Content Description of the COROTSKY Asteroseismology and Exoplanet Search Databases

This document

This document summarizes the content of the seismology and exoplanet search databases that is accessible through the Web with the tool COROTSKY. These databases collect a large amount of informations obtained over the years from various ground based observations and thorough analyses dedicated to the preparation of COROT for both the seismology and the exoplanet search programs. Such informations are crucial for an efficient selection of the stars that COROT will monitor. For stars lacking such detailed informations, data from pre-existing catalogs are used to complete the databases. These additions come either from SIMBAD (CDS Strasbourg) for the seismology database or from the USNOA-2 catalog for the exoplanet search database.

General informations on the seismology database

The COROT asteroseismology database contains all the stars referenced in SIMBAD (11,921 objects) brighter than $m_V = 9.5$ that are found within 15 degrees around the positions RA(2000) = 6h 50m, DEC = 0° (anti-centre direction; 7,443 objects) and RA(2000) = 18h 50m, DEC = 0° (centre direction; 4,468 objects). All these stars are *a priori* potential targets for the asteroseismology program, although only a small fraction will be effectively selected for observations with COROT, either as targets for the short runs or as targets for the long runs.

The COROTSKY database now includes most of the informations that the end user needs for the preparation of observing programs with COROT in the seismology channel. Updates of the database with addition of still missing information and correction of eventual errors will continue to be performed regularly in the future, however. With each update, this document will be modified according to the corresponding changes.

In this document, the content of the seismology database is described according to the graphical interface that is provided by the tool COROTSKY to visualize the various informations available for each star. When a specific object has been selected, these informations are accessible through a set of three windows: the "main parameters" window which shows the most important quantities needed to evaluate the scientific interest of the star, the "other parameters" window that shows less important quantities that may be of some use in specific cases, and the "details on main parameters" window which contain various quantities related to the main parameters (e.g. some error estimates and informations on the origin of the data) which may be useful but are not of prime interest.

General informations on the exoplanet search database

The exoplanet search database is made of two parts. The first, and most important part has been extracted from the EXODAT database provided by the ECOWG and which contains data derived from specific ground based observations. The EXODAT data will cover all the sky regions accessible to the CCDs devoted to the

