

Executive Summary for: Cosmic ray feedback across the sequence of star-forming galaxies

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What is this contribution about?: The importance of cosmic rays as an agent of feedback in galaxies that form stars (like the Milky Way).

Why is it relevant / interesting?: The universe turns gas into stars with low efficiency. Exactly why this is remains somewhat contentious. We show that in galaxies like the Milky Way, cosmic rays provide at least part of the answer to the origin of this low efficiency.

What have we done?: Introduced a model for how cosmic ray transport works in dense, partially-ionised, but largely neutral, star-forming gas; used this understanding of cosmic ray transport in a numerical investigation of the circumstances under which star-forming gas will be rendered unstable because of cosmic rays.

What is the result?: Modern, star-forming galaxies like the Milky Way and nearby dwarfs are shown to inhabit a region of parameter space that means that they sit at the cusp of cosmic ray-driven instability; they cannot sustain much high star formation rate surface densities without their gas columns becoming unstable. In contrast, gas rich systems like starbursts – while gamma-ray bright – are *not* cosmic ray unstable – because hadronic losses render the cosmic ray pressure small in comparison with other ISM constituents.

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