Contribution ID: **211** Type: **not specified**

High-Energy Neutrinos from Scalar Decays in Primordial Black Hole Evaporation

Monday 19 May 2025 17:30 (15 minutes)

We investigate the potential of evaporating primordial black holes (PBHs) as unique astrophysical sources of high-energy neutrinos originating from the decays of heavy beyond-Standard-Model (BSM) scalars. In their final stages, PBHs can attain temperatures sufficient to emit CP-even (H2), CP-odd (⊠), and charged Higgs bosons (⊠±). In specific regions of parameter space, ⊠2 and A predominantly decay into neutrinos, yielding distinctive spectral features. We compute the resulting neutrino fluxes, incorporating greybody factors and detailed kinematic distributions, and demonstrate that such signals may be observable at detectors like IceCube. These results position PBH evaporation as a promising probe of hidden scalar sectors and new physics beyond the Standard Model.

Mini Symposia (Invited Talks Only)

Plenary (Invited talks only)

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Session Classification: Astro-particle

Track Classification: Astro-Particle Physics