The red-giant CoRoT target HD181907

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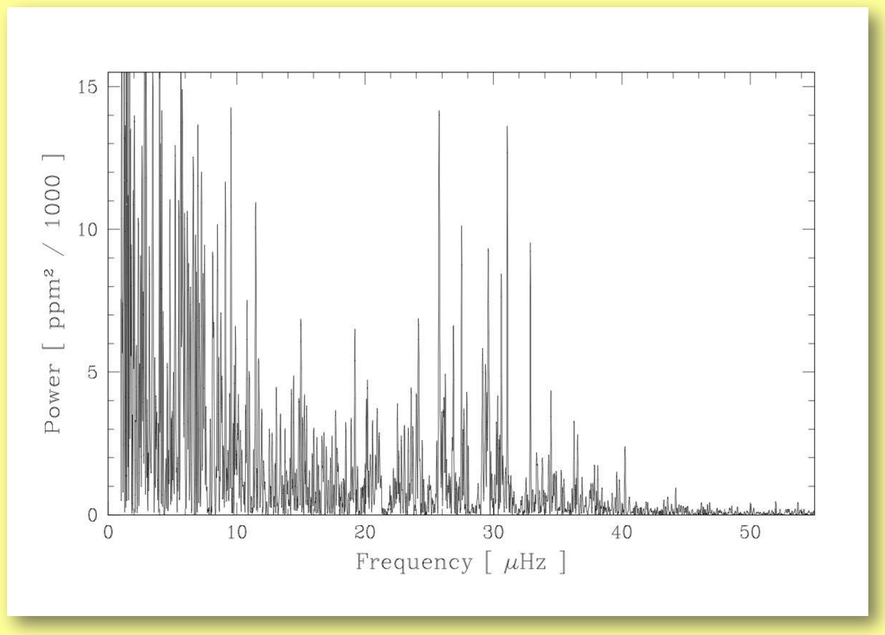
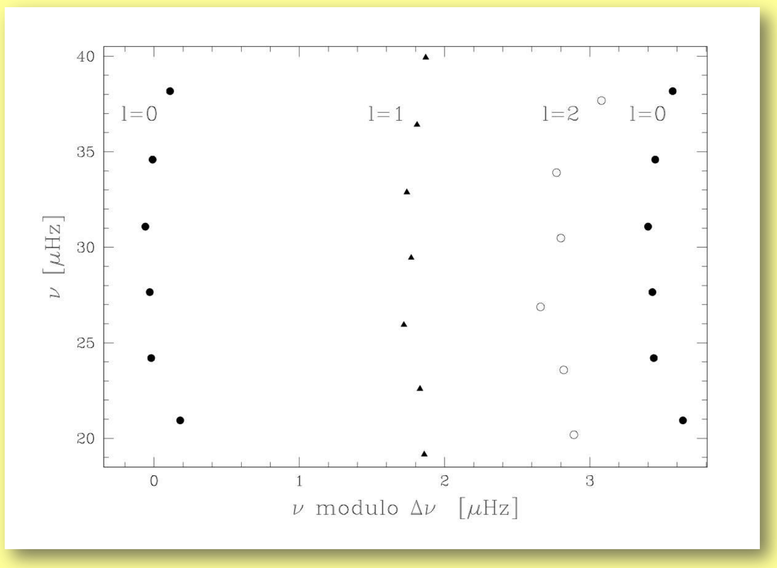
HD181907 is a bright [V=5.8] red giant observed by CoRoT in the seismo field of the first long run. The outstanding CoRoT light curve allowed the detection of several solar-like oscillation modes (both radial and non-radial). On top of these seismic constraints, our observational knowledge on HD181907 benefits as well from a precise parallax and detailed spectroscopic constraints. We present all the observational constraints that are available for the theoretical modelling of this most promising target.

Seismic constraints: CoRoT observations

Power spectrum of the giant star HD181907 which was observed during the first 150d-long run (Lrc01) in the CoRoT seismofield. Oscillation modes are clearly visible between 20 and 40 μHz with a regularity near 1.7 μHz corresponding to half the large separation. The 380760 measurements lead to a "high-frequency" noise (60-80 μHz) of only 5 ppm.

