



## Physics Colloquium

Thursday, 25 April 2024 | 17:00 – 18:00, Seminar Room, 3rd floor

### Quantum Mechanics, Entanglement and Gravity

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#### ABSTRACT

*One of the crucial properties of Quantum Mechanics is the possibility of entanglement between quantum systems, (a property that Einstein called "spooky action at a distance" and never accepted). This is the property that is central to the field of Quantum Information and its avatar: Quantum Computation. (Quantum) Gravity is a theory that is expected to determine the dynamics of space-time geometry and matter. I will review relatively recent ideas on how the modern approaches to this problem lead to the presence of underlying quantum microscopic degrees of freedom in quantum gravity theories. Such degrees of freedom are strongly coupled and strongly quantum-entangled. This leads to the "fabric" of gravity: the semiclassical space-time geometry postulated by Einstein. It also links quantum entanglement to geometric wormholes in spacetime. It also relates entanglement entropy and thermodynamic entropy, and holds some lessons for the quantum dynamics of Black-Holes.*

