



Contribution ID: 15

Type: **Contributed Talk**

Exploring nonlocal potentials in few-body reactions

Monday, 31 July 2023 15:15 (15 minutes)

The dynamics of quantum few- and many-body systems is often modeled with local interaction models, mainly due to simplicity, though more microscopic or fundamental approaches yield nonlocal interactions. For few-cluster nuclear reactions the interactions usually are given in the local form of real binding and complex optical potentials. We made a two-fold extension of that standard dynamics by developing a new nonlocal form of binding and optical potentials and simultaneously including the excitation of the nuclear core. Exact three-body Faddeev-type equations in momentum-space are solved for the description of nucleon transfer reactions (d,p) and (p,d) and deuteron inelastic scattering(d,d'). Example results for ^{10}Be and ^{24}Mg nuclei demonstrate a good reproduction of the experimental data and an improved consistency between the two-body (elastic and inelastic nucleon-nucleus scattering) and three-body description [1].

A different application of the nonlocality is presented in the context of local strongly repulsive interatomic potentials such as those between ^4He atoms. Making a gradual extension of the original potential into a nonlocal form it becomes more smooth enabling to achieve well converged solutions of three- and four-body bound-state or scattering equations. An extrapolation back to the original potential yields the desired results such as the dimer-dimer scattering length or tetramer binding energies [2].

1. A. Deltuva, D. Jurčiukonis, *Physics Letters B* 840, 137867 (2023).
2. A. Deltuva, *Phys. Rev. A* 105, 043310 (2022).

Primary author: DELTUVA, Arnoldas (Vilnius University)

Co-author: Dr JURČIUKONIS, D. (Vilnius University)

Presenter: DELTUVA, Arnoldas (Vilnius University)

Session Classification: Monday Parallel Session: Few-body systems (Atrium Maximum)