eROSITA's Legacy in Structure Formation and Evolution and Cosmology

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Galaxy clusters, representing the peaks in the cosmic density field, serve as an independent and powerful tool for investigating the evolution of cosmic structures. The strategic identification of these clusters through multi-wavelength surveys is essential for advancing our understanding of gravitational theory, general relativity, and cosmological models. Launched in 2019 aboard the Spectrum-RG mission, eROSITA marked a major milestone in astronomy by enabling the construction of the largest pure sample of galaxy clusters and groups detected through their hot intra-cluster medium in the X-ray band. In this talk, I will present results from my group's work on deriving cosmological constraints from the evolution of the cluster mass function, combining eROSITA data with optical surveys such as DESI Legacy, DES, HSC, and KIDS. These parameters are constrained at a percentage level through the evolution of the cluster mass function, representing a significant leap forward. Beyond cosmology, a central focus of my research is on AGN feedback and its role in shaping galaxy and structure formation. Leveraging the statistical power of the eROSITA sample, we have detected warm baryons within cosmic filaments and cluster outskirts, offering a first glimpse of baryons in the faint, diffuse cosmic web.