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Quantum Effects of Bose Dark Matter Structure Beyond the de Broglie Scale ERIK LENTZ, University of Goettingen, THOMAS QUINN, LESLIE ROSENBERG, University of Washington, LEON LETTERMAN, University of Goettingen, ADMX COLLABORATION — Axions and axion-like particles are becoming increasingly attractive candidates for the dark matter. Likewise, searches for these candidates are increasing in sophistication, number, reach, and may span much of the candidates' viable parameter space in the next decade. Haloscope searches crucially depend on the form of the local axion halo distribution. However, our understanding of axion structure formation is far from complete, due largely to the candidates unique properties as a highly-degenerate Bose fluid. I present in this talk a novel model of structure formation for Bose dark matter that contains physically-motivated extra-classical physics above the de Broglie scale in the form of exchange-correlation interactions. Theory and preliminary N-body simulations show Bose correlations grow quickly in the early universe and that galaxies seeded by axion dark matter include unique extra-classical structures that may have observable consequences. Implications for dark matter axion searches such as the ADMX haloscope are also presented.

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