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(Im)precise nuclear forces: From experiment to model[1]

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The nuclear force is the most fundamental building block in nuclear science. It is the cornerstone of every nuclear application from nuclear reactors to the production of heavy elements in supernovae. Despite being rigorously derived from the Standard Model, the actual determination of the nuclear force requires adjusting a set of parameters to reproduce experimental data. This introduces uncertainties that need to be quantified and propagated into all nuclear applications. I'll review a series of works on the determination of the Nucleon-Nucleon interaction from a collection of over 8000 elastic scattering data. Statistical tools used on the selection of data and the propagation of statistical uncertainties will be presented. The implications for charge independence of the pion-nucleon coupling constant and the predictive power of chiral interactions will be discussed. Although this is not the final word on theoretical nuclear uncertainties, as other sources of errors should be explored, this series of works allow to set the foundations for a new era for uncertainty quantification in nuclear applications.

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