

## **Classification of an unbiased sample of variable stars from the COROT exoplanet data**

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### Science case:

The COROT exoplanet database will contain thousands of stars that will turn out to be new variables, just as was the case for HIPPARCOS. This COROT sample will be unbiased with respect to (periodic) variability. We propose to classify these new variables according to their basic parameters as available in COROT-sky, their (peak-to-peak) variations, colours (if available), and frequencies (the latter for the periodic ones) by means of a statistical scheme that we have developed earlier in the framework of the HIPPARCOS mission and that turned out to be efficient. Such a classification of all the variable stars will allow us to derive *statistical inferences* on oscillations of all kinds, up to unforeseen low amplitudes. This is very important to confront these observational facts with theoretical instability predictions and to assess the selection mechanisms in different types of oscillators, which are not yet understood presently.

We do not require any specific observing mode, the integration times of some 10 minutes are sufficient for our purpose; only the oscillation periods of compact objects, such as WD and sdB stars, will not be well sampled.

We will produce a catalogue of all newly classified variables and will provide the COROT community with it, for follow-up research.

### Type of observations:

SW, exo CCD windows, no specific requirements. We do ask to window as many OB stars as possible without any disadvantage for the exoplanet research, as such massive stars will in general be under-represented. The normal long exposures are fine for this project. The provision of colour information is evidently very valuable for our purpose. We propose the attitude: we will take what we can get according to the Core Programme of the planet research.

### Targets:

All stars resulting from all the windows of the exoplanet fields, both for the long + short runs.

5 relevant publications:

1. Waelkens, C., Aerts, C., Kestens, E., Grenon, M., Eyer, L., 1998, Study of an unbiased sample of B stars observed with HIPPARCOS: the discovery of a large amount of new Slowly Pulsating B Stars, *Astronomy & Astrophysics* **330**, 215 – 221  
The paper reports the result of our classification scheme developed to interpret the numerous HIPPARCOS data of new variable B stars. The classification is based on a multivariate discriminant analysis. This implies that our criteria are much more stringent than those used in some other classifications which usually only use frequency as criterion. Our procedure leads to a smaller amount of misclassifications.
2. Aerts, C., Eyer, L., Kestens, E., 1998, The discovery of new  $\gamma$  Doradus stars from the HIPPARCOS mission, *Astronomy & Astrophysics* **337**, 790 – 796  
The same as item 1., but this time for newly discovered variable F stars.
3. Aerts, C., 2000, Follow-up photometry of six new  $\beta$  Cep stars discovered from the HIPPARCOS mission, *Astronomy & Astrophysics* **361**, 245 – 257  
Title speaks for itself.
4. Aerts, C., 2002, The study of pulsating stars from the COROT exoplanet field data, *Communications in Asteroseismology*, 141, 20 – 25  
Report of our talk during the first COROT week where we already put forward the current proposal.
5. Aerts, C., Thoul, A., Daszyńska, J., Scuflaire, R., Waelkens, C., Dupret, M-A., Niemczura, E., Noels, A., 2003, Asteroseismology of HD 129929: Core Overshooting and Nonrigid Rotation, *Science*, Vol. 300, Issue 5627, 1926 – 1928  
The most in-depth seismic analysis of a massive star done so far.

No ground-based observations will be taken for the classification. The COROT community can pick out the stars most interesting for them for follow-up observations.