

# Introducing SISMA

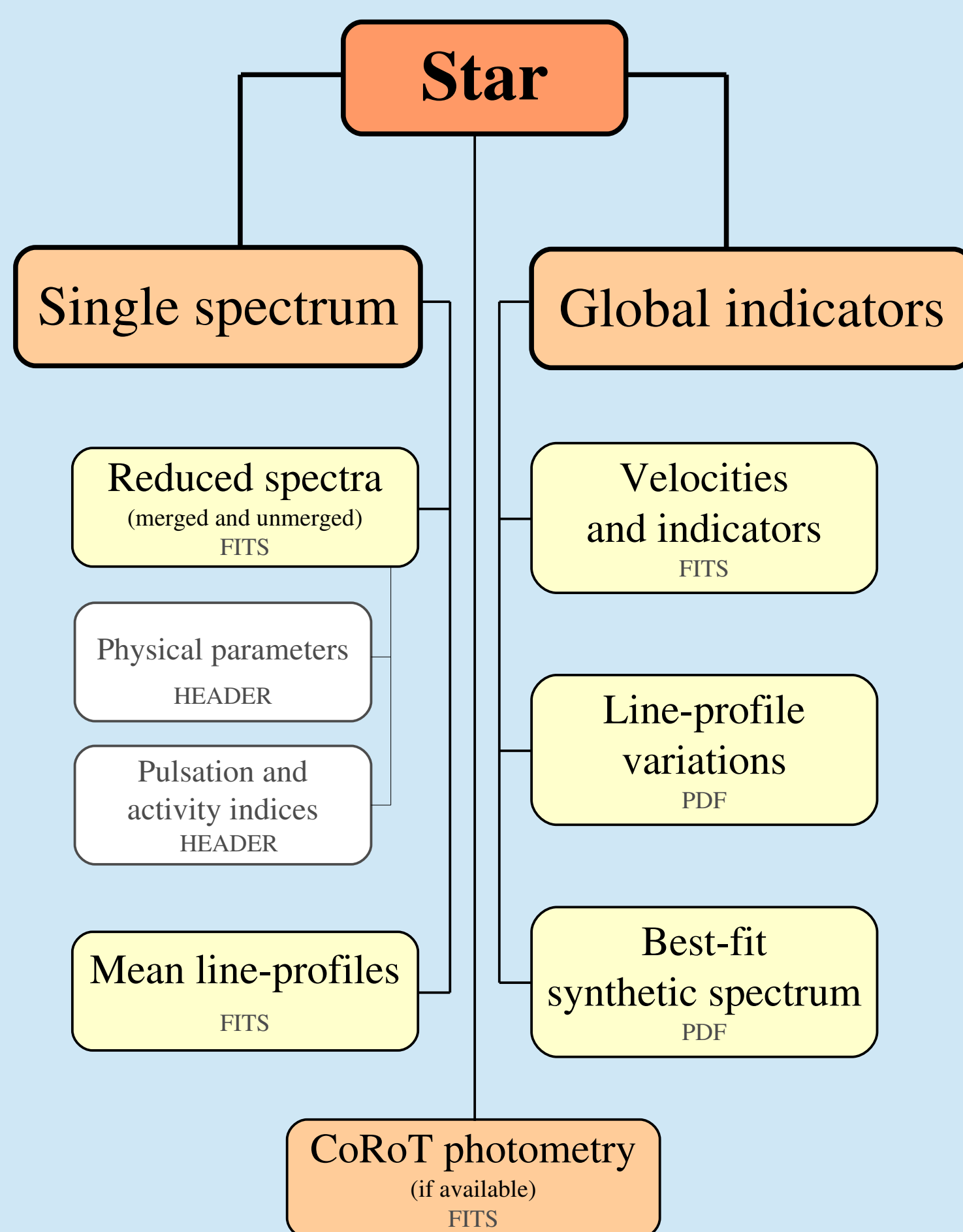
## the HARPS archive of the CoRoT asteroseismic targets

