Contribution ID: **12** Type: **flash talk**

Average energy of the X-ray spectrum as a model-independent proxy for the mass of galaxy clusters

Friday 11 October 2024 16:55 (5 minutes)

Temperature of the hot gas in galaxy clusters is known to be a reliable proxy for the their total gravitating mass, allowing one to use spectroscopic X-ray observations for halo mass function measurements. Data of shallow wide area surveys, however, often precludes direct fitting of the X-ray spectra, given possible biases arising due to unresolved (multitemperature) inner structure of the intracluster medium (ICM), projection effects and necessity of certain model assumptions to be made to allow for robust spectral fitting. We consider using a simple observable value - the average energy of the observed cluster X-ray spectrum - as a model-independent proxy for the ICM temperature and, consequently, cluster's mass. We calibrate relation of this proxy to the cluster parameters using mock obsesrvations for a sample of 84 massive galaxy clusters extracted from the *Magneticum* cosmological hydro simulations. We consider observational parameters corresponding to the all-sky survey observations by *SRG/eROSITA*. Taking into account contributions of various background and foreground signals, average energy of the simulated X-ray spectra in the $0.4-7.0$ keV band is shown to be a stable indicator of the ICM temperature with $\sim 10\%$ scatter and cluster's mass M_{500} with a $\sim 20\%$ scatter. A database containing simulated X-ray images and their spectra is publicly available.

Authors: KRUGLOV, Aleksei; Mr KHABIBULLIN, Ildar; LYSKOVA, Natalia

Presenter: KRUGLOV, Aleksei

Session Classification: Flash talks