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Testing the isotropy of the Universe with galaxy clusters in X-rays

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We introduce a new test to study the cosmological principle with galaxy clusters. Galaxy clusters exhibit a tight correlation between the luminosity and temperature of the X-ray-emitting intracluster medium. While the luminosity measurement depends on cosmological parameters through the luminosity distance, the temperature determination is cosmology-independent. We exploit this property to test the isotropy of the luminosity distance over the full extragalactic sky, through the normalization of the L_x - T scaling relation and the cosmological parameters Ω_m and H_0 . We use two almost independent galaxy cluster samples: the ASCA Cluster Catalog (ACC) and the XMM Cluster Survey (XCS-DR1). These two samples appear to have the same pattern for H_0 with respect to the Galactic longitude. More specifically, we identify one sky region within $l \sim (-15^\circ, 90^\circ)$ that shares very different best-fit values for H_0 for both independent samples (~ 2.7 sigma for both). Several reasons were tested, but none of them was able to significantly alleviate the tension. Finally, the eHIFLUGCS galaxy cluster sample is introduced and its potential for further testing this apparent anisotropy, is presented.

Presenter: Mr MIGKAS, Konstantinos (University of Bonn)

Session Classification: Afternoon session