

Precipitation-Regulated Galaxy Evolution

Some galaxies are actively forming new stars and others are not. The origin of this dichotomy is one of the central questions of astrophysics. Our studies of the universe's largest galaxies have shown that star formation depends critically on the thermodynamic state of their circumgalactic gas and are motivating a new framework for understanding galaxy evolution. We have recently established that feedback from supernova explosions and accretion onto black holes suspends the circumgalactic gas in a state that is marginally unstable to condensation. The rate of star formation in such a galaxy is therefore governed by the rate at which cold clouds precipitate out of the surrounding gas and fall into the galaxy. I will show how this generic emergent property of the complex interplay between radiative cooling and energetic feedback results in remarkably simple explanations for many of the observable properties of galaxies.