Contribution ID: **13** Type: **not specified**

Primordial black hole formation from an aborted phase transition

Monday, 30 September 2024 16:10 (30 minutes)

Primordial black holes may be produced from cosmological first-order phase transitions. I will discuss a new mechanism for PBH formation based on an aborted heating phase transition during reheating. Here "heating" means that the phase transition occurs as the temperature increases during the earlier stage of reheating (when the Universe is still matter-dominated). "Aborted" means that there are bubble nucleations but the nucleation rate is so low such that there is no coalescence for these nucleated bubbles. The particular evolution of the effective potential during reheating makes the bubble expand first, then shrink, and finally disappear. However, such disappeared bubbles generate perturbed spherical regions with over-density in energy, which would accrete the surrounding matter (reheaton) and collapse into black holes.

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