Sterile neutrinos and the rapid formation of supermassive black holes

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Abstract
Massive sterile neutrinos that are embedded in a renormalizable seesaw-like extension of the standard model of particle physics are a most attractive dark matter candidate. Indeed, lowering the seesaw mass-scale from the grand unification scale to well below the weak interaction symmetry breaking scale, the lowest-mass right-handed neutrino may acquire a mass around 10 keV/c^2 and thus become a quasi-stable dark matter particle due to its small Yukawa coupling. Moreover, this low mass-scale seesaw mechanism may explain the observed oscillation properties of the left-handed active neutrinos as well as the baryon asymmetry through ordinary mixing. Here we show that self-gravitating degenerate balls, made of such sterile neutrinos, can resolve the longstanding mystery of the formation of supermassive black holes at redshift larger than six, less than a Gyr after the big bang.

Keywords: cosmology, quasars, black holes, sterile neutrinos, dark matter

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