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A New Window into Gravitationally Produced Scalar Dark Matter

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In this presentation, I discuss the production of a spectator scalar dark matter field that directly couples to the inflaton. Conventional scenarios of purely gravitationally produced dark matter with masses below the Hubble parameter at the end of inflation are in tension with Cosmic Microwave Background (CMB) constraints on the isocurvature power spectrum. We explore a more general scenario with a non-minimal coupling between the scalar dark matter field and gravity, which allows for significantly lighter scalar dark matter masses compared to minimal coupling predictions. By imposing relic abundance, isocurvature, Lyman-α, and Big Bang Nucleosynthesis (BBN) constraints, we show the viable parameter space for these models. Our findings demonstrate that the presence of a non-minimal coupling expands the parameter space, yielding a dark matter mass lower bound of 2x10ˆ{-4} eV.

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