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Formation of Axion Miniclusters

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We will discuss the formation of axion dark matter miniclusters during the QCD phase transition in numerical simulations.
The existence of axion miniclusters might be crucial to the outcome of axion dark matter direct detection experiments but also of possible indirect signatures. For a detailed description of these effects the miniclusters properties, such as mass spectrum, number density and density profile, need to be known, which, in turn, depend crucially on the density contrast of the axion field previous to the gravitational collapse. Our simulations indicate that the inclusion of strings and domain walls puts a lot of fluctuation power in scales smaller than the horizon at the time of the QCD phase transition. These can collapse into a larger number of miniclusters of much smaller mass than previously consider.

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