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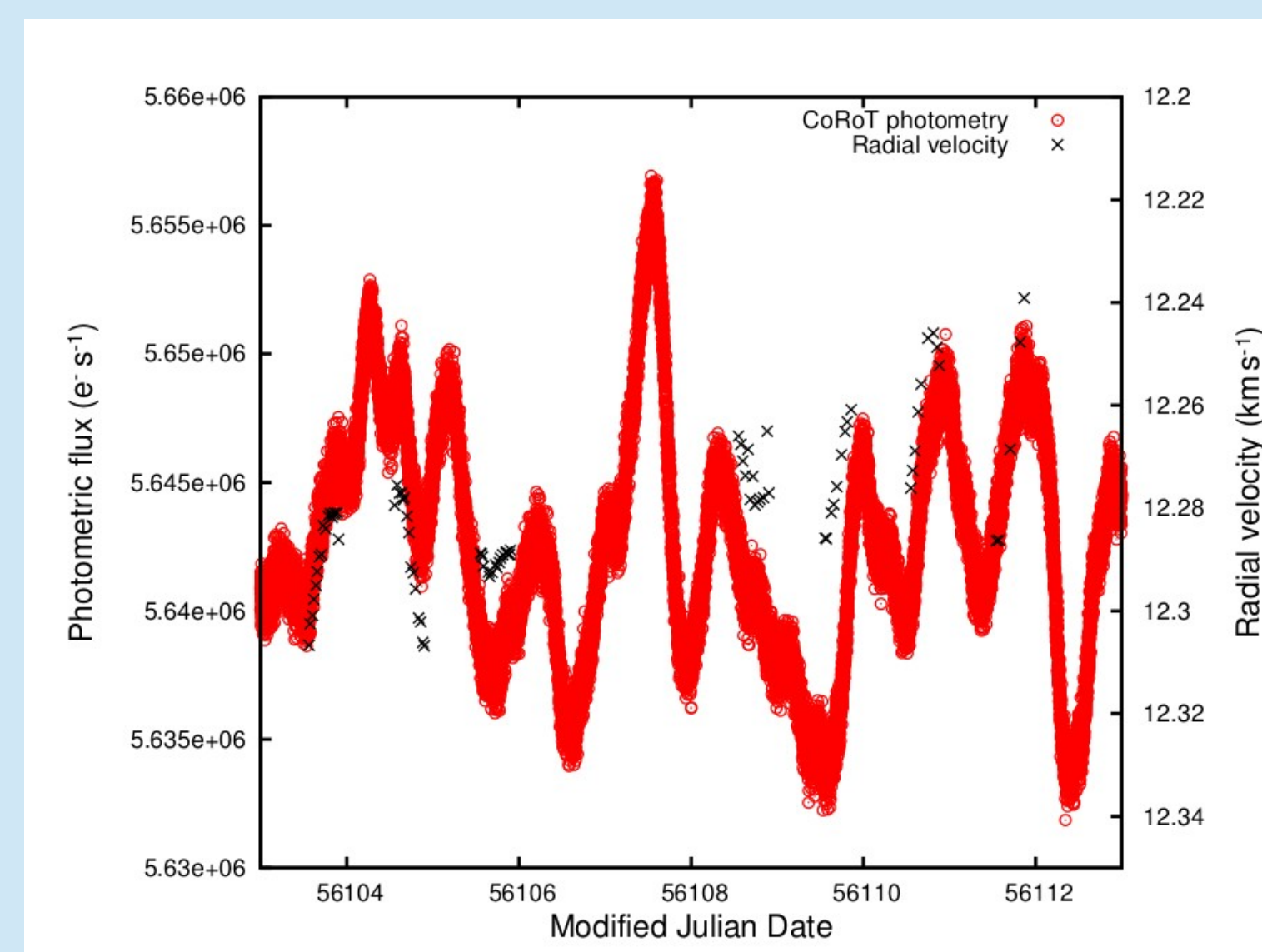
### The SISMA archive

The online archive SISMA (*Spectroscopic Indicators in a Seismic Archive*) was created in the framework of the Spaceln project, with the goal of providing to the scientific community the results of the CoRoT ground-based asteroseismic campaigns. SISMA is an unique blend of high-quality, high-resolution reduced spectra, CoRoT light curves and spectroscopic variability indicators.

