8th COROT week – 23-27 May 2005 – Toulouse

Contribution to the COROT ground-based preparatory work from Serra La Nave (Catania) Observatory

G. Cutispoto – INAF-OAC
E. Distefano – INAF-OAC
M. Rainer – INAF-OAB

ABSTRACT

The additional ground-based observational programm aims at obtaining high-resolution spectra for all the stars with $8 < m_V < 9.5$ near the main targets of COROT, in order to find the most suitable secondary targets. The mountain station M.G. Fracastoro, located at Serra La Nave (Mt. Etna, Italy), satisfies the necessary requirements of the programm with FRESCO (Fiber-optic Reosc Echelle Spectrograph of Catania Observatory). These observations supplied the only solution to the spectroscopic monitoring of the stars in the Anticenter direction, since other instruments were not available to complete the survey before the COROT preparatory work deadlines. The work will continue this summer in the center direction and in autumn/winter still in the anti-center.

NEED FOR ADDITIONAL OBSERVATIONS

The ground-based observations carried on so far covered all of the stars with $m_V < 8$ in the COROT's eyes. Unfortunately, they have not proved sufficient to choose the secondary asteroseismological targets of the mission. During the 6th COROT week, the decision has been made to extend the observations to stars with $8 < m_V < 9.5$.
It was clearly impossible to cover all of these stars in the whole COROT's eyes, but the most probable main targets were already known, so it was decided to observe only the stars around the main targets that could fall in the asteroseismological CCDs fields .
The strategy was to make two proposal: one for ESPaDOnS (CFHT), to cover both the center and the anti-center direction, and the other for FEROS (LaSilla ESO), as a backup in the center direction.
Unfortunately, the CFHT proposal was rejected and the anti-center direction was left uncovered.
So in the 7th COROT week we proposed to use the Serra La Nave observatory as a substitute to complete the observations needed, in order to offer a new, original contribution from Italian astronomers to the mission's preparation.

M. G. FRACASTORO MOUNTAIN STATION

The M. G. Fracastoro Mountain Station is located at Serra La Nave, on the southern slope of Mount Etna (1735 m a.s.l):

longitude: +14° 58'.4
latitude: +37° 41'.5

It is about 30 km away from Catania and 15 km from Nicolosi, the last town on the road to Serra La Nave. This is the second observatory built on Mt. Etna, the first being the Vincenzo Bellini Observatory (built in 1880 at the base of Etna main crater, 2940 m a.s.l.), which was very difficult to reach, due to the lack of a car road and large snowfall in the winter. The Vincenzo Bellini Observatory was eventually destroyed by a lava flow in 1971, when it was used as a volcanologic observatory.
The M. G. Fracastoro Mountain Station started operating on June 1966 and is composed by several buildings: the domes of the telescopes, the guardian house and the dormitory and office building.
The three telescopes of the observatory are:

- 91-cm Cassegrain telescope
- 61-cm Schmidt telescope
- 80-cm Automated Photoelectric Telescope

FRESCO SPECTROGRAPH

The Fiber-optic Reosc Echelle Spectrograph of Catania Observatory on the 91-cm telescope was used for the COROT observations. The technical data on the telescope and the spectrograph are shown below.

91-cm Telescope

Optical configuration . . . . . .Cassegrain
Main mirror:
– diameter . . . . . .91 cm
– curvature . . . . . paraboloid
– focal length . . . . . 4.143 m
– focal ratio f/4.6
Secondary mirror:
– diameter . . . . . 24 cm
– focal length . . . . . -1.427 m
Cassegrain focus:
– equivalent focal length . . . . . .14.275 m
– equivalent focal ratio f/16

FRESCO Spectrograph

Echelle grating . . . . . 128x254 mm
. . . . . 79 l/mm
. . . . . blazed at 63.433°
Echellette grating . . . . . 160x106 mm
. . . . . 300 l/mm
. . . . . blazed at 4.3°
Spectral coverage . . . . . from 3800 Å to 8000 Å

Single dispersion

Only the echellette grating is used: linear dispersion of ~ 90 Å/mm (R ~ 1000), spectral range ~ 2500 Å.

Cross-dispersion

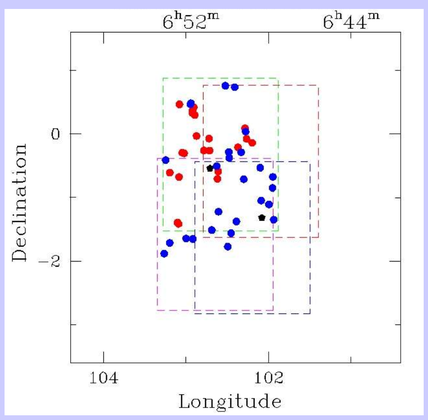
Both the echelle and the echellette gratings are used: R ~ 21000, spectral range ~ 2500 Å in 19 orders.

