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Uncertainties in Determining Parton Distributions at Large x: Results from the CJ Collaboration

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The results of a global next-to-leading order fit of parton distribution functions in which cuts on W and Q are relaxed, thereby including more data at high values of x, will be reported. Effects of target mass corrections (TMC), higher twist contributions, and nuclear corrections for deuterium data are significant in the large-x region. The leading twist parton distributions are found to be stable to TMC model variations as long as higher twist contributions are also included. Importantly, uncertainties in parton distribution functions (PDFs) at large x arising from nuclear effects in deuterium F2 structure function data are evaluated. Within this global analysis, the impact on the PDFs from uncertainties in the deuteron wave function at short distances and nucleon off-shell effects, the use of relativistic kinematics, as well as the use of less a restrictive parametrization of the d/u ratio, have been assessed. In particular the d-quark and gluon PDFs are found to vary significantly with the choice of nuclear model. The impact of these uncertainties on the determination of the neutron structure function, and on W boson production and parton luminosity at the Tevatron and the LHC are highlighted. Prospects for new measurements sensitive to the d-quark and gluon distributions but insensitive to nuclear corrections will also be discussed.

Author: KEPPEL, Cynthia (Hampton University)

Presenter: KEPPEL, Cynthia (Hampton University)

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