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PBH formation from first-order phase transition.

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Primordial black holes (PBHs) can be formed from the collapse of large-density inhomogeneities in the early Universe through various mechanisms. One such mechanism is a strong first-order phase transition, where PBH formation arises due to the delayed vacuum transition. The probabilistic nature of bubble nucleation implies that there is a possibility that large regions are filled by the false vacuum, where nucleation is delayed. When the vacuum energy density inside those regions decays into other components, overdensity reaches a threshold, and the whole mass inside the region could gravitationally collapse into PBHs. In this scenario, PBHs can serve as both dark matter candidates and probes for models featuring first-order phase transitions, making it phenomenologically appealing. This mechanism can be tested through a multi-pronged approach, encompassing gravitational wave detectors, microlensing studies, and collider experiments.

Mini Symposia (Invited Talks Only)

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