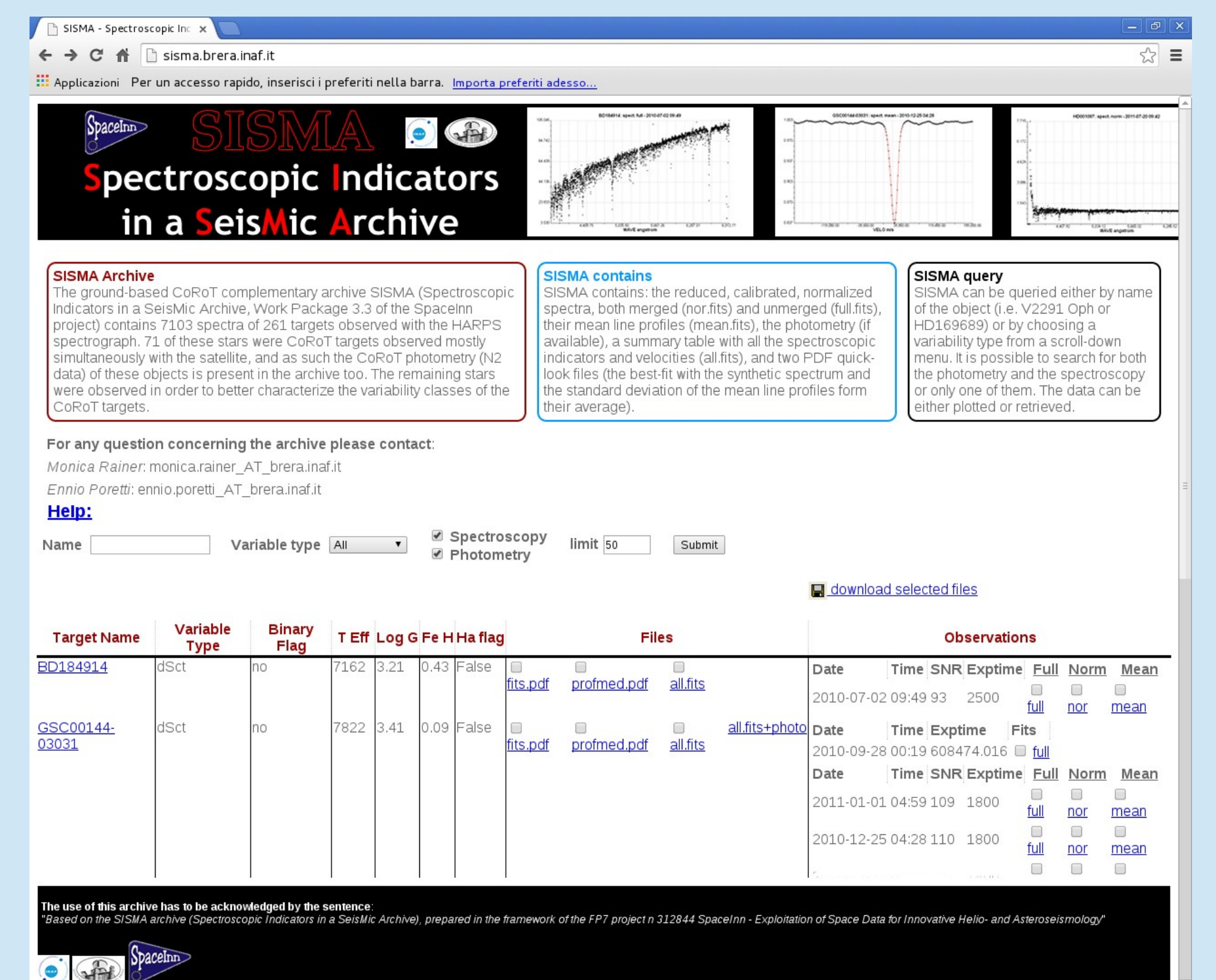
The archive is online at <http://sisma.brera.inaf.it>. It can be queried either by target or by variability class, and the data can both be retrieved and plotted online. For each target it is possible to access or download the reduced spectra, the mean line profiles, the CoRoT light curves and the global indicators, that are stored in the header of the FITS spectra and in the global FITS table.



The backbone of the archive is comprised by the CoRoT asteroseismic targets: because of the simultaneity between ground-based and satellite observations, it is possible to study the spectroscopic and photometric stellar variations at the same time.



