

## Sub Coulomb barrier $d+^{208}\text{Pb}$ scattering in the time-dependent basis function approach

*Tuesday, 12 July 2022 10:20 (20 minutes)*

We investigate the scattering of the deuteron on  $^{208}\text{Pb}$  below the Coulomb barrier based on the non-perturbative time-dependent basis function (tBF) approach[1]. We obtain the bound and discretized scattering states of the projectile, which form the basis representation of the tBF approach, by diagonalizing a realistic Hamiltonian in a large harmonic oscillator basis.

We find that the higher-order inelastic scattering effects are noticeable for sub barrier scatterings with the tBF method. By considering all the possible electric dipole (E1) transition paths among all the states involved in the tBF approach and taking into account the corrections of the polarization potential to Rutherford trajectories, we have successfully reproduced experimental sub Coulomb barrier elastic cross section ratios with the tBF approach. We find that both the internal E1 transitions of the deuteron projectile and the corrections of the polarization potential to the classical Rutherford trajectories are essential for reproducing experimental data in these sub barrier experiments. More specifically, the correction of the polarization potential to the Rutherford trajectory is dominant in reproducing the data at very low bombarding energies, whereas the role of internal transitions of the deuteron projectile induced by the E1 interaction during the scattering becomes increasingly significant at higher bombarding energies.

1. Peng Yin, Weijie Du, Wei Zuo, Xingbo Zhao, James P. Vary, arXiv: 1910.10586 [nucl-th].

### The speaker is a student or young scientist

Yes

### Section

1. Experimental and theoretical studies of nuclear reactions

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