Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **4616** Type: **Poster (Non-Student) / Affiche (Non-étudiant(e))**

# (POS-79) Scalar cosmological perturbations from quantum-gravitational entanglement

*Tuesday 28 May 2024 18:20 (2 minutes)*

A major challenge at the interface between quantum gravity and cosmology is to understand how cosmological structures can emerge from physics at the Planck scale. In this talk, I will provide a concrete example of such an emergence process by extracting the physics of scalar and isotropic cosmological perturbations from full quantum gravity, as described by a causally complete Barrett-Crane group field theory model. From the perspective of the underlying quantum gravity theory, cosmological perturbations will be associated with (relational) nearest-neighbor two-body entanglement, providing crucial insights into the potentially purely quantum-gravitational nature of cosmological perturbations. I will also show that at low energies the emergent relational dynamics of these perturbations are perfectly consistent with those of general relativity, while at trans-Planckian scales quantum effects become important. Finally, I will comment on the implications of these quantum effects for the physics of the early universe and outline future research directions.

## Keyword-1

Quantum Gravity

## Keyword-2

Cosmology

## Keyword-3

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**Session Classification:** DTP Poster Session & Student Poster Competition (11) | Session d'affiches DPT et concours d'affiches étudiantes (11)

**Track Classification:** Technical Sessions / Sessions techniques: Theoretical Physics / Physique théorique (DTP-DPT)