CoRoT light curve and radial velocity curve of HD 178484

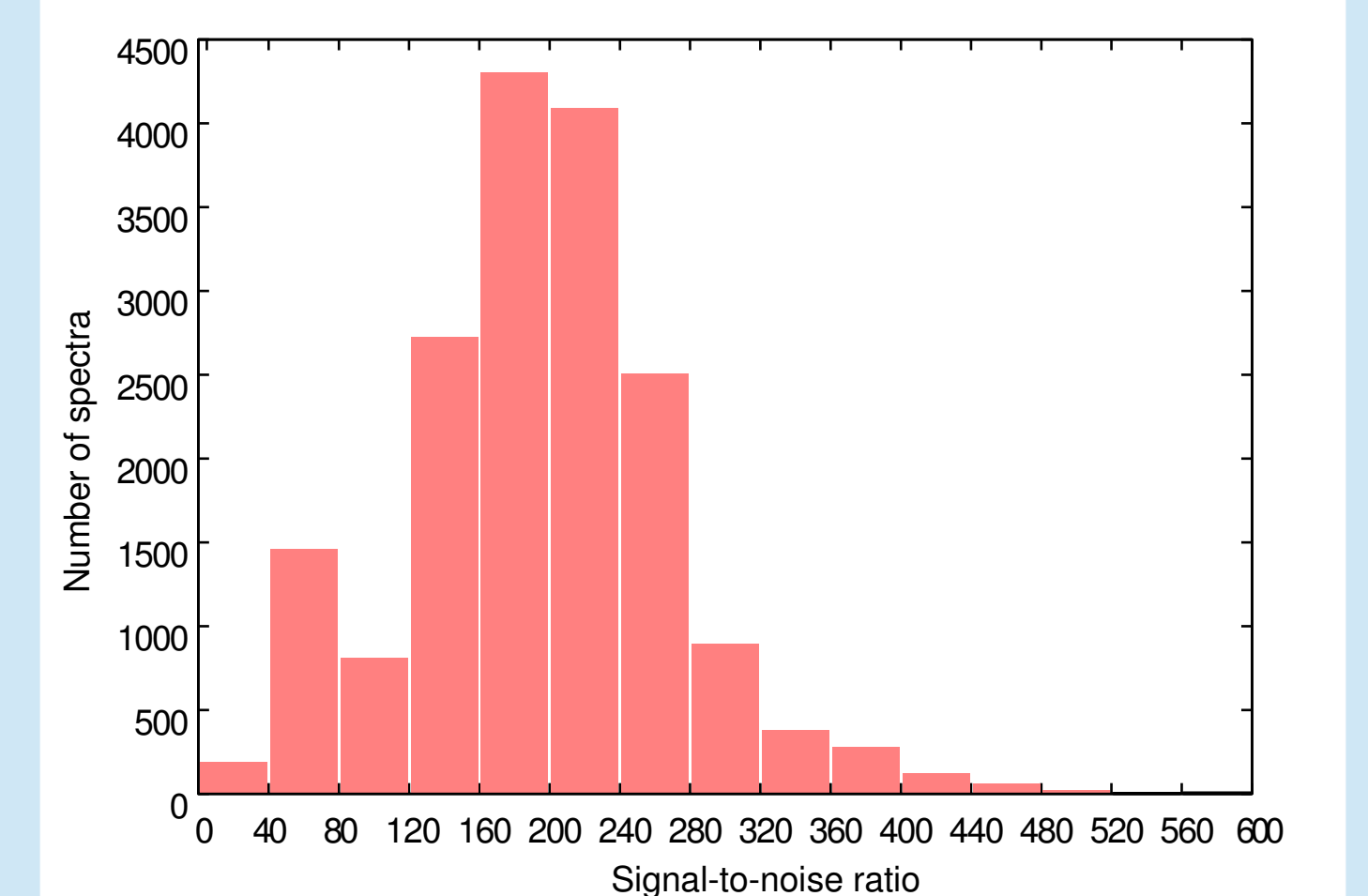


SISMA query interface

### The CoRoT ground-based asteroseismic campaign

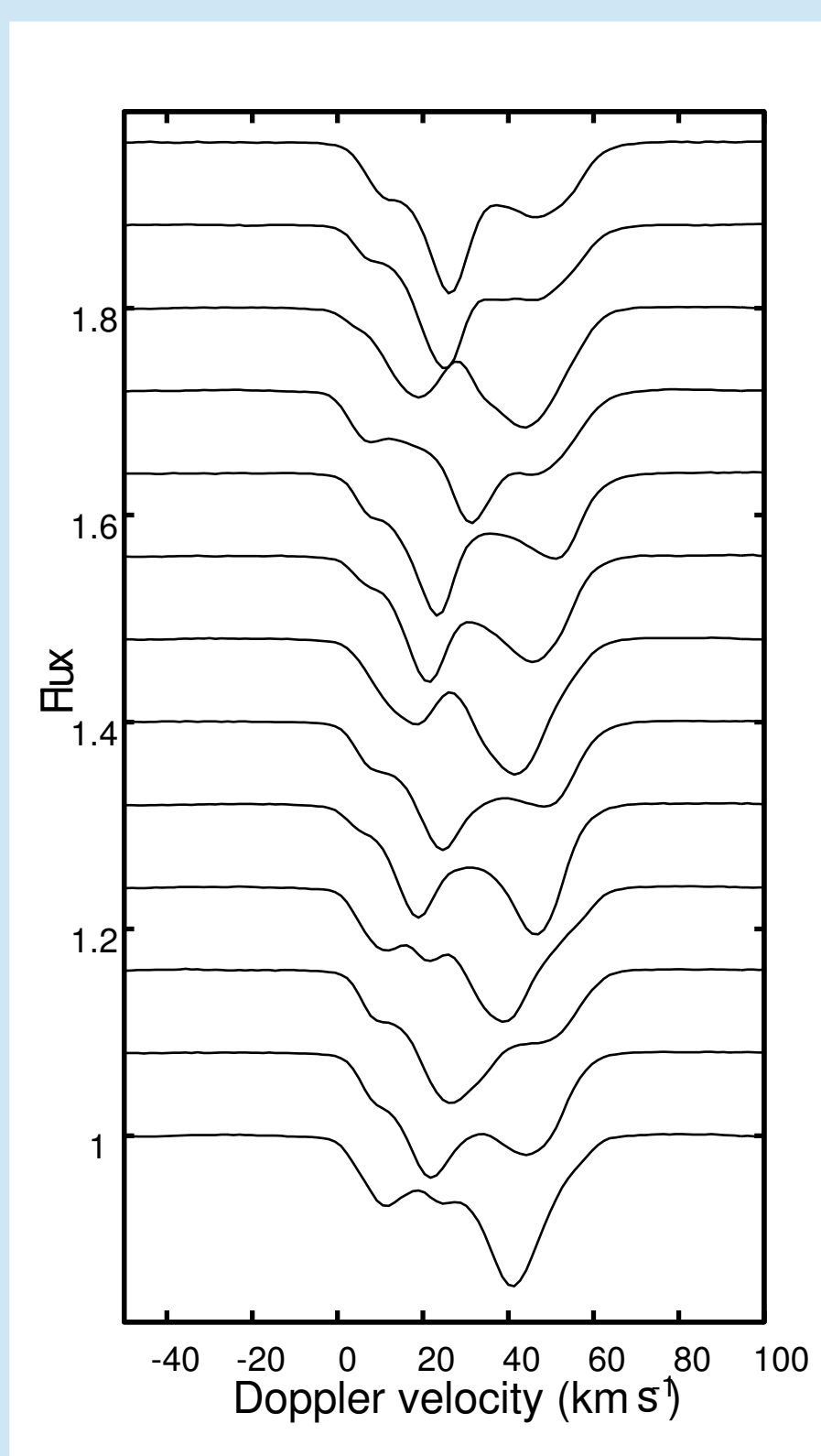
A large number of high-resolution spectra have been taken in a six-year long ground-based observational campaign in order to complement the asteroseismic observations of the CoRoT satellite (Baglin et al., 2207, AIPC 895, 201).

The main instrument used in this work was the HARPS spectrograph at the ESO-LaSilla Observatory, with which we collected 7103 high-quality, high signal-to-noise ratio (typically around 200, see figure on the right) spectra of 261 stars. 71 of those stars were CoRoT asteroseismic targets, while the others were observed in order to better characterize the variability classes of the CoRoT targets (Rainer et al., 2012, AN 333, 1061).



