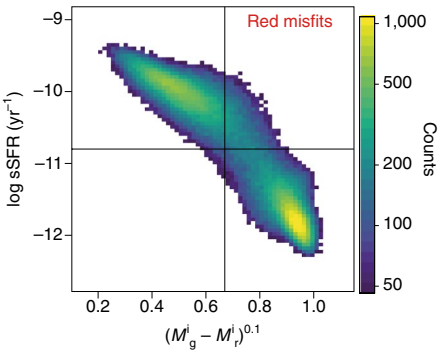
GALAXY EVOLUTION

The odd ones out

Mon. Not. R. Astron. Soc. (in the press); preprint at https://arxiv.org/abs/1803.01027



Credit: Oxford Univ. Press

A basic way to classify a galaxy and get a sense of its properties is by looking at its colours. Colours are indicative of the shape of the galaxy's spectral energy distribution, which in turn reflects, among other things, its stellar mass and the rate with which it forms stars. Galaxies actively forming stars show blue colours while quiescent galaxies are red. Fraser Evans, Laura Parker and Ian Roberts now report a population of galaxies whose distinct set of properties points to them being at a transitional phase in galaxy evolution.

Using the Sloan Digital Sky Survey, the authors select galaxies that are actively forming stars but have red colours (pictured), which they dub red misfits. Roughly 10% of all galaxies fall into this category, independent of their stellar mass. The fraction of red star-forming galaxies does not depend on their halo mass either. Furthermore, these galaxies show higher probability to host an active galactic nucleus (AGN). Interestingly, this combination of properties clearly sets them apart from both blue and red galaxies.

The authors present arguments that these 'misfits' are neither dusty star-forming galaxies nor quiescent galaxies for which the specific star formation rate (sSFR) has been misestimated. Instead, they conclude that they represent a transition between these two evolutionary stages. The independence from halo mass implies that environmental effects do not contribute to the emergence of this population, making these galaxies distinct from other previously suggested transitional galaxies. Feedback from an AGN and dynamical effects induced by bars are examples of secular processes that may instead be operating in these systems.

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