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The ongoing 2005–2006 campaign on β Cephei stars in NGC 6910 and χ Persei (NGC 884)

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Abstract

We announce the discovery of eight new β Cephei stars and several other interesting variable stars as the preliminary result of the ongoing campaign on two northern open clusters, NGC 6910 and χ Persei.

The results

The recent progress in asteroseismic studies of some bright β Cephei stars prompted us to study stars in open clusters, where at least two β Cephei members were known. The main advantage of observing stars in clusters is that we can simultaneously obtain photometry for many objects and that the members share many properties (e.g., age and metallicity) which can be used in subsequent modelling. Three open clusters were selected for observations: NGC 3293 in the southern hemisphere, where eleven β Cephei stars were known (Handler et al. 2007), and two clusters in the northern sky, NGC 6910 and χ Persei (NGC 884). In NGC 6910 four β Cephei stars were discovered by Kołaczowski et al. (2004), while in the central part of χ Persei two variables of this type were known from the study of Krzesiński & Pigulski (1997).

The observations of the two northern clusters started in 2005 but the main campaign is occurring during this season (2006). Three telescopes, the 120-cm Mercator in La Palma, the 80-cm vlt in Vienna and the 60-cm in Białków, were dedicated for the 2005–2006 campaign in the summer–autumn time and nine other observatories have contributed data as well. The campaign involves almost 60 observers at twelve sites.

In 2005, observations were obtained from five sites (TUG, Białków, Vienna, Mt. Cuba and La Palma). In total, about 470 hours of observations, 230 for NGC 6910 and 240 for χ Persei, were gathered. In 2006, we already (by September 15, 2006) acquired 700 hours of observations for both clusters, but the number is growing rapidly and we expect to have at least twice as many. From the preliminary analysis of a part of the Białków 2005 data

we found new low-amplitude modes for the known β Cephei stars and discovered eight new pulsators of this type. Three of them (WEBDA¹ 25, 34, and 41) are in NGC 6910 and five [Oo 2085, 2444, 2488, 2566, and 2572 (Oosterhoff 1937)] belong to χ Persei. Oo 2444 was already suspected to be variable by Krześciński (1998). Moreover, some eclipsing binaries, including possible members, WEBDA 30 in NGC 6910 and Oo 2433 in χ Persei, were found.

Our analysis indicates that from the whole data set of the campaign we can expect to detect modes with semi-amplitudes as small as 0.1–0.3 mmag. Consequently, from the final analysis we should discover many new modes in the known β Cephei stars and new variables of this type. This makes the prospects for applying asteroseismology to pulsators in both clusters very promising.

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¹See <http://obswww.unige.ch/webda/> for the numbering system used in NGC 6910.