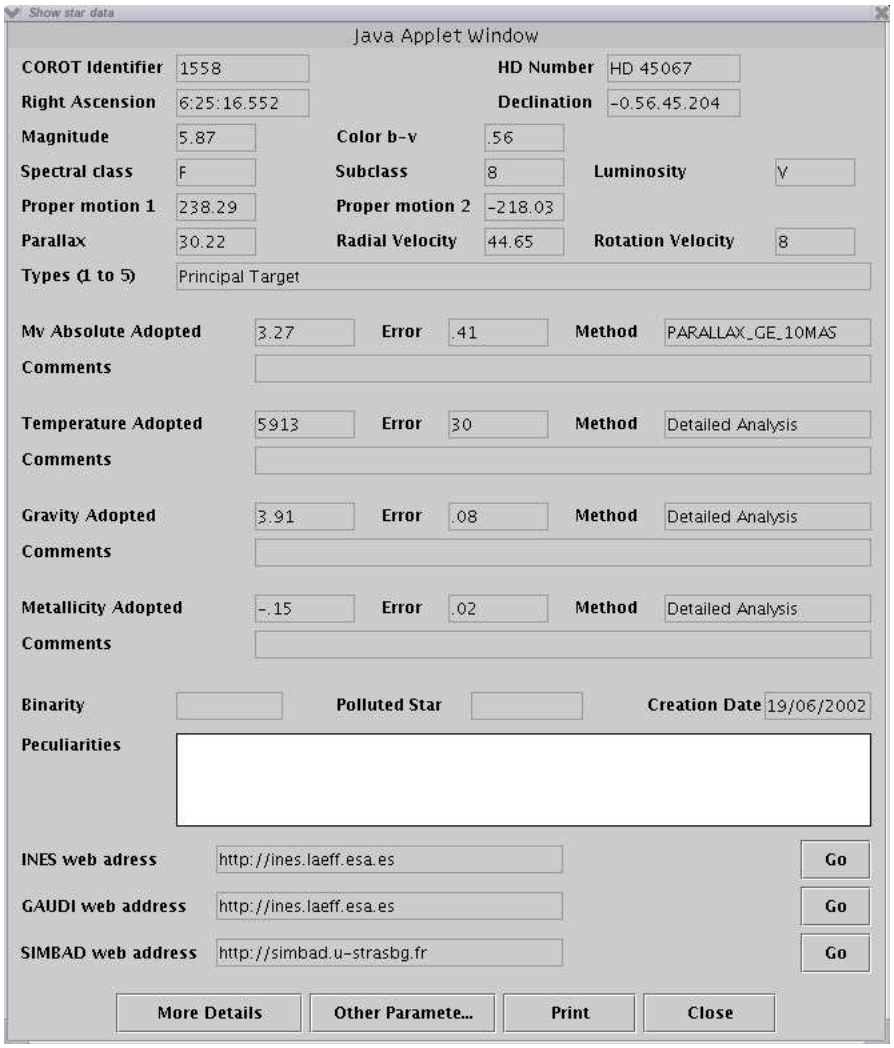
exoplanet search program around the principal seismology targets of COROT. This part is not yet fully implemented as it requires a huge amount of work from the ECOWG to treat all the hundred of thousand stars involved (down to magnitude $m_V = 16.5$). Regular updates of this part of the database will therefore occur in the future as new data from EXODAT become available. The tool COROTSKY provides a function called "view populated regions" that allows to visualize which parts of the sky are effectively covered by the EXODAT data. As a complement, in the regions where no EXODAT data exist (i.e., far away from the principal seismology targets), a second part for the database has been built from the USNOA-2 catalog and covers the entire domain accessible to COROT down to magnitude $m_V = 19$. These data will be mostly useful for the short runs.

The Asteroseismology Database

The "main parameters" window

This window gives access to the most relevant data available for a given star in the Corotsky database. Each field is briefly described below.

Figure 1: Main Parameters Window



COROT Identifier: Specific COROT identifying number for the star (for internal use only).

Usual Name: Most usual name used for the star. In general, we give the identifier from the HD catalog, if available. If not, this is the first identifier returned by the SIMBAD database. Note that the Corotsky database has a cross reference table built in, with all the known identifiers for any given star (based on SIMBAD). To search for a specific star by name in COROTSKY, one can enter any of its identifier and COROTSKY will find it.

Right Ascension: Right ascension of the star (year 2000). Source is SIMBAD.

Declination: Declination of the star (year 2000). Source is SIMBAD.

Magnitude: Apparent magnitude of the star in the V-band

Color B-V: (B-V) color index. Obtained from the HIPPARCOS catalog or calculated from SIMBAD (when a B-band measurement is available). A few stars in the database have no (B-V) measurements available.

Spectral Class, Subclass, Luminosity: Spectral type of the star (class, subclass and luminosity class). Source is SIMBAD. May be incomplete for some stars. In some rare cases where no information on the spectral type of the star is available, the spectral class is set to "Z" (for internal purposes).

Proper Motion 1: Proper motion measurement (Right Ascension component). If available, source is SIMBAD.

Proper Motion 2: Proper motion measurement (Declination component). If available, source is SIMBAD.

Parallax: Parallax Measurement. Source is the HIPPARCOS catalogue. Some stars in the database have no parallax measurement available.

Radial Velocity: Radial Velocity measurement (if available). Sources are SIMBAD and results from spectroscopic ground based observations. In that later case, the values come from the analysis of the spectroscopic data obtained at/with OHP/ELODIE, LaSilla/FEROS, and TNG/SARG.

Rotation Velocity: $V \sin i$ measurement (if available). These values come from the analysis of the spectroscopic data obtained at/with OHP/ELODIE, LaSilla/FEROS, and TNG/SARG. For "slow" rotators ($V \sin i < 200$ km/s), the method by Catala et al. is used to measure this quantity from the spectra. For "rapid" rotators ($V \sin i > 200$ km/s), the method of Hubert et al. is preferred.

