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The Excitation of Pulsation Modes in Rapidly Rotating Main Sequence B-Stars

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Abstract content
   (Max 300 words)
Formatting &
Special chars

All stars rotate - some quite rapidly, others quite slowly - which causes a breakdown in the spherical symmetry of stars, which (in turn) complicates and reduces the accuracy of stellar models, seeing as most stellar models in use today rely on the assumption of spherical symmetry to simplify the analysis to a manageable level. Stellar rotation also gives rise to various fluid dynamical phenomena, which result in large uncertainties in the rates of stellar evolution and physical stellar parameters in general. Treating rotation consistently in stellar models is unfortunately very difficult and has (until recently) been mostly neglected in studies of the structure and evolution of stars. Good accounts of the scientific problem appear in Maeder and Meynet ("The Evolution of Rotating Stars", ARA&A 38, 143-190, 2000) and in Zahn ("Effects of rotation on stellar structure: rotation induced mixing", Communications in Asteroseismology 157, 196-202, 2008).

An intensive observational study of the internal rotation dynamics of stars can therefore provide a wealth of information to support further theoretical work. Asteroseismology is a unique tool for probing stellar interiors - in this context to determine the internal rotation dynamics of stars using the pulsations that are excited deep within the stellar interior. The Beta Cephei class of pulsating stars are ideal for such a study, since they typically exhibit multiple non-spherical pulsation modes.

For the purpose of this study, twelve candidate stars were selected from the list of Beta Cephei pulsating stars that were identified from the All Sky Automated Survey catalog (Pigulski & Pojmanski, personal communication). The candidates have been observed intensively since April 2013 (both photometrically and spectroscopically). Preliminary analysis has yielded some interesting results for individual stars.

The presentation will cover a basic summary of the current state of theoretical and observational work regarding stellar structure and evolution and the Beta Cephei class of pulsating stars. The core of the presentation will address the observational work done as part of this project, the data reduction and analysis methods developed in order to efficiently process the large quantities of data collected and the preliminary results produced as part of this project.

Apply to be
 considered for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD)?

PhD

Main supervisor (name and email)
and his / her institution

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