OBSERVATIONS

We observed for several nights in the period from January to March, working in cross-dispersion mode, which allowed us to cover the spectral range 4300-6800 Å with R = 21000.
Due to the faintness of the stars, the exposure time was quite long (about one hour). The bad weather conditions lowered the S/N ratio to a value of about 70.

Exposure time: ~1 hour
S/N ratio: ~ 70
Spectral range: 4300-6800 Å

The climatic conditions have severely hindered our observations, preventing us from completing the whole survey. A large number of observing nights was lost due to the snow or the strong wind.
In the worst observing run, there were problems even in leaving the observatory, because of the large snowfall and the wind.



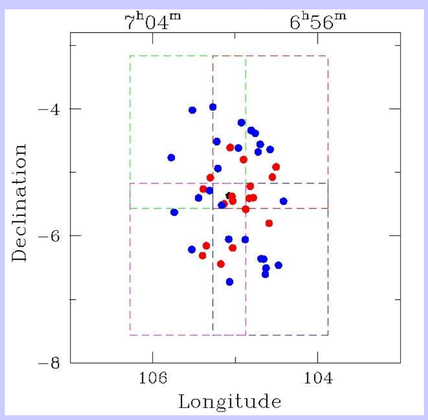
HD49933+HD49434

Main targets
(black pentagons)

Targets observed (22)

Remaining targets (27)

Total targets: 49



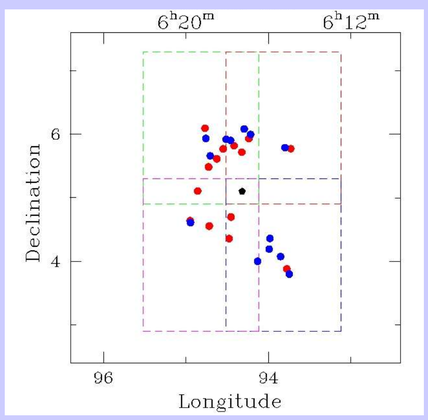
HD52265

Main target
(black pentagon)

Targets observed (18)

Remaining targets (28)

Total targets: 46



HD43587

Main target
(black pentagon)

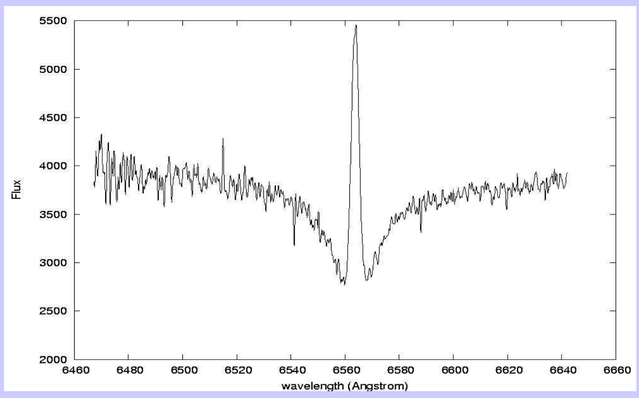
Targets observed (14)

Remaining targets (13)

Total targets: 27

OBSERVED SPECTRA

Despite of the climatic conditions, the observed spectra proved to be of quality high enough to be used for the COROT preparatory work.
The spectra obtained so far are already been reduced and should soon be available in the GAUDI database.

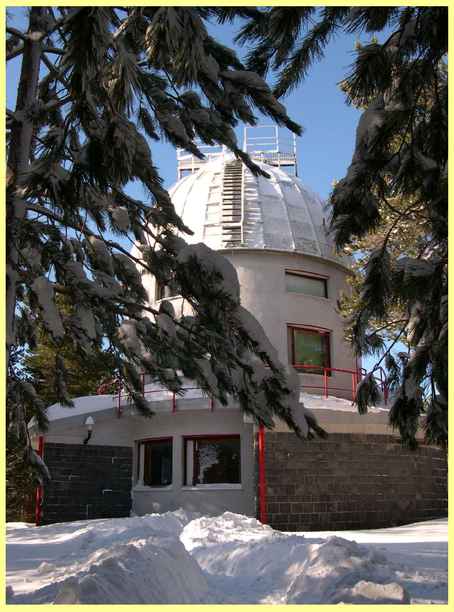


In the graphic is displayed the whole Hα order of a Be star.

HD50087

Spetral type: B8III

$m_V = 9.08$



FUTURE OBSERVATIONS

During this summer, the Serra La Nave observatory will continue to be used to observe in the center direction, so to have some back-up observations to cover for any problems that may occurr during the FEROS nights (17-21 June 2005).
In autumn, as soon as the COROT's fields will be observable, the anti-center observations will start again, in order to cover all of the remaining targets as soon as possible. In fact, the good quality of the spectra obtained so far influenced the decision made not to present another ESO proposal for the anti-center direction: the survey will be completed by the Serra La Nave observatory.
In addition to that, the observatory is available for any other observational plan. For the proposal submission see:

http://w3c.ct.astro.it/sln/general.html