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Solar-like Oscillations with Kepler

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Abstract

We describe our program of ground-based spectroscopic and photometric observations of stars selected to be scientific targets in the Kepler Asteroseismic Program.

Introduction

Kepler is a NASA Discovery space mission scheduled for launch in November 2008. It will perform continuous observations of all $V = 9 - 15$ mag stars that fall into its field of view. The observations will be continued for the entire life–time of the mission, i.e., 4–6 years, with an expected precision at the level of several ppm. The main purpose of the mission is the detection of terrestrial planets with the method of transits. The other scientific aim of the Kepler mission is a study of pulsating stars which will support the interpretation of planetary transit events and the study of stars that harbour planetary systems. The mission is described in more detail by Christensen-Dalsgaard et al. (2007).

Along with the main aims, Kepler will realize the Kepler Asteroseismic Program. This program will be coordinated from the University of Aarhus, under the lead of Professor Jørgen Christensen-Dalsgaard. One of the ongoing activities related to this program are spectroscopic and multi–colour observations of the most promising asteroseismic targets listed by Molenda-Żakowicz et al. (2006). Since the majority of these stars have solar–like spectral type, we expect them to show solar–like oscillations.

Observations

Our observations are made at four observatories, namely, Harvard-Smithsonian Astrophysical Observatory, SAO (USA), Serra la Nave Observatory (Italy), Stara Lesna Observatory (Slovakia) and Białków Observatory (Poland).

At the SAO, the Kepler targets are observed spectroscopically by Prof. David Latham who uses the 6.5-m MMT telescope, the 1.5-m Tillinghast Reflector and the 1.5-m Wyeth Reflector. At Serra la Nave Observatory, the targets are observed by Dr. Molenda-Żakowicz who uses a 1-m telescope of Catania Astrophysical Observatory, the FRESCO echelle spectrograph and a set of $UBVuvby\beta$ filters.

At the Observatory of the Slovak Academy of Sciences in Stara Lesna, and the Białków Astrophysical Observatory of Wrocław University, Drs. M. Vaňko and J. Molenda-Żakowicz perform time-series observations of NGC 6811 and NGC 6866, two open clusters that fall into Kepler's field of view and that are selected to be Kepler asteroseismic targets.

Results

We determined V_r, [Fe/H], $v \sin i$, $\log T_{\rm eff}$, $\log g$, $E(B-V)$ and $UBVuvby\beta$ standard magnitudes and for all targets that were selected for observations in the first run of our observing program (Molenda-Żakowicz et al. 2007).

In the next observing season we will continue the observations and determinations of astrophysical parameters of the remaining stars. We will also study the variability of stars that fall into the fields of NGC 6811 and NGC 6866. Our final aim is an asteroseismic study of all the Kepler asteroseismic targets and a detailed analysis of solar–like pulsations in other stars.

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