## NEHOP'25 - New Horizons in Primordial Black Hole Physics



Contribution ID: 65

Type: not specified

## Prospects for strong interaction and PBH formation in SU(∞) Quantum Gravity (QGR)

Wednesday 21 May 2025 11:00 (20 minutes)

 $SU(\infty)$ -QGR is a recently developed foundationally quantum model of

cosmology and gravity (reviewed in arXiv:2409.08932). It treats the Universe as an isolated quantum system having an infinite number of mutually commuting observables. Quantum fluctuations locally fragment the SU( $\infty$ ) group representing Hilbert space of the Universe to approximately isolated subsystems representing G x SU( $\infty$ ), where G is a generic finite-rank symmetry and the global SU( $\infty$ ) symmetry - interpreted as gravity - entangles each subsystem to the rest of the Universe. In addition to parameters of G symmetry, subsystems depend on 4 continuous parameters that their average/effective values are perceived as the classical spacetime with a Lorentzian geometry. In this talk I first highlight the main properties of this model. Then, using the analogy with condensed matter, I present possibilities for the emergence of local strong correlations in the early Universe that may generate - without fine-tuning - over-densities leading to formation of black holes.

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Session Classification: PBHs, structure formation, cosmological evolution & particle DM