

QM, SUSY, and Outlook in NN-FT

Wednesday 10 December 2025 13:30 (45 minutes)

I'll review the essentials of a neural network approach to defining and studying field theories, listing previous results related to symmetries, conformal symmetry, locality, interactions, etc. The focus of the talk will be on two 2025 papers, one related to QM, and the other related to fermions and SUSY. The QM results include a universality theorem, a new construction of Euclidean QM theories with deep neural networks, and the recovery of cherished properties from QM, such as Heisenberg uncertainty and the spectrum of the harmonic oscillator. The fermion and SUSY results include the definition of Grassmann-valued neural networks and their use in constructing fermionic NN-FTs, including the free Dirac spinor in an infinite width limit. With fermions in hand, I will also present a new construction of interacting supersymmetric theories in 1d and 4d. I'll try to devote a significant portion at the end for outlook and also getting feedback from friends.

Presenter: HALVERSON, James