
Cosmic-ray transport in simulations of galactic disks

Abstract

Modeling cosmic-ray (CR) transport on galactic scale is a challenging task due to the complex physical processes that couple CRs to the thermal gas, which are not yet fully understood. As a result, in most interstellar-medium (ISM) studies involving CRs, the interaction between CRs and their scattering waves, that is unresolved on macroscopic scales, is treated via a constant scattering (or diffusion) coefficient, whose value is motivated by observational constraints. Considering the vastly varying conditions within the multiphase ISM, however, a constant scattering coefficient is unrealistic. To address this issue, we recently developed a detailed physical prescription for the transport of CRs, in which the scattering coefficient varies with the properties of the ambient gas, with a functional form motivated by the theory of self-confinement. In this talk, I will present the application of this prescription in the TIGRESS MHD simulations of portions of star-forming galactic disks, and discuss how transport and distribution of CRs depend on the properties of the multiphase, magnetized ISM.