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Supernovae-driven Galactic Outflows and the X-ray Emission and Absorption of Hot Circumgalactic Medium

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The missing baryon and missing metals problems are the two major challenges for galaxy formation. The missing matter most likely resides in the warm-hot (10^{5-7} K) medium beyond galaxies. Hot outflows driven by supernovae carry the majority of energy and metals, providing a natural solution to these problems. X-ray emission from hot corona around spiral galaxies, observed by XMM-Newton and Chandra, provides critical information about the outflows and its interaction with the pre-existing gas. We use 3D galactic scale simulations to investigate this interaction, using physical outflow models calibrated by small-box, high-resolution simulations. We construct mock X-ray emission maps and absorption maps of galaxy coronae. I will talk about how the X-ray luminosity and its spatial distribution are related to the star formation activities in the galaxies, and in particular, how the simulated maps compared to the current observations. With a robust feedback model and current observational constraints, we predict emission and linewidths of hot gas further away from galaxies. This can be detected by future missions like ATHENA and HUBS with unprecedented sensitivities and spectral resolutions.

Topic

Hot and diffuse baryons

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