, France.~<A "http://meetings.copernicus.org/epscdps2011">http://meetings.copernicus.org/epsc-dps2011</A>, p.1584, 1584

Wuchterl, G., 2010, Masses and Radii for CoRoT-Planet Populations from Formation Theory, EGU General Assembly Conference Abstracts, 12, 12507

Zhao, M., Monnier, J.~D., Swain, M.~R., Barman, T., Hinkley, S., 2012, Ground-based Detections of Thermal Emission from CoRoT-1b and WASP-12b, The Astrophysical Journal, 744, 122

Ziethe, R., Wurz, P., Lammer, H., 2010, The expected interior and surface environment of CoRoT-7b, AGU Fall Meeting Abstracts, A1590

Zwintz, K., and 10 colleagues, 2011, Pulsational Analysis of V 588 Mon and V 589 Mon Observed with the MOST and CoRoT Satellites, The Astrophysical Journal, 729, 20