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PDFSense: Mapping the PDF sensitivity of future facilities

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The publicly available PDFSense analysis package provides a variety of tools for quantifying the potential impact of experimental data on the extraction of PDFs. Our approach relies crucially on the Hessian correlation between theory-data residuals and the PDFs themselves, as well as on a newly defined quantity —the sensitivity —which represents an extension of the correlation and reflects both PDF-driven and experimental uncertainties. This offers a new means of understanding the influence of individual measurements in existing fits, as well as a predictive device for future facilities; toward this goal, we examine pseudo-data from the EIC, LHeC, and HL-LHC. Along the way, many new physics insights can be gained or reinforced.

Authors: OLNESS, Fred; HOBBS, TIMOTHY J (Southern Methodist University); NADOLSKY, Pavel (Southern Methodist University)

Presenter: NADOLSKY, Pavel (Southern Methodist University)

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