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Global fits for deep inelastic scattering and related processes

NOBUO SATO, Old Dominion University

Several decades of high-energy scattering experiments have given us intriguing, though limited, glimpses into the inner structure of protons and neutrons. With the 12 GeV nuclear physics program at Jefferson Lab underway, and plans being made for a future Electron-Ion Collider facility, we are at the threshold of imaging the nucleons three-dimensional structure through its quark and gluon quantum probability distributions. Extracting the quantum distributions from the experimental data is very challenging, however, because of the inverse problem: the measured cross sections are given by convolutions of the quantum probability distributions with process-dependent hard coefficients that are perturbatively calculable from Quantum Chromodynamics. While most previous analyses have been based on the maximum likelihood approach, it has become evident that Bayesian likelihood methods are needed, using Monte Carlo sampling techniques to thoroughly explore the parameter space associated with the quantum probability distributions. I this talk I will review recent developments in tackling the inverse problem for extracting quantum distributions from experimental measurements.