Joseph Karpie – HEP Seminar – November 11, 2025
Jefferson Lab

Title: Learning Parton Structure with Lattice QCD

Abstract: Hadrons like the proton and neutron are bulky composite particles described by their constituent quarks and gluons. In order to make predictions of many types of cross sections of hadron scattering, such as those at the EIC or LHC, require understanding how the quarks and gluons are distributed within the hadron in order to understand the probability of each constituent or parton interacting. Typically, this information is extracted from global phenomenological analyses of collider data, but for the last decade lattice QCD has been used to calculate parton distributions. I will present advances the HadStruc collaboration has made towards this goal. Specifically, I will highlight the novel machine learning approach, Gaussian Process Regression, we have implemented to determine the parton distributions from these datasets.