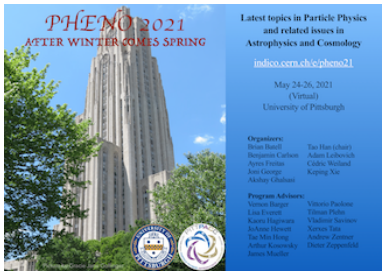

Contribution ID: **1241** Type: **Cosmology**

Precision Calculation of Dark Radiation from Spinning Primordial Black Holes and Early Matter Dominated Eras

Wednesday 26 May 2021 14:30 (15 minutes)

We present precision calculations of dark radiation in the form of gravitons coming from Hawking evaporation of spinning primordial black holes (PBHs) in the early Universe. Our calculation incorporates a careful treatment of extended spin distributions of a population of PBHs, the PBH reheating temperature, and the number of relativistic degrees of freedom. We compare our precision results with those existing in the literature, and show constraints on PBHs from current bounds on dark radiation from BBN and the CMB, as well as the projected sensitivity of CMB Stage 4 experiments.As an application, we consider the case of PBHs formed during an early matter-dominated era (EMDE). We calculate graviton production from various PBH spin distributions pertinent to EMDEs, and find that PBHs in the entire mass range up to 10^9 g will be constrained by measurements from CMB Stage 4 experiments, assuming PBHs come to dominate the Universe prior to Hawking evaporation. We also find that for PBHs with monochromatic spins $a^* > 0.81$, all PBH masses in the range $10^{-1}\ \mathrm{g} < M_{\mathrm{BH}} < 10^9\ \mathrm{g}$ will be probed by CMB Stage 4 experiments.

Summary

Authors: ARBEY, Alexandre (Lyon U. & CERN TH); AUFFINGER, Jérémy (Université Claude Bernard Lyon 1); SANDICK, Pearl (University of Utah); SHAMS ES HAGHI, Barmak (University of Utah); Prof. SINHA, Kuver (University of Oklahoma)

Presenter: SHAMS ES HAGHI, Barmak (University of Utah)

Session Classification: Cosmology V