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# Dark matter heats up in dwarf galaxies

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Pure dark matter structure formation simulations in LCDM predict that dwarf galaxies should inhabit dark matter halos that have steeply rising central density “cusps”. However, observations of nearby dwarf irregulars favour instead constant density dark matter “cores”. Many solutions to this cusp-core problem have been proposed, from modifications to the nature of dark matter to dark matter being kinematically “heated up”by bursty star formation. In this talk, I present the first observational evidence for dark matter being heated up at the centres of nearby dwarf galaxies due to baryonic processes. I show that the inner dark matter density of these dwarfs is anti-correlated with their star formation histories. Dwarfs that have undergone a Hubble time of star formation have a lower central density than those whose star formation shut down long ago. This result is challenging to understand in theories that attempt to solve the cusp-core problem by modifying dark matter or the cosmological model, because these theories predict that dark matter cores should be ubiquitous. Our results suggest that dark matter is, to a good approximation, a cold, collisionless fluid that can be heated up and moved around.

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