Type: Some stars of specific type (such as the primary candidates of COROT, or various classes of pulsating stars, eclipsing binaries, and so on) are of particular interest for COROT. Stars that are members of such classes are identified in this field. The current list of star types is given in Table 1.

Mv Absolute Adopted, Error, Method, Comments: This field contains the "best" estimation – hence the adopted value – for the absolute magnitude M_V of the star. This quantity can be obtained/calculated from different sources and a hierarchy between the various measurements has been set up in order to select a single value. How this selection is made is explained below, along with the different methods employed. Also indicated are the error estimate associated with the adopted value, the method used to obtain this value, and an eventual comment associated with this measurement.

Temperature Adopted, Error, Method, Comments: This field contains the "best" estimation – hence the adopted value – for the effective temperature $T_{\rm eff}$ of the star. This quantity can be obtained/calculated from different sources and a hierarchy between the various measurements has been set up in order to select a single value. How this selection is made is explained below, along with the different methods employed. Also indicated are the error estimate associated with the adopted value, the method used to obtain this value, and an eventual comment associated with this measurement. Note that a comment can be given with no adopted value shown. This occurs when possible values exist but are considered unreliable. In those cases, more informations can be obtained by looking at the "other parameters" window.

Gravity Adopted, Error, Method, Comments: This field contains the "best" estimation – hence the adopted value – for the surface gravity $\log g$ of the star. This quantity can be obtained/calculated from different sources and a hierarchy between the various measurements has been set up in order to select a single value. How this selection is made is explained below, along with the different methods employed. Also indicated are the error estimate associated with the adopted value, the method used to obtain this value, and an eventual comment associated with this measurement. Note that a comment can be given with

Table 1: List of Star Types in the seismology channel

#	Star type	Catalog reference
1	Principal target	The COROT Seismology Working Group
2	Ap star	W.W. Weiss, private communication
3	Semi regular variable	Poretti et al. 2003, A&A 406, 203
4	Be star	Jaschek M., Egret D., 1982, IAU Symp. 98, 261 Anne-Marie Hubert, private communication
5	Beta Cephei (field)	C. Aerts, private communication
6	Beta Cephei (LPV)	C. Aerts, private communication
7	Beta Cephei (photometric)	C. Aerts, private communication
8	Chromospherical active binary	K. Strassmeier, see: http://www.aip.de/groups/activity/CABS2/
9	Delta Scuti	Rodriguez E., Lopez-Gonzalez M.J., Lopez de Coca P., 2000, ASP Conf. Series Vol. 210, p.499
10	Eclipsing binary	Peter Reegen, private communication
11	Star with exo-planets	J. Schneider, see: http://cfa-www.harvard.edu/planets/catalog.html
12	Gamma Doradus (candidate)	G. Handler, private communication
13	Gamma Doradus	G. Handler, private communication
14	HgMn star	Sylvain Turcotte, private communication
15	Hipparcos periodic variable	HIPPARCOS catalog
16	Hipparcos possible microvariable	HIPPARCOS catalog
17	Hipparcos unsolved variable	HIPPARCOS catalog
18	HST guide star (constant)	K. Zwintz, private communication
19	HST guide star (interesting)	K. Zwintz, private communication
20	Lambda Bootis	E. Paunzen, private communication
21	Maia candidate	C. Aerts, private communication
22	Mira star	Thomas Lebzelter, private communication
23	MOST target	MOST homepage
24	PMS emission-line star (Orion)	K. Zwintz, private communications
25	Wolf-Rayet star	Van der Hucht, New Astronomy Reviews 45, 135 (2001)
26	Binary	Carla Maceroni, private communications

no adopted value shown. This occurs when possible values exist but are considered unreliable. In those cases, more informations can be obtained by looking at the "other parameters" window.

