Abstract Submitted
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Non-local Optical Potentials IAN THOMPSON, Lawrence Livermore National Laboratory — In all direct reactions to probe the structure of exotic nuclei at FRIB, optical potentials will be needed in the entrance and exit channels. At high energies Glauber approximations may be useful, but a low energies (5 to 20 MeV/nucleon) other approaches are required. Recent work of the UNEDF project [1] has shown that reaction cross sections at these energies can be accounted for by calculating all inelastic and transfer channels reachable by one particle-hole transitions from the elastic channel. In this model space, we may also calculate the two-step dynamic polarization potential (DPP) that adds to the bare folded potential to form the complex optical potential. Our calculations of the DPP, however, show that its non-localities are very significant, as well as the partial-wave dependence of both its real and imaginary components. The Perey factors (the wave function ratio to that from an equivalent local potential) are more than 20% different from unity, especially for partial waves inside grazing. These factors combine to suggest a reexamination of the validity of local and L-independent fitted optical potentials, especially for capture reactions that are dominated by low partial waves. Prepared by LLNL under Contract DE-AC52-07NA27344. [1] G.P.A. Nobre, F.S. Dietrich, J.E. Escher, I.J. Thompson, M. Dupuis, J. Terasaki and J. Engel, submitted to Phys. Rev. Letts., 2010.

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