

## Impact of adiabatic fluctuations on axion minicluster formation

Axions and axion-like particles (ALPs) have gained attention as potential dark matter candidates, leading to extensive research into their detection and characterization. Energy density fluctuations in the ALP field can result in the formation of axion miniclusters (AMC), gravitationally bound configurations with implications for dark matter structure. While widely accepted in the post-inflationary Peccei-Quinn symmetry-breaking scenario, uncertainties persist regarding the pre-inflationary phase, where large initial field fluctuations may extend beyond the horizon due to inflation. We investigate the influence of adiabatic fluctuations in the primordial plasma on ALP density perturbations, revealing their significant impact on large scales and emphasizing their crucial role in AMC formation during the pre-inflationary era. This prompts questions about the reliability of using AMC detection alone to distinguish between pre- and post-inflationary axion origins.

**Would you be interested in presenting a poster? (this will not impact the decision on your talk)**

yes

**Primary author:** Dr AYAD, Ahmed (Bielefeld University)

**Presenter:** Dr AYAD, Ahmed (Bielefeld University)

**Session Classification:** Reception and Poster Session