Metallicity Adopted, Error, Method, Comments: This field contains the "best" estimation – hence the adopted value – for the metallicity [Fe/H] of the star. This quantity can be obtained/calculated from different sources and a hierarchy between the various measurements has been set up in order to select a single value. How this selection is made is explained below, along with the different methods employed. Also indicated are the error estimate associated with the adopted value, the method used to obtain this value, and an eventual comment associated with this measurement. Note that a comment can be given with no adopted value shown. This occurs when possible values exist but are considered unreliable. In those cases, more informations can be obtained by looking at the "other parameters" window.

Binarity: Indication if this star is the member of a double or multiple system. Part of these informations come from ground based spectroscopic observations done at OHP with ELODIE, at La Silla with FEROS, and at TNG with SARG (C.Catala, E. Poretti et al.).

Peculiarities: Any recorded peculiarities about the star.

Polluted star: Flag indicating if this star is polluted by a nearby, fainter star. Part of this information come from dedicated observations conducted at CFHT with AOB (PI: C.Catala).

Creation date: Date indicating the creation or the last update of this entry in the database.

INES web address: Link to the INES database.

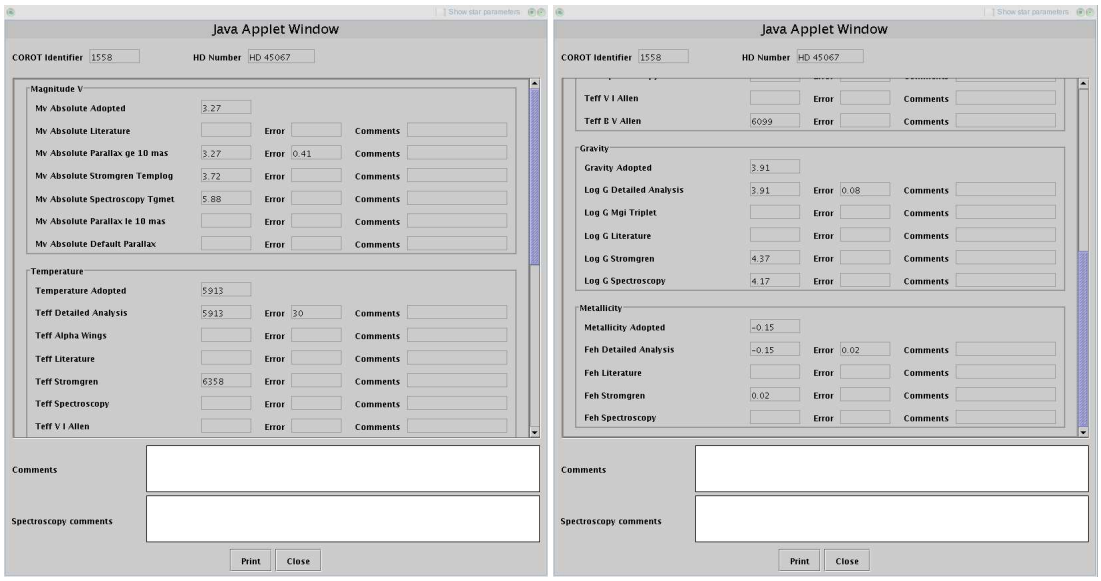
GAUDY web address: Link to the GAUDY database. Some of the stars in the COROTSKY database have been observed both spectroscopically (at/with OHP/ELODIE, LaSilla/FEROS, and TNG/SARG) and/or with Strömgren photometry. For these objects, the spectra and photometric data can be accessed directly at this site. Note that a specific login and password are required to have access to the GAUDY database.

SIMBAD web address: Link to the CDS/SIMBAD database.

The "other parameters" window

This window gives access to additional data available for a given star in the COROTSKY database. Each field is briefly described below.

Figure 2: Other Parameters Window



COROT Identifier: Specific COROT identifying number for the star (for internal use only).

Usual Name: Most usual name used for the star. In general, we give the identifier from the HD catalog, if available. If not, this is the first identifier returned by the SIMBAD database. Note that the COROTSKY database has a cross reference table built in, with all the known identifiers for any given star (based on SIMBAD). To search for a specific star by name in COROTSKY, one can enter any of its identifier and COROTSKY will find it.

