Abstract Submitted
for the DNP20 Meeting of
The American Physical Society

Toward the Next Generation of Optical-Model Potentials[1] COLE PRUITT, JUTTA ESCHER, Lawrence Livermore National Laboratory, MACK ATKINSON, TRIUMF, WIM DICKHOFF, BOB CHARITY, LEE SOBOTKA, Washington University in St Louis — Almost 70 years after their debut, phenomenological optical-model potentials (OMPs) remain the standard for theoretical descriptions of low-energy nuclear reactions. A handful of venerable nucleon-nucleus potentials, including Koning-Delaroche and Chapel Hill 89, accurately reproduce average scattering observables on stable, near-spherical isotopes up to several hundred MeV. But despite caveats from their creators, these potentials are often pushed beyond their intended limits to make predictions for highly-deformed, highly-asymmetric systems, many of which will be newly accessible in the FRIB era. Are these extrapolations justifiable, or do they yield unreliable predictions? Are there sufficient experimental structure and scattering data to constrain the functional forms of the potential? To address these questions, we have begun to characterize the inherent uncertainty in widely-used OMPs and to study the sensitivity of the potentials components to various sectors of experimental data. We compare standard phenomenological potentials with new dispersive and microscopic optical models and formulate recommendations for developing the next generation of OMPs.

[1]This work was performed in part under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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Date submitted: 25 Jun 2020 Electronic form version 1.4