

Ultralight Black Holes as Astrophysical Particle Accelerators

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The *memory burden* effect, which stabilizes systems by storing information, plays a key role in black holes, where evaporation halts after roughly half the initial mass is lost. This suggests that light primordial black holes (PBHs) with mass below 10^{15} g, expected to have fully evaporated, may still be viable dark matter (DM) candidates. We show that their mergers could form “young” black holes, resuming evaporation and emitting ultrahigh-energy cosmic rays detectable by current experiments. Tensions arise between current neutrino flux measurements and light PBHs as DM, and we discuss refining these constraints through cosmic-ray, gamma-ray, and gravitational wave observations. Based on 2410.07037

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