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The KBC void and Hubble tension in Î□CDM and Milgromian dynamics

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The observed spatial arrangement of galaxies on scales ranging from 100 kpc to 1 Gpc is a very powerful test of different cosmological models and gravitational theories. The observed Keenan-Barger-Cowie (KBC) void is an immense local underdensity with an apparent density of about half the cosmic mean on a 300 Mpc scale. In my talk (based on Haslbauer et al., MNRAS, 499, 2845), I will first show that the KBC void falsifies the standard model of cosmology at high significance. This strongly suggests that structure formation is much more efficient than possible with Newtonâ□□s gravitational law, implying a long-range enhancement to gravity. Therefore, the second part of my talk will discuss the formation of structures in Milgromian dynamics (MOND) supplemented by 11 eV/cˆ2 sterile neutrinos. This Angus (2009) cosmological model has a standard expansion history, primordial abundances of light elements, and fluctuations in the cosmic microwave background (CMB). The model is also consistent with observations of galaxy clusters like the Bullet and El Gordo. I will show that the enhanced growth of structure in Milgromian gravitation leads to the formation of KBC-like voids, gravitational flows within it towards its edges explaining the locally measured Hubble constant. MOND has also made many successful a priori predictions on galaxy scales, which are quite difficult to reconcile with standard cosmology (e.g. the Local Group satellite planes and the radial acceleration relation). Therefore, I will argue that Milgromian dynamics supplemented by 11 eV/cˆ2 sterile neutrinos provides a more holistic explanation for astronomical observations across all scales.

Presenter: Mr HASLBAUER, Moritz