# Machine learning action parameters in LQCD

Objectives

- Discovery of the properties of hadronic and nuclear matter through world leading Lattice Quantum Chromodynamics (LQCD) calculations

- Accelerate computation of gauge configuration generation

- Reduce regression problem of determining LQCD action parameters

Impact

- Established symmetry-preserving deep neural network able to accurately identify parameters used to generate streams of ensembles

- Enabled future class of methods to reduce parameter space searches
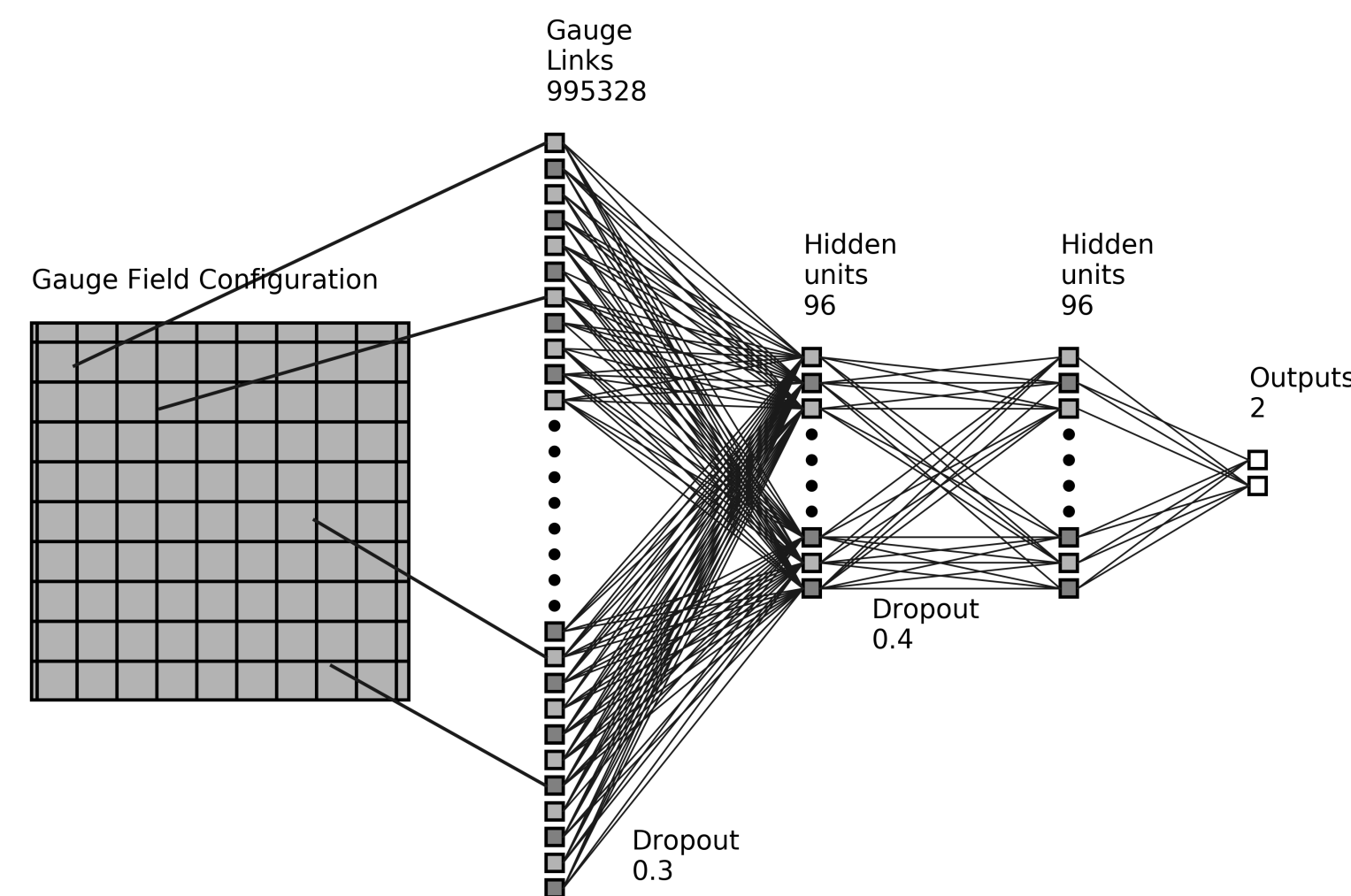
Accomplishments

- Established symmetry-preserving deep neural network able to accurately identify parameters used to generate streams of ensembles

- Non-Symmetry preserving networks revealed features manifested from long auto-correlation lengths in ensembles not recognized in standard analyses

Network for parametric regression

U.S. DEPARTMENT OF **ENERGY** | Office of Science