Absolute Magnitude Determination:

Mv Absolute Literature, error, comments: In some specific cases, the absolute magnitude of the star has already been accurately measured and is published in the literature. When such a value has been found and is judged accurate (C. Soubiran et al.), it is given in this field along with the associated error estimate and eventual comments.

Mv Absolute Parallax ge 10 mas, error, comments: For stars having an Hipparcos parallax larger than 10 milli arcsec, M_V is computed with the relation $M_V = m_V + 5 + 5\log(\pi/1000)$, where π is the parallax in mas. Note that in this evaluation of M_V, we assume no absorption from interstellar material and the value obtained can be overestimated (the star might be intrinsically brighter than it looks like). With this method, error on M_V is estimated from the uncertainty on the parallax solely, with the relation $\Delta M_V = 13.591409(\Delta\pi/\pi)$.

Mv Absolute Strömgren/Templogg, error, comments: Value of M_V determined from a dedicated, ground based program of Strömgren photometry (R. Garrido et al.) analyzed with the code "templogg" (Weiss et al.). Only a fraction (~ 1000) of the stars in the database have a value derived from this method. Associated errors and comments are also given.

Mv Absolute Spectroscopy/Tgmet, error, comments: Value of M_V determined from a dedicated, ground based program of high resolution spectroscopy (C.Catala, E. Poretti et al.) and analyzed with the code "tgmet" (C. Soubiran et al.). Only a fraction (~ 1000) of the stars in the database are expected to have a value derived from this method. Associated errors and comments are also given.

Mv Absolute Parallax le 10 mas, error, comments: For stars having an Hipparcos parallax less than 10 mas but larger than 3 mas, M_V is computed with the relation $M_V = m_V + 5 + 5\log(\pi/1000)$, where π is the parallax in mas. In this evaluation of M_V, we assume no absorption from interstellar material and the value obtained can be overestimated (the star might be intrinsically brighter than it looks like). With this method, error on M_V is estimated from the uncertainty on the parallax solely, with the relation $\Delta M_V = 13.591409(\Delta\pi/\pi)$.

Mv Absolute Parallax Default, error, comments: For stars having an Hipparcos parallax less than 3 mas or no parallax measurement, a default value of $\pi = 3$ mas is assumed and M_V is computed with the relation $M_V = m_V + 5 + 5\log(3/1000)$. In this evaluation of M_V, no absorption from interstellar material is taken into account. Moreover care must be issued concerning the values derived from this method. No numerical error estimate is given in this case, but it should be considered large. A specific comment indicates when a star has an HIPPARCOS parallax that is less than 3 mas (as opposed to stars with no parallax measurement at all).

Mv Absolute Adopted, error, comments: In order to select a single, so-called adopted value for the absolute magnitude of the star, a hierarchy between the various methods mentioned above have been adopted. The hierarchy by order of preference is the following:

Priority	Method	Conditions/Comments
1	literature	Only for a few stars
2	Parallax $\pi > 10$ mas	
3	Strömgren/Templog	$m_V \leq 8$
4	Spectroscopy/Tgmet	$m_V \leq 8$, $T_{\rm eff} \leq 8000$ K, $V \sin i \leq 30$ km/s
5	Parallax $\pi \leq 10$ mas	$3 \leq \pi \leq 10$ (mas)
6	Parallax Default	$\pi < 3$ mas or no value

Consequently, if a value from method 1 is available and if the eventual conditions for validity are fulfilled, this value is adopted (as well as its associated errors and comments). If no value is available or if the conditions are not fulfilled, then method 2 is checked out, and so on...

Effective Temperature Determination:

Teff Detailed Analysis, error, comments: Value of $T_{\rm eff}$ (and associated error and comments) determined from a very careful analysis of high resolution, high signal to noise spectra (P. Magain et al.). Only available for a handful of stars in the database.

