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Primordial Black Holes Are True Vacuum Nurseries

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The Hawking evaporation of primordial black holes (PBH) reheats the Universe locally, forming hot spots that survive throughout their lifetime. We propose to use the temperature profile of such hot spots for light PBHs to calculate the decay rate of metastable vacua in cosmology, avoiding inconsistencies inherent to the Hartle-Hawking or Unruh vacuum and thermal loop correction which suppress the decay rate. We apply our formalism to the case of the purported electroweak (Higgs) vacuum stability and find that a PBH energy fraction $\beta > 7 \times 10^{-80} (M/g)^{3/2}$ is ruled out for black holes with masses $0.8g < M < 10^{15}g$.

Presenter: HAMAIDE, Louis (UCL, London)