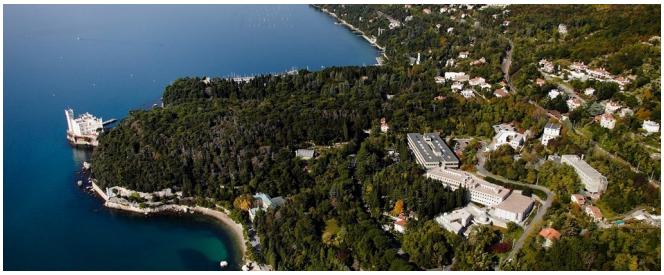

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Stochastic Multiple Fields Inflation and Primordial Black Holes Formation

Friday 1 September 2023 15:25 (25 minutes)

There has been a revival of interest in PBHs in recent years, especially after the discovery of gravitational waves from merging black holes with mass at the order of tens of solar masses in the LIGO/Virgo observations. As black holes with this range of mass may not form from the known astrophysical processes, it is argued that these objects may indeed be PBHs. On the other hand, PBHs are extensively studied as candidates for dark matter. The USR setup has been also employed extensively in recent years as a mechanism to generate PBHs during inflation since during this phase of inflation the curvature perturbation is not frozen and grows. We Study the PBHs formation in a multiple field inflation in diffusion dominated regime and calculate the mass fraction and the contribution of PBHs in dark matter energy density for various higher dimensional field spaces. The fields are under pure Brownian motion in a dS background with boundaries in higher dimensional field space. This setup can be realized towards the final stages of the ultra-slow-roll setup where the classical drifts fall off exponentially and the perturbations are driven by quantum kicks. We have shown that there are regions in the parameter space of the model where PBHs with various mass ranges can be generated. However, this model typically predicts PBHs which can only furnish a relatively small fraction of the dark matter.

Presenter: ASADI, Kosar

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