Teff Alpha Wings, error, comments: Value of $T_{\rm eff}$ (and associated error and comments) determined from the detailed analysis of the H_α line wings (C. Van't Veer, C. Catala et al.). Only accurate for effective temperatures between 5500 K and 8500 K.

Teff Literature, error, comments: Value of $T_{\rm eff}$ (and associated error and comments) found in the literature and judged accurate (C. Soubiran et al.). Only available for a few stars in the database.

Teff Strömgren/Templog, error, comments: Value of $T_{\rm eff}$determined from a dedicated, ground based program of Strömgren photometry (R. Garrido et al.) analyzed with the code "templogg" (Weiss et al.). Only a fraction (~ 1000) of the stars in the database have a value derived from this method. Associated errors and comments are also given.

Teff Spectroscopy/Tgmet, error, comments: Value of $T_{\rm eff}$ determined from a dedicated, ground based program of high resolution spectroscopy (C.Catala, E. Poretti et al.) and analyzed with the code "tgmet"

(C. Soubiran et al.). Only a fraction ($\sim$ 1000) of the stars in the database are expected to have a value derived from this method. Associated errors and comments are also given.

Teff V-I/Allen, error, comments: Not yet implemented.

Teff B-V/Allen, error, comments: Value of $T_{\rm eff}$ (and associated comments) derived from the main sequence stars (B-V)/$T_{\rm eff}$ conversion table found in Allen (Astrophysical Quantities 1976, 4th Edition). No value is given when the star has no (B-V) color information or when the (B-V) is far outside the conversion table limits. When the (B-V) is slightly outside the table (± 0.5 off the largest/smallest limit), the $T_{\rm eff}$ value is extrapolated. No numerical error is given, but the uncertainty is relatively large with this method and one must be careful when relying on these values.

Teff Adopted, error, comments: In order to select a single, so-called adopted value for the effective temperature of the star, a hierarchy between the various methods mentioned above have been adopted. The hierarchy by order of preference is the following:

Priority	Method	Conditions/Comments
1	Detailed analysis	Only for a few stars
2	H_α line wings	5500 K $\leq T_{\rm eff} \leq$ 8500 K
3	Literature	Only for a few stars
4	Strömgren/Templog	$m_V \leq 8$
5	Spectroscopy/Tgmet	$m_V \leq 8$, $T_{\rm eff} \leq 8000$ K, $V \sin i \leq 30$ km/s
6	V-I/Allen	For a few stars
7	B-V/Allen	Almost for all stars

Consequently, if a value from method 1 is available and if the eventual conditions for validity are fulfilled, this value is adopted (as well as its associated errors and comments). If no value is available or if the conditions are not fulfilled, then method 2 is checked out, and so on...

Surface Gravity Determination:

Log g Detailed Analysis, error, comments: Value of $\log g$ (and associated error and comments) determined from a very careful analysis of high resolution, high signal to noise spectra (P. Magain et al.). Only available for a handful of stars in the database.

Log g MgI Triplet, error, comments: Not yet implemented.

Log g Literature, error, comments: Value of $\log g$ (and associated error and comments) found in the literature and judged accurate (C. Soubiran et al.). Only available for a few stars in the database.

Log g Strömgren/Templog, error, comments: Value of $\log g$ determined from a dedicated, ground based program of Strömgren photometry (R. Garrido et al.) analyzed with the code "templogg" (Weiss et al.). Only a fraction ($\sim$ 1000) of the stars in the database have a value derived from this method. Associated errors and comments are also given.

Log g Spectroscopy/Tgmet, error, comments: Value of $\log g$ determined from a dedicated, ground based program of high resolution spectroscopy (C.Catala, E. Poretti et al.) and analyzed with the code "tgmet" (C. Soubiran et al.). Only a fraction ($\sim$ 1000) of the stars in the database are expected to have a value derived from this method. Associated errors and comments are also given.

