

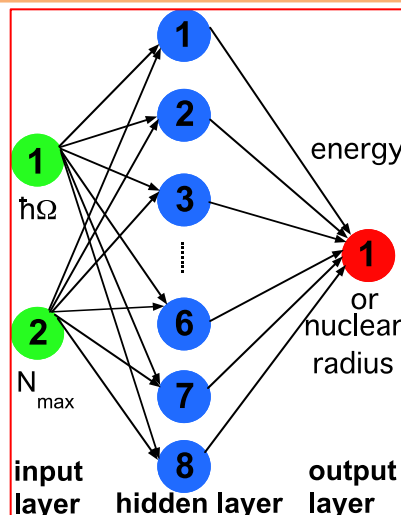
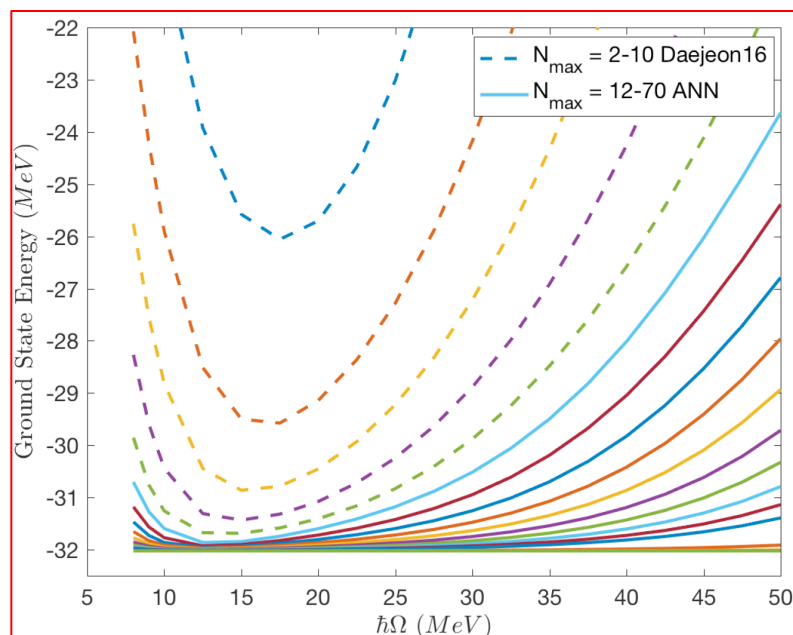
Deep Learning for Nuclear Binding Energy and Radius

Scientific Achievement

- Development of an artificial neural network (ANN) for extending the application range of the *ab initio* No-Core Shell Model (NCSM)
- Demonstrated predictive power of ANNs for converged solutions of weakly converging simulations of the nuclear radius
- Provided a new paradigm for matching Deep Learning with results from high performance computing simulations

Significance and Impact

- Guides experimental programs at DOE's rare isotope facilities
- Extends the predictive power of *ab initio* nuclear theory beyond the reach of current high performance computing simulations
- Establishes foundation for deep learning tools in nuclear theory useful for a wide range of applications



Research Details

- Predict properties of nuclei based on *ab initio* structure calculations in achievable basis spaces
- Develop artificial neural networks that extend the reach of high performance computing simulations of nuclei
- Produce accurate predictions of nuclear properties with quantified uncertainties using fundamental inter-nucleon interactions