Impact of strong Lyman alpha pressure on metal-poor dwarf galaxies

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Abstract

Using a set of radiation-hydrodynamic simulations of an isolated dwarf galaxy, we show that the momentum transferred from resonantly scattered Lyman alpha (Lya) photons is an important source of stellar feedback which can shape the evolution of galaxies. We find that Lya feedback can regulate the dynamics of star-forming clouds before the onset of supernova explosions (SNe). This is possible because each Lya photon resonantly scatters and imparts 10-300 times greater momentum than in the single scattering limit. Because star formation and associated SNe become less burst, galactic outflows become weaker in the presence of strong Lya radiation feedback. The typical mass loading factors in our metal-poor dwarf system are estimated to be 5-10 near the mid plane, while it is reduced to _˜1 at larger radii.

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