

Axion clumps, streams and voids

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Axions are an increasingly popular dark matter candidate with a flourishing experimental campaign now poised to discover them if they exist. However, there is a potential crisis lurking within this model which could make a discovery impossible, even if the axion does turn out to be the correct dark matter candidate. In one of the general classes of cosmological production scenarios—namely the scenario in which the axion is born after inflation—it has been known for some time that dark matter is expected to inherit ultra-small-scale inhomogeneities from dynamics of the field taking place at the QCD scale. These inhomogeneities eventually collapse under gravity into small-scale structures called miniclusters or minihalos, which have potentially drastic consequences for experimental efforts to detect the axion on Earth. I will discuss recent and ongoing work which aims to address the degree of substructure in the axion dark matter distribution and attempt to quantify the extent to which prospects for discovering axions experimentally are hindered or potentially doomed altogether.

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