Log g Adopted, error, comments: In order to select a single, so-called adopted value for the surface gravity of the star, a hierarchy between the various methods mentioned above have been adopted. The hierarchy by order of preference is the following:

Priority	Method	Conditions/Comments

1	Detailed analysis	Only for a few stars
2	MgI triplet	Only for a few stars
3	Literature	Only for a few stars
4	Strömgren/Templog	$m_V \leq 8$
5	Spectroscopy/Tgmet	$m_V \leq 8$, $T_{\rm eff} \leq 8000$ K, $V \sin i \leq 30$ km/s

Consequently, if a value from method 1 is available and if the eventual conditions for validity are fulfilled, this value is adopted (as well as its associated errors and comments). If no value is available or if the conditions are not fulfilled, then method 2 is checked out, and so on...

Metallicity Determination:

[Fe/H] Detailed Analysis, error, comments: Value of [Fe/H] (and associated error and comments) determined from a very careful analysis of high resolution, high signal to noise spectra (P. Magain et al.). Only available for a handful of stars in the database.

[Fe/H] Literature, error, comments: Value of [Fe/H] (and associated error and comments) found in the literature and judged accurate (C. Soubiran et al.). Only available for a few stars in the database.

[Fe/H] Strömgren/Templog, error, comments: Value of [Fe/H] determined from a dedicated, ground based program of Strömgren photometry (R. Garrido et al.) analyzed with the code "templogg" (Weiss et al.). Only a fraction (~ 1000) of the stars in the database have a value derived from this method. Associated errors and comments are also given.

[Fe/H] Spectroscopy/Tgmet, error, comments: Value of [Fe/H] determined from a dedicated, ground based program of high resolution spectroscopy (C.Catala, E. Poretti et al.) and analyzed with the code "tgmet" (C. Soubiran et al.). Only a fraction (~ 1000) of the stars in the database are expected to have a value derived from this method. Associated errors and comments are also given.

[Fe/H] Adopted, error, comments: In order to select a single, so-called adopted value for the metallicity of the star, a hierarchy between the various methods mentioned above have been adopted. The hierarchy by order of preference is the following:

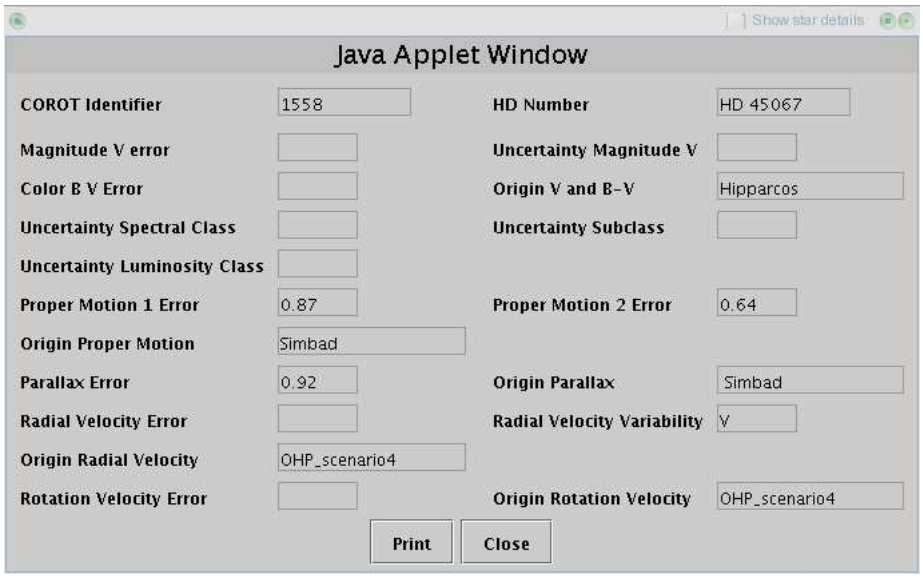
Priority	Method	Conditions/Comments
1	Detailed analysis	Only for a few stars
2	Literature	Only for a few stars
3	Strömgren/Templog	$m_V \leq 8$
4	Spectroscopy/Tgmet	$m_V \leq 8$, $T_{\rm eff} \leq 8000$ K, $V \sin i \leq 30$ km/s

Consequently, if a value from method 1 is available and if the eventual conditions for validity are fulfilled, this value is adopted (as well as its associated errors and comments). If no value is available or if the conditions are not fulfilled, then method 2 is checked out, and so on...

