Synergies for stellar evolution tests

Karsten Brogaard*[1], Søren Frandsen[1], Frank Grundahl[1], Jens Jessen-Hansen[1], Hans Bruntt[1], and Torben Arentoft[1]

[1]Aarhus University [Aarhus] – Nordre Ringgade 1 DK-8000 Aarhus C, Denmark

Abstract

Any age measurement technique for stars, no matter how sophisticated, must rely on a model of stellar evolution to translate observable quantities to an age. The basic principles of stellar structure and evolution are considered well known, but we are still quite far from a detailed understanding of the physics involved. As a consequence the real error in any stellar age measurement is still significantly larger than the measurement precision!
Current knowledge of stellar evolution has been obtained by testing theoretical stellar models with a number of different methods such as measurements of detached eclipsing binaries, isochrone fitting to colour-magnitude diagrams (CMDs), classical spectroscopic analysis, and, more recently, asteroseismology. However, when applied separately these methods rarely pose enough simultaneous constraints to further improve our knowledge of stellar physics. Thus, we want to combine as many of the methods as possible to provide a long awaited leap forward in our understanding of stellar evolution and much more accurate ages for stars and their planets than presently possible.
Our work focuses on two subsets of detached eclipsing binary stars where methods can be optimally combined, those in star clusters and those where one component is a red giant star that shows oscillations that can be analysed through asteroseismology. Here we present our most recent results.

*Speaker