

Propagation of CR secondary species and gamma ray emission in MHD simulations of galaxies

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We develop a new algorithm for the production and propagation of cosmic ray (CR) secondary elements and hadronic gamma ray emission within the framework of Cosmic Ray Energy SPectrum (CRESPE) module of Piernik MHD code (Ogrodnik et al ApJS 253, 18, 2021). CRESPE is based on the piece-wise power-law (coarse-grained) method for self consistent and numerically efficient cosmic ray (CR) propagation in the magnetized ISM of galaxies. We shall demonstrate the application of the method in simulations of CR secondary nuclei and predicting their ratios to primary CRs in MHD simulations of galaxies such as the Milky Way.

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