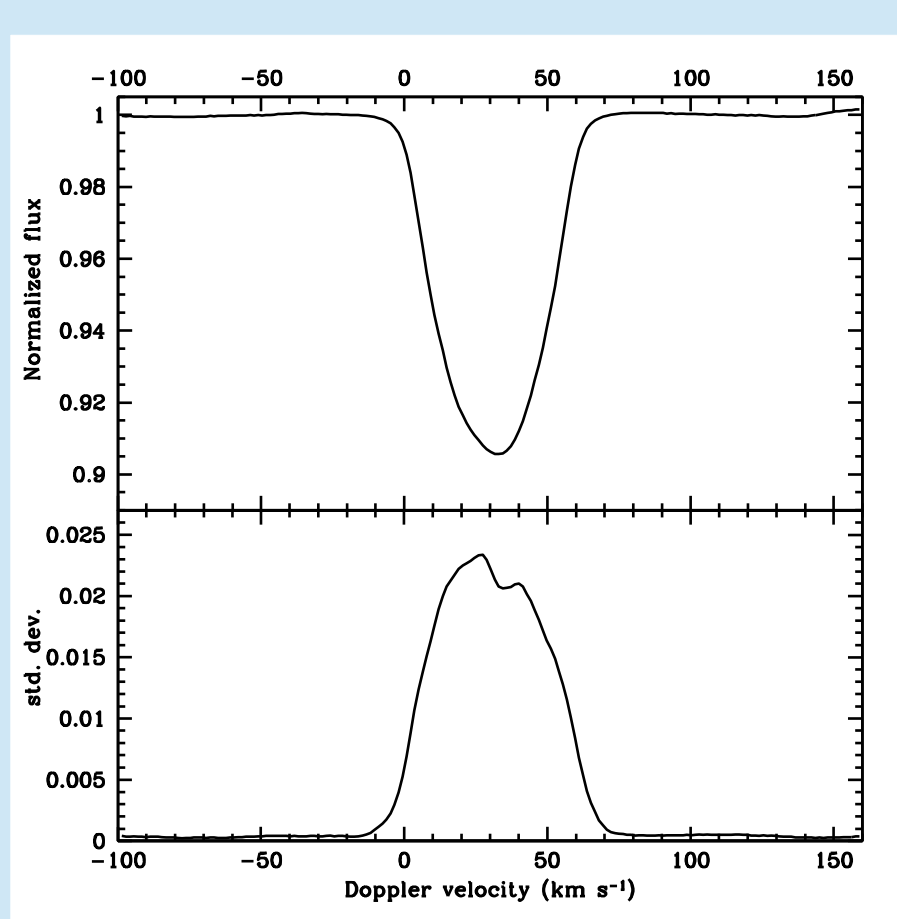
Distribution of the signal-to-noise of the observed spectra. The 1160 spectra of the exoplanet host star HD 46375 (S/N clustering around 60) have been removed for easier reading.

