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Axions and the Formation of Supermassive Black Holes at Cosmic Dawn

Abstract

Axion dark matter thermalizes by gravitational self-interactions and forms a Bose-Einstein condensate. The rethermalization of the axion fluid during the initial collapse of large scale overdensities near cosmic dawn transports angular momentum outward sufficiently fast that black holes form with masses ranging from approximately 10^5 to a few times $10^{10} M_{\odot}$.