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The effects of source morphology on machine learnings ability to identify dark matter substructure in strong gravitational lenses.

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Warm and cold dark matter models predict very different abundancies of dark matter substructure within the halos of galaxies. Strong gravitational lensing has shown, in theory, to be a useful probe to measure the parameters of the subhalo mass function which describes these abundancies. In recent years, the focus has been primarily in utilising machine learning to identify substructure properties using simulated photometric data, but often these datasets are rudimentary and not representative of real images. In particular, there is little focus on the influence of the source light galaxies morphology on machine learnings ability to identify substructure signatures. In this talk I will explore the degree to which structure in the source light galaxy is degenerate with substructure signals in the lensing galaxy, comparing a convolutional neural networks ability to accurately classify lenses with and without substructure using increasingly more complex source morphologies. This is done in both the cold and warm dark matter regimes.

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