1167-47-343 **Andre Kornell*** (akornell@tulane.edu), **Bert Lindenhovius** and **Michael Mislove**.
Quantum posets and quantum powersets.

A quantum partial order on a von Neumann algebra M is a unital ultraweakly closed antisymmetric operator algebra on the same Hilbert space that contains the commutant M'. This structure may be viewed as an information order and used to model instability and recursion in the quantum setting. In this talk, we consider quantum partial orders on those von Neumann algebras that are direct sums of full matrix algebras, which are an established quantum generalization of discrete spaces. These quantum posets naturally form a well-behaved category.

The powerset functor is the right adjoint to the inclusion of the category of sets and functions into the category of sets and binary relations. We may similarly define the powerset of a quantum set, generalizing functions to unital normal *-homomorphisms and binary relations to the quantum relations of Weaver. The quantum powerset carries a canonical quantum partial order structure. Furthermore, every quantum poset admits a canonical embedding into its powerset that generalizes the familiar downset embedding. (Received March 10, 2021)