



Contribution ID: 271

Type: Talk

## A Universal velocity dispersion profile for pressure supported systems: evidence for MONDian gravity across 12 orders of magnitude in mass

*Sunday 6 December 2015 16:35 (20 minutes)*

For any MONDian extended theory of gravity where the rotation curves of spiral galaxies are explained through a change in physics rather than the hypothesis of dark matter, a generic dynamical behaviour is expected for pressure supported systems: an outer flattening of the velocity dispersion profile occurring at a characteristic radius, where both the amplitude of this flat velocity dispersion and the radius at which it appears are predicted to show distinct scalings with the total mass of the system. By carefully analysing dynamics of globular clusters, elliptical galaxies and galaxy clusters, we are able to significantly extend the astronomical scales over which MONDian gravity has been tested, from those of spiral galaxies, to the much larger range covered by pressure supported systems. We show that a universal projected velocity dispersion profile accurately describes various classes of pressure supported systems, and further, that the expectations of extended gravity are met, across twelve orders in magnitude in mass. These observed scalings are not expected under dark matter cosmology, and would require particular explanations tuned at the scales of each distinct astrophysical system.

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**Session Classification:** 03 - Modifications of gravity