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Scalar field dark matter around supermassive Black Holes

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We consider scalar field models of dark matter, with a mass in the range $10^{-21} \ll m \ll 10^{-3}$ eV. In the nonrelativistic regime, derivative or potential self-interactions can give rise to an effective pressure that builds equilibrium configurations (solitons) in galactic halos. We extend the analysis to the relativistic regime, down to the horizon of the supermassive galactic Black Hole (BH). We discuss when the large-scale soliton is eaten by the central BH or survives on timescales much greater than the age of the Universe.

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