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Seminar of the theory group of APC

Mardi 21 Mai 2019, 14 :00
APC, 646A - Mondrian
Domaines : gr-qc

Titre : *Primordial black holes and the inflationary universe*

Orateur : **Kenta Ando (University of Tokyo, Kashiwa & Kavli IPMU)**

Résumé : *The interest in primordial black holes (PBHs) has recently risen up again after the discovery of around 30 solar mass black holes through the LIGO/Virgo gravitational wave events. PBHs are black holes produced by gravitational collapse of the over-dense region in the early universe. An attractive origin of the overdensity is primordial perturbations generated during inflation. In this talk, I will first explain the relation between the power spectrum of the perturbations predicted by inflation models and the estimated PBH abundance. This relation has various theoretical uncertainties including the choice of the window function (https ://arxiv.org/abs/1802.06393). Next, as a concrete model, I will briefly introduce the so-called axion-like curvaton model, where the phase direction of a complex scalar field different from inflaton is responsible for small-scale perturbations (https ://arxiv.org/abs/1711.08956, https ://arxiv.org/abs/1805.07757). We found that PBHs produced in this model can successfully reproduce the LIGO/Virgo gravitational wave events. Finally, I would like to discuss the case where a single-field inflaton potential has an inflection point. There, a slow-roll violation enhances quantum fluctuation. We should use stochastic inflation formalism since the quantum back reaction could become significant. However, stochastic inflation beyond slow-roll regimes is nontrivial and worth investigating by itself. I will show a numerical result obtained so far under a simplified setup.*