

Dark-to-luminous properties of early type galaxies

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We introduce a convenient parameter for characterising the halo masses from both observational and theoretical results: the logarithmic radial gradient of the mass-to-light ratio. Using halo density profile as predicted from Λ CDM simulations, we derive prediction for this gradient for various galaxy luminosities and star formation efficiencies, ϵ_{SF} . We find a correlation between luminosity and logarithmic gradients such that the brightest galaxies appear the most dark matter dominated. This is also found in real galaxies: as a pilot study, we assemble the available gradients from kinematics in early-type galaxies and find the same luminosity – M/L gradient correlation. While brightest galaxies fit in well with Λ CDM prediction, there is a population of fainter galaxies whose gradients are so low to imply an unreasonably high star formation efficiency ($\epsilon_{\text{SF}} > 1$). This difficulty is eased if the dark haloes are not assumed to have the standard Λ CDM profiles, but instead have lower central concentrations.

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