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Primordial black holes dark matter from inflection point models of inflation and the effects of reheating

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We study the formation of primordial black holes (PBH) in a single field inflection point model of inflation wherein the effective potential is expanded up to the sextic order and the inversion symmetry is imposed such that only even power terms are retained in the potential. By working with a near inflection point in the potential, we find that PBHs can be produced in our scenario in a very relevant mass range with a nearly monochromatic mass function which can account for a sizeable fraction of the cold dark matter in the universe. By change various parameters in our model, we do generate the PBHs mass fraction in the higher mass range but the primordial spectrum of curvature perturbations becomes strongly tilted at the CMB scales. We also briefly discuss already existing difficulties and uncertainties associated with the PBHs mass fraction for a given inflationary model. Moreover, we study the effects of a reheating epoch after the end of inflation on the PBHs mass fraction and find that an epoch of a prolonged reheating can shift the mass fraction to larger mass ranges as well as increase the fractional contribution of PBHs to the total dark matter. Finally, we summarise our findings and discuss the implications of our results for future directions.

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