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Probing kinematics of ICM/CGM with microcalorimeter-based X-ray missions

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Current and future microcalorimeter-based X-ray missions (e.g., XRISM, LEM, ATHENA) will have transformative impacts on the study of hot gaseous atmospheres across galactic scales: spanning the circumgalactic medium (CGM) to the intra-group/cluster medium (IGrM/ICM). Notably, these missions will offer high-resolution (eV-scale) spectroscopic data, enabling detailed analysis of the gas motions in the CGM/IGrM/ICM. In the first part of this talk I will present a recent study using the new TNG-Cluster simulation suit to explore the X-ray inferred kinematics of the ICM based on a simulated sample of Perseus-like clusters. I will discuss the predictions from TNG-Cluster for upcoming XRISM observations as well as the comparison with the existing Hitomi observations of the Perseus cluster. In the second part, I will talk about a future X-ray mission concept named Line Emission Mapper (LEM), which has been proposed to NASA as an Astrophysics Probe mission for the 2030s. In particular, using high-resolution TNG50 simulation I will discuss the prospects of the LEM All-sky survey in probing kinematic structures of the eROSITA bubbles in the Milky Way.

Presenter: TRUONG, Nhut