



Contribution ID: 442

Type: Oral Presentation

Dynamical mass estimates of Sunyaev-Zel'dovich effect selected galaxy clusters in the Millennium Gas simulations

Wednesday, 1 July 2015 10:20 (20 minutes)

Abstract content **Formatting** **Special chars**

Galaxy of Clusters are the most massive gravitationally bound systems in the Universe, by studying them they provide powerful means of tracing the growth of cosmic structures and, ultimately, constraining cosmological parameters (e.g. Allen, Evrard & Mantz 2011). Despite the richness of data clusters can provide, probing strong constraints from cluster surveys is a non-trivial problem due to the complexity of estimating accurate cluster masses. Mass is not a directly observable quantity but can be determined in several ways. One way is to find it is by using the Sunyaev-Zel'dovich (SZ) effect – this is the inverse Compton scattering of photons from the cosmic microwave background by hot gas in clusters (see e.g., Carlstrom et al. 2002 for review).

Experiments like the Atacama Cosmology Telescope (ACT; Marriage et al. 2011, Hasselfield et al. 2013) have carried out surveys using the SZ to find clusters. To use clusters to measure cosmological parameters, we need well-calibrated results between the SZ signal and cluster mass (the quantity predicted by models of structure formation). Mass also can be measured using the line of sight velocity dispersion of galaxies; however depending on the type of galaxies selected, such measurements may be subject to biases. We investigate this issue using simulated cluster and galaxy catalogues produced by the Millennium Gas project (Short et al. 2010; Kay 2012).

We aim to design an optimal observing strategy for calibrating the dynamical mass - SZ-signal scaling relation using future Southern African Large Telescope (SALT) observations. We use the Millennium Gas simulations (MGs) to determine how many member galaxies in each cluster we need to observe, in order to quantify the bias and scatter in the relations between observables and cluster mass.

Well calibrated mass-observable relations are crucial for current and future cosmological studies

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

Yes

Level for award (Hons, MSc, PhD, N/A)?

MSc

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

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No

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Session Classification: Astro

Track Classification: Track D1 - Astrophysics