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Composite Asymmetric Dark Matter from Primordial Black Holes

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We investigate a cogenesis scenario for composite asymmetric dark matter framework: a dark sector has a similar strong dynamics to quantum chromodynamics in the standard model, and the dark-sector counterpart of baryons is the dark matter candidate. The Hawking evaporation of primordial black holes plays a role of a source of heavy scalar particles whose CP-violating decay into quarks and dark quarks provides particle–anti-particle asymmetries of baryon and dark matter, respectively. Primordial black holes should evaporate after electroweak phase transition and before the big-bang nucleosynthesis for explaining the baryon asymmetry of the Universe and for consistent cosmology. We find that this scenario explains the observed values for both baryon and dark matter energy densities as the heavy scalar particles with a mass of 10^6-10^9 GeV and the primordial black holes with a mass of 10^7-10^9 g.

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