Simultaneous Monte Carlo analysis of parton distributions: a new paradigm in global QCD studies W. MELNITCHOUK, CARLOTA ANDRES, Jefferson Lab, JACOB ETHIER, Nikhef, NOBUO SATO, Jefferson Lab, YIYU ZHOU, College of William and Mary, JEFFERSON LAB ANGULAR MOMENTUM (JAM) COLLABORATION — We report the results of the first simultaneous extraction of unpolarized and polarized parton distributions and parton-to-hadron fragmentation functions from a Monte Carlo analysis of global high energy lepton and hadron scattering data. We use data resampling techniques to thoroughly explore the Bayesian posterior distribution of the extracted functions, and use k-means clustering on the parameter samples to identify the configurations that give the best description across all reactions. Inclusion of semi-inclusive deep-inelastic scattering data reveals a strong suppression of the strange quark distribution in the proton, in contrast with recent results from $W^\pm$ and Z production at the LHC. The analysis is the first to include jet production data in both unpolarized and polarized proton-proton collisions, which provides the best constraints to date on the momentum and spin carried by gluons in the proton.

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