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Dark Matter production from two evaporating PBH Distributions

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Particulate Dark Matter (DM), completely isolated from the Standard Model particle sector, can be produced in the early universe from Primordial Black Hole (PBH) evaporation. However, Big Bang Nucleosynthesis (BBN) observations put an upper bound on the initial mass of PBH requiring the PBH to evaporate completely before the advent of BBN. DM particles in the mass range $\sim(1-10^9)$ GeV can not explain the observed relic abundance for an early matter dominated universe due to this BBN constraint. However, this assumes the presence of only one monochromatic PBH mass distribution in the early universe. In this work, we explore the simple possibility of achieving the observed relic with DM masses from the above mentioned range for an early matter dominated era with two monochromatic evaporating PBH mass distributions and demonstrate that the BBN constraints can be alleviated to a good degree.

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