Contribution ID: **27** Type: **not specified**

The Sun as a Laboratory for Electromagnetic Dipole Dark Matter

Thursday, 12 January 2017 12:40 (25 minutes)

In recent years, a revised set of solar abundances has led to a discrepancy in the sound-speed profile between helioseismology and theoretical solar models. Conventional solutions require additional mechanisms for energy transport within the Sun. Vincent et al. have recently suggested that dark matter with a momentum or velocity dependent cross section could provide a solution. In this work, we consider three models of dark matter with such cross sections and their effect on the stellar structure. In particular, the three models incorporate dark matter particles interacting through an electromagnetic dipole moment: an electric dipole, a magnetic dipole or an anapole. Each model is implemented in the DarkStec stellar evolution program, which incorporates the effects of dark matter capture and heat transport within the solar interior. We show that dark matter with a mass of 3 GeV and an electric dipole moment or an anapole moment of may possibly improve the sound-speed profile, small frequency separations and convective zone radius with respect to the Standard Solar Model. However, the required dipole moments are strongly excluded by direct detection experiments.

Primary author: Mr GEYTENBEEK, Ben (University of Cambridge)

Co-authors: Dr VINCENT, Aaron (Durham University); Dr SERENELLI, Aldo (Universitat Autònoma de Barcelona); Prof. WILLIAMS, Anthony (University of Adelaide); Dr WHITE, Martin (University of Adelaide); Dr SCOTT, Pat (Imperial College London); Dr RAO, Soumya (University of Adelaide)

Presenter: Mr GEYTENBEEK, Ben (University of Cambridge)

Session Classification: Parallel Sesion: Dark Matter