Abstract Submitted
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High-resolution cosmological simulations of fuzzy dark matter GABRIEL LYNCH, SALMAN HABIB, Argonne Natl Lab — Fuzzy dark matter (FDM) is a theoretically well-motivated model which posits that dark matter consists of a condensate of ultra-light bosons with a macroscopic de Broglie wavelength on the order of 10 kpc. Cosmological simulations of FDM are computationally demanding because the de Broglie scale must always be resolved in order to obtain accurate dynamics, and as such it has been difficult to systematically study large-scale structure and halo properties in FDM models. Here, we use a spectral Schrödinger-Poisson solver in order to directly simulate the macroscopic wave-function of the FDM condensate in a cosmological volume. This solver uses a distributed 3D Fast Fourier Transform that can efficiently handle simulation grids of up to 10^6 points, allowing for the necessary small scales to be resolved. As an application, we calculate density profiles for FDM halos taken from a large simulation volume.

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