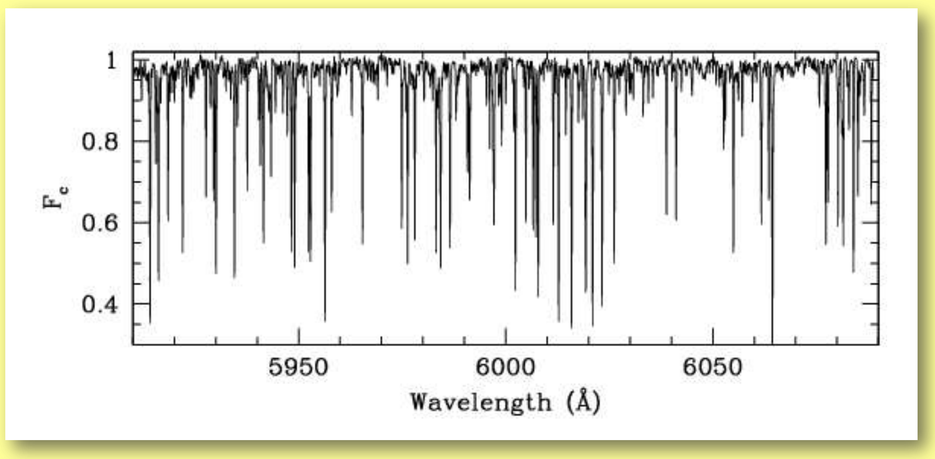




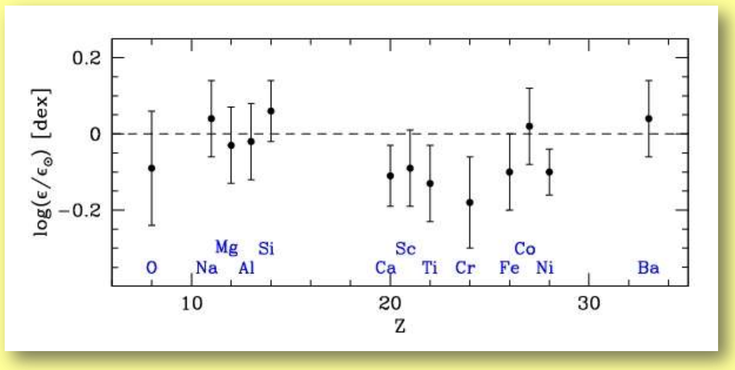
Echelle diagram of the significant frequencies. Three separate vertical ridges, interpreted as l=0,1 and 2 modes, clearly appear in the diagram.

Spectroscopic constraints

A high-resolution spectrum of HD181907 was obtained with FEROS as part of the ESO Large Programme: LP178.D-0361 (PI: E. Poretti)



We determined the atmospheric parameters of HD181907 from the analysis of the iron lines following Hekker & Melendez (2007) and the abundances from classical curve-of-growth techniques. Preliminary results suggest Teff ≈ 4760 K, logg ≈ 2.65 dex, [Fe/H] ≈ -0.10 dex and an abundance pattern solar within the errors.



Preliminary abundance pattern (deviations in dex relative to the solar abundances; the error bars are only indicative)

Astrometric & Photometric constraints

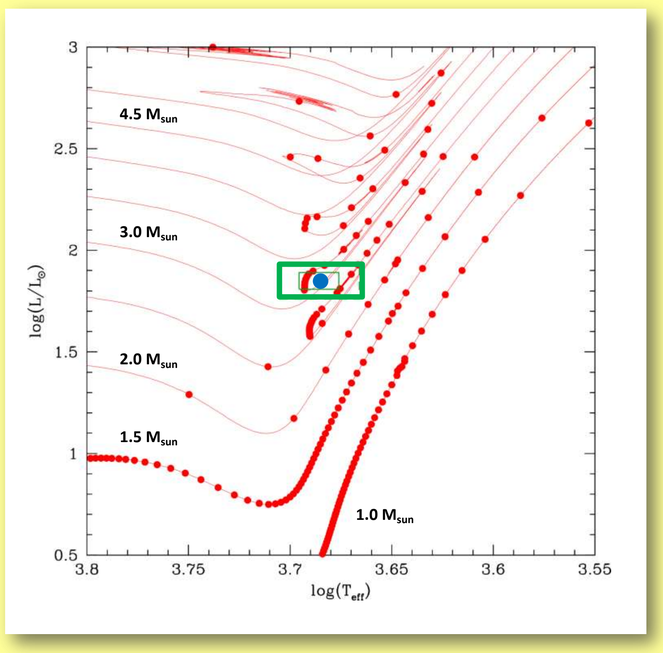
Photometric T_{eff}=4700 ± 100 using T_{eff} vs (B-V) calibrations by Alonso et al. 1999

Av = 0.185 ± 0.03 (Arenou et al 1992) ➡ E(B-V)=0.05
mv = 5.81 ± 0.02
B-V = 1.093

π= 9.64 ± 0.34 mas (Van Leeuwen 2007)

BC=-0.42 ± 0.06 (Flower 1996)

L= 71.1 ± 6.7 L_{sun}



HR diagram showing the location of HD181907 (blue dot) and the 1 and 2-sigma error boxes in Teff and L (thin and thick green lines). Red lines represent evolutionary tracks of different mass computed with the code ATON (Ventura et al. 2008). The initial chemical composition assumed is Z=0.02 and Y=0.278, a mixing-length parameter α_{MLT}=1.9 was adopted. Red points represent time intervals of 10 Myr.

The numerous and precise observational constraints available for HD181907 (seismic and non seismic) make this star a most promising target for a first detailed theoretical modelling of a solar-like pulsating red giant.