The “details on main parameters” window

This window gives access to additional details associated with the main parameters available for a given star in the Corotsky database. Each field is briefly described below.

Figure 3: Details on Main Parameters Window



COROT ID: Specific COROT identifying number for the star (for internal use only).

Magnitude V error: Error estimate on the V magnitude.

Color B-V Error: Error estimate on the B-V color index.

Origin B-V: Origin of the B-V color value (SIMBAD or computed from separate B and V measurements).

Uncertainty Spectral Class:

Proper Motion 1 Error: Error estimate on proper motion (Right Ascension component)

Proper Motion 2 Error: Error estimate on proper motion (Declination component)

Proper Motion Origin: Origin of the proper motion value (SIMBAD)

Parallax Error: Error estimate on parallax

Parallax Origin: Origin of the parallax value (SIMBAD/HIPPARCOS catalog)

Radial Velocity Error: Error estimate on the radial velocity measurement.

Radial Velocity Variability: This field will be removed in a future update

Radial Velocity Origin: Origin of the radial velocity measurement (SIMBAD, specific ground based observations, ...)

Rotation Velocity Error: Error estimate on the rotation velocity ($V \sin i$)

Rotation Velocity Origin: Origin of the $V \sin i$ measurement (Simbad, specific ground based observations, ...)

The Exoplanet Search Database

This section describes the information provided for each star in the Exoplanet search database.

Part extracted from EXODAT

COROT Identifier: Specific COROT identifying number for the star (for internal use only).

Right Ascension: Right ascension of the star (year 2000).

Right Ascension error: Error estimate on the right ascension.

Declination: Declination of the star (year 2000).

Declination error: Error estimate on the declination.

Type: Some stars of specific type (such as pulsating stars, eclipsing binaries, and so on) are of particular interest for COROT in the framework of the Additional Programs. Stars that are members of such classes are identified in this field. The list of star types in the exoplanet channel will be available soon.

Magnitude B, Error, Origin: Apparent magnitude of the star in the B-band, associated error and origin of the measurement.

Magnitude V, Error, Origin: Apparent magnitude of the star in the V-band, associated error and origin of the measurement.

Magnitude R, Error, Origin: Apparent magnitude of the star in the R-band, associated error and origin of the measurement.

Magnitude I, Error, Origin: Apparent magnitude of the star in the I-band, associated error and origin of the measurement.

Color Temperature, Error: Temperature evaluated from the color indices and associated error.

Spectral Type, Luminosity Class: Spectral classification derived from the color indices.

Luminosity Quality Flag: Indicator of the reliability of the spectral classification.

Binarity, Comments: Indicator of the binary nature of the star and associated comments.

Variability Flag: Indicator of the variability of the star.

Variability Min, Max: Minimum and maximum value of the apparent magnitude V (i.e., amplitude of the variability).

Contamination Level: Indicator of the degree of contamination of the star by background objects or by bright nearby stars.

Creation date: Date indicating when this entry was created.

Update date: Date indicating the last update of this entry in the database.

Part extracted from existing catalogs

COROT Identifier: Specific COROT identifying number for the star (for internal use only).

Catalog Origin: Name of the catalog from which the data are taken (the catalog USNOA-2 has been used).

Catalog Identifier: Identifier of the star in the source catalog.

Right Ascension: Right ascension of the star (year 2000).

Declination: Declination of the star (year 2000).

Magnitude B: Apparent magnitude of the star in the B-band

Magnitude R: Apparent magnitude of the star in the R-band

Creation date: Date indicating when this entry was created.

Update date: Date indicating the last update of this entry in the database.

History

2003-10-01: First version of the document.
2004-09-07: Minor updates for the asteroseismology part.
Addition of a content description of the exoplanet search database.