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Axion as a cold dark matter candidate: fully relativistic and nonlinear analysis

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We investigate aspects of axion as a coherently oscillating massive classical scalar field
by analyzing the fully nonlinear order perturbations in Einstein's gravity in the axion-comoving gauge.
The axion fluid has its characteristic pressure term leading to an axion Jeans scale
which is cosmologically negligible for a canonical axion mass.
Our classically derived axion pressure term in Einstein's gravity is identical to the one derived
in the non-relativistic quantum mechanical context in the literature.
We present the general relativistic energy and momentum conservation equations
for an axion fluid valid up to fully nonlinear order in perturbation.

Summary

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