X35a Impact of magnetic field and thermal conduction onto cold streams accreting massive high redshift galaxies

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Cold streams of gas ($T \sim 10^4$K) are the dominant channels of gas accretion onto high-redshift galaxies and the main explanation of the cosmic star-formation history peak around redshift 2. Recent studies aim to theorize the survival conditions of cold streams surrounded by the hotter ($\sim 10^6$ K) circum-galactic medium (CGM) gas. They provided evidence of the impact of Kelvin Helmholtz instabilities (KHI) on both stream dynamics and detectability in Lyα emission. KHI are not solved yet by the current resolution of cosmological simulation in the CGM, thus the need of idealized high-resolution simulation. Here we study the impact of magnetic field and anisotropic thermal conduction (TC) on radiatively cooling streams with a suite of magnetohydrodynamical two-dimensional simulations. We used the Athena++ code in which we implemented an anisotropic TC extension. Overall, the magnetic field and the TC reduce the stream mass growth and loss, respectively for strong and weak cooling regimes and can even prevent the disruption of the stream. The magnetic field angle and the TC reduce the cooling emission in most simulations up to 1 order of magnitude. While assuming an initially weak magnetic field with $\beta = 10^5$ (ratio of thermal pressure over magnetic pressure), we also find that the condensation of CGM gas onto the stream greatly enhances the magnetic field to the order of $\beta \sim 1$. Extrapolating our results to the cosmological context could imply that cold streams may fuel galaxies with cold turbulent magnetized gas, and they would less likely be disrupted by KHI.