### Mean line profiles and velocities

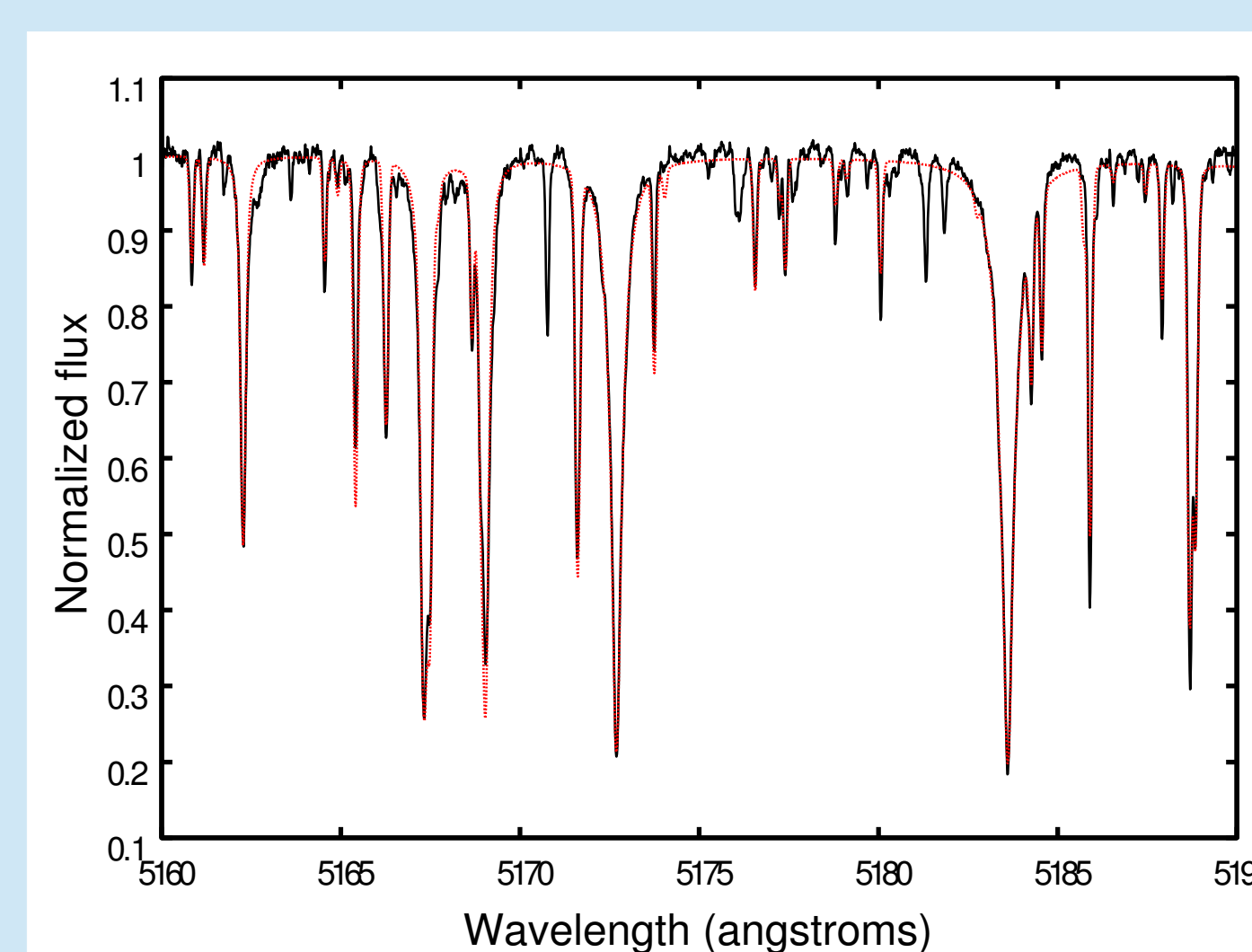


The mean line profiles of each and every spectrum have been computed with the LSD software (Donati et al., 1997, MNRAS 291, 658) and they have been used to estimate both the radial and the projected rotational velocities of the stars, along with an indicator of the presence of differential rotation.

The mean line profiles are largely useful to study line-profile variations in the spectroscopic time series (see upper left figure). In order to have a quick look at line-profile variability of the spectroscopic time series, a PDF file with the average of the mean line profiles and the standard deviation from the average is present in the archive for each star (see bottom left figure).



### Stellar physical parameters



The physical parameters of the stars ( $T_{\text{eff}}$ ,  $\log g$  and  $[\text{Fe}/\text{H}]$ ) have been estimated in an homogeneous way using the SME software (Valenti & Piskunov, 1996, A&AS 118, 595) in the wavelength region 5160-5190 Å. A PDF file with both the observed and synthetic spectrum has been created for each star and it is available in the archive (see figure on the left).

### Spectroscopic indicators

Most of the relevant information about the spectroscopic time series are stored in FITS tables, one table for each star.

These tables contain for each observed spectrum of the target:

- the barycentric modified Julian Date at mid-exposure;
- the signal-to-noise ratio;
- the radial velocity and its error;
- the projected rotational velocity and its error;
- the differential rotation indicator and its error;
- the activity index computed using the H and K Calcium lines;
- the V/R H $\alpha$  violet-to-red peak intensity ratio (emission stars only).