

Simulating AGN feedback in galaxy clusters with pre-existing turbulence

Saturday, May 17, 2025 5:00 PM (15 minutes)

Active galactic nuclei (AGN) feedback's role in suppressing cooling flows in cool-core clusters is acknowledged, but the primary heating mechanism of AGN jets is debated. One potential heating mechanism is heating caused by turbulence within the intracluster medium (ICM). However, there has been disagreement between simulation and observational studies. Therefore, the goal of our study is to elucidate this discrepancy using 3D hydrodynamic simulations including both AGN feedback and pre-existing turbulence. Our results indicate that turbulence has a limited impact on entropy. From examining the second-order velocity structure (VSF_2) and power spectrum, we found that the turbulence dissipation rates per unit mass obtained from these two methods are consistent. Therefore, we will calculate the turbulent heating rate and assess its ability to offset radiative cooling. Leveraging new XRISM data, our research provides key insights into the long-standing problem of AGN heating in clusters.

Section

High Energy

Primary authors: LI, Jia-Lun (National Tsing Hua University); YANG, Hsiang-Yi Karen (National Tsing Hua University)

Presenter: LI, Jia-Lun (National Tsing Hua University)

Session Classification: High-energy astrophysics