

# Study of an unbiased sample of OB stars from the COROT exoplanet data

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## Science case:

In the COROT exoplanet database a few hundreds of stars of spectral type O and B will be present. In almost all of these stars variability will be detected. If not yet done in a general classification program before, we will search for (multi-)periodicity in these O and B stars. Our expertise with asteroseismological data of the satellite WIRE (see e.g. publication 5) will be of great value here.

The variability analysis will allow us to study the incidence of oscillations (and other kinds of variability) in massive stars (OB-stars), since the sample will be a priori unbiased with respect to (periodic) variability.

To study the oscillation behaviour of these stars more in detail, we will select the candidate pulsating stars ( $\beta$  Cephei, Slowly Pulsating B stars, ...) of the sample for seismic modelling if the frequency spectra are sufficiently rich to identify the oscillation modes.

## Type of observations:

SW, exo CCD windows, as many OB stars as possible without interference with the exoplanet research. For this program we do not require any specific observing mode, since the integration times are largely sufficient for our purpose (periods longer than at least a few hours are expected). Colour information is very valuable for this project, but also without the colours, identification of the modes on the basis of the frequency spectrum can be done.

## Targets

All OB stars resulting from all the runs in the exoplanet field, and from the 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  
*A classification of 267 new variable B-type stars discovered by Hipparcos is presented. Different classification schemes resulted in a few new  $\beta$  Cephei stars, a huge number of new slowly pulsating B stars, quite some supergiants with  $\alpha$  Cyg-type variations and variable CP stars, and further some new periodic Be stars and eclipsing binaries.*
2. Aerts, C., De Cat, P., Peeters, E., Decin, L., De Ridder, J., Kolenberg, K., Meeus, G., Van Winckel, H., Cuypers, J., Waelkens, C., 1999, Selection of a sample of bright southern Slowly Pulsating B stars for long-term photometric and spectroscopic monitoring, *Astronomy & Astrophysics* **343**, 872 – 882  
*Twelve bright southern SPB stars and five previously known SPB stars were selected for spectroscopic and photometric monitoring. A preliminary asteroseismological analysis of these intermediate-massive stars is presented.*
3. Ausseloos M., Aerts C., Uytterhoeven K., Schrijvers C., Waelkens C., Cuypers, J. 2002,  $\beta$  Centauri: An eccentric binary with two  $\beta$  Cep-type components, *Astronomy & Astrophysics* **384**, 209 – 214  
*An in-depth analysis of a special  $\beta$  Cep-type variable.*
4. Thoul, A., Aerts, C., Dupret, M. A., Scuflaire, R., Korotin, S. A., Egorova, I. A., Andrievsky, S. M., Lehmann, H., Briquet, M., De Ridder, J., Noels, A. Seismic modelling of the beta Cep star EN (16) Lacertae, 2003, *Astronomy & Astrophysics* **406**, 287 – 292  
*Photometric mode identification based upon a non-adiabatic description of the eigenfunctions in the outer atmosphere, combined with previous spectroscopic mode identification allowed to fine-tune the stellar parameters of EN Lacertae with unprecedented precision.*
5. Cuypers, J., Aerts C., Buzasi D., Catanzarite J., Conrow T., Laher R., 2002, Multiperiodicity in the light variations of the  $\beta$  Cep star  $\beta$  Crucis, *Astronomy & Astrophysics* **392**, 599 – 603  
*Analysis of satellite data of a  $\beta$  Cep star allowed to identify frequencies in the light variations that were before only seen in the radial velocity variations.*

## Needed ground-based observations plan:

Interesting stars suitable for an in-depth seismic analysis will be selected for follow-up ground-based observations. UVES time at the VLT to check binarity, to derive vsini and to obtain detailed abundance analyses will be applied for.