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Primordial black holes from inflation: dark matter, gravitational waves and imprints from evaporation

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Primordial black holes (PBH) have recently emerged as very interesting candidates for the cold dark matter in the universe. We study the generation of PBHs in a single field model of inflation with an inflection point in the inflaton potential. We found that PBHs can be produced in our scenario in the asteroid-mass window with a nearly monochromatic mass fraction which can account for the total dark matter in the universe. Further, we study the induced stochastic gravitational waves background (ISGWB) arising from the second order scalar perturbations. We found that the ISGWB in our scenario can be generated in the frequencies range from nanoHz to KHz that covers the observational scales corresponding to future space based GW observatories such as IPTA, LISA, DECIGO and ET as well as Advanced LIGO and BBO. Finally, we study the observational signatures due to the Hawking evaporation of ultra-light PBHs. While stable heavy particles from evaporation can be an interesting dark matter candidate, we find that light relativistic particles can also contribute to the effective relativistic degree of freedom which can be constrained by future CMB experiments.

Presenter: JAIN, Rajeev Kumar (Dept. of Physics, Indian Institute of Science, Bangalore 560012, India)

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