Impact of cosmic rays on observational signatures in the circumgalactic medium

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Feedback processes influence the dynamical and thermal structure of a galaxy, redistributing gas and metals throughout the interstellar medium and out into the circumgalactic medium. Large-scale galactic winds can drive gas out of the galactic plane, as observed in galaxies recently undergoing intense star formation (Veilleux et. al. 2005). Photoionization heating from the radiation of young, massive stars is significant in the warm ionized medium (Reynolds 1990). Additional heating processes, such as from dust, turbulence, or cosmic ray streaming may also contribute. Simulations have shown that CRs in particular can greatly affect the both the dynamic and thermal states of gas in a galaxy (e.g. Ji et al. 2019). The complete details of CR transport through the circumgalactic medium remain uncertain. The exact properties of simulated galactic models depend sensitively on how CR transport is modeled (e.g. Simpson et al. 2016; Ruszkowski et al. 2017, Farber et al 2018, Holguin et al. 2019). Observational signatures such as metal emission/absorption lines (e.g. Tumlinson et al. 2017) can help distinguish these models and illuminate the processes that play a key role in shaping a galaxy. We perform three-dimensional coupled CR-MHD simulations of a section of a galactic disk and post-process predicted metal line signatures with the code *Cloudy.* We will compare predictions from different simulations and how they depend on simulated galaxy properties and the assumptions made in post-processing.

References

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