
GeV cosmic rays and interstellar magnetism

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Résumé

By adding pressure, compressibility, heating, and energy diffusion on kpc scales, GeV cosmic rays alter the gas dynamics inside and around galaxies. Using RAMSES, we have simulated the MHD and cosmic-ray evolution of a gas-rich dwarf galaxy, forming stars at a rate of 1 Msun/year. We have followed its evolution down to 9-pc resolution for different cosmic-ray transport schemes: in addition to advection by the gas, cosmic rays could diffuse either isotropically or preferentially along the magnetic field, with diffusion coefficients that encompassed the broad range of possible values inferred in the Milky Way. The simulations show a significant coupling between cosmic-ray pressures and the growth of the magnetic fields in dense gas. Such a coupling complicates the interpretation of the radio-SFR relation between galaxies.

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