

# NQS for Hypernuclei, Neural-IDF, and Equivariant NQS for Excited-State Targeting

*Thursday 2 October 2025 14:20 (20 minutes)*

Three advances in Neural Quantum States for nuclear physics: (i) We develop a Pfaffian-Jastrow VMC-NQS ansatz for single- $\Lambda$  hypernuclei. Calibrated via Gaussian-process assisted LO pionless EFT it reproduces s- and p-shell binding and  $\Lambda$ -separation energies, capturing the proton “shrinkage” in  ${}^7_\Lambda\text{Li}$  relative to  ${}^6\text{Li}$ ; (ii) Neural Interacting Dynamical Fields (Neural-IDF) are a continuation of Madeira’s dynamical-pion QMC recast as an NQS, treating pion modes as explicit variational DOFs jointly sampled with nucleons, enabling a unified  $N$ - $\pi$  description; (iii) Excited states — an explicitly  $SO(3)$ -equivariant backflow architecture targets  $J > 0$  states.

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