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Low energy excitations in nuclei and their implication for nucleon-nucleus inelastic scattering

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The properties of nuclear excitations, particularly collective excitation modes such as the giant resonance (GR) and pygmy resonance (PR), can reveal important characteristics of the underlying nuclear structure. The successful description of the nuclear excitations will enable the complete modelling of transitions between their ground and excited states and, furthermore, produce inputs for scattering calculations. We perform fully consistent calculations of excited states using the Quasi-particle Random Phase Approximation (QRPA) built on Hartree-Frock-Bogoliubov (HFB) states, offering valuable insights into the collective excitation characteristics. We integrate microscopic structure of nuclei with reaction theory for nucleon-nucleus scattering. We utilize the nucleon-nucleus effective interaction to proton-induced inelastic scattering, which are applicable as surrogate reaction method. In this presentation, we present characteristics of low energy electric excitations in spherical molybdenum isotopes and elastic and inelastic scattering cross sections.

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