Fluorescent emission from dark haloes

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Abstract

Numerical simulations predict a population of low-mass haloes, which remain 'dark' due to baryonic processes preventing gas from cooling into them in sufficient quantities to trigger star formation. However, since gas which does accrete is ionised by the ultraviolet background (UVB), dark haloes are expected to glow due to fluorescent emission.
Moreover the geometry of the sources, consisting of an ionised shell surrounding a neutral core, will result in distinctive ring-shaped patterns of emission. A detection of these fluorescent rings would constitute a valuable test of the predictions of standard Lambda-CDM cosmology.

In this talk I will introduce a set of radiative transfer simulations, which model dark haloes as spherical gas clouds in hydrostatic equilibrium with a dark matter halo and thermal equilibrium with the UVB. These simulations predict the haloes' radial H-alpha surface brightness profiles, and explore the dependence of the profiles on input parameters such as the assumed dark matter density profile and UVB spectrum.
We aim to use these simulations to predict the expected abundance of fluorescent dark haloes on the sky, and thereby evaluate future prospects for observing these objects.

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