R28a Structure and dynamics of perturbed galactic discs

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The nature of the spiral structure of disc galaxies is still somewhat of an open question. A number of different mechanism have been suggested to underpin spiral features; density waves, swing amplified transient spirals, bar driven arms and tidal encounters. The regimes where each of these mechanisms becomes dominant is an unknown, when does an interaction between a galaxy and a companion become strong enough to drown out the structure formed in isolation? We present the results of an investigation into the various morphologies created in the interaction between a disc galaxy and minor companion using numerous numerical simulations with stars, dark matter and gas. The primary goal of which is to discern the sensitivity of disc galaxies to tidal spiral structure. For what orbital paths, mass and velocity limits does the galaxy cease to feel the companion, and therefore any spiral generation is left to the galaxy itself? This also includes comparisons to transient spiral arm structures, those generated in simulations of isolated discs, and how the longevity, morphology and gas structure differs between the two mechanisms. We then proceed to identify the likely mechanisms driving a variety of 2-armed galaxies seen in the night's sky, and the likely properties of small mass companions that may be driving the observed spiral structure. By understanding the mechanisms driving different spiral morphologies we can better assess the origin of structure in external galaxies and the Milky Way.