

Simulating AGN feedback in galaxy clusters with pre-existing turbulence

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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 induced by AGN jet-inflated bubbles. 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. We found that the observed line-of-sight velocity dispersion (σ_{los}) could overestimate the true velocity dispersion (σ), thus providing an explanation for the discrepancy between the simulated and observationally inferred turbulent heating rates. Leveraging new XRISM data, our research provides key insights into the long-standing problem of AGN heating in clusters.

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