



Contribution ID: 3

Type: **Presentation**

The dark matter density profile in spherical systems: A simple way to get more information from the Jeans equation

Friday, June 27, 2014 3:20 PM (20 minutes)

Detailed measurements of the dark matter density profile in systems such as dwarf galaxies and galaxy clusters would allow us to test predictions from N-body simulations of cold dark matter and how complex astrophysical effects and interactions with baryons may have reshaped dark matter halos. Traditionally, the Jeans equation is used to constrain the dark matter density profile in spherical systems by fitting to the line-of-sight velocity dispersion of visible tracers such as stars or galaxies that are gravitationally bound in the dark matter halo. Unfortunately due to a degeneracy with the velocity anisotropy of the tracers, the Jeans equation only constrains the mass of the dark matter halo at one radius. We propose a very simple extension to the Jeans equation that adds two new constraints from the fourth moment of the line-of-sight velocity distribution. Without adding any new parameters to the fit or making additional assumptions, we show that in the case of stars in dwarf spheroidal galaxies these new constraints can dramatically reduce the space of possible density profiles. If the shape of the density profile is fixed (to say a cosmologically motivated NFW profile), we find that the new constraints can give much stronger predictions for the concentration of the halo and the velocity anisotropy of the tracers.

Primary author: Mr RICHARDSON, Tom (King's College London)

Presenter: Mr RICHARDSON, Tom (King's College London)

Session Classification: Dark Matter: Cosmological Aspects

Track Classification: Dark Matter: Cosmological Aspects