Contribution ID: **91** Type: **Oral talk (15 min + 5 min questions)**

SS-HORSE APPROACH: FURTHER DEVELOPMENT AND APPLICATION TO THE STUDY OF LIGHT NUCLEI

Friday, 15 July 2022 11:00 (20 minutes)

We have proposed the SS-HORSE approach [1] which makes it possible to calculate scattering phase shifts and S-matrix based on variational results in the oscillator basis. Within SS-HORSE, one can locate the S-matrix poles to obtain resonance parameters [1] and improve the description of bound states [2].
We discuss the results of our recent applications of the SS-HORSE approach combined with the No-Core Shell Model (NCSM) to the studies of resonant states in exotic light nuclei. In particular, we present calculations of resonances in 7He nucleus with realistic NN interactions JISP16 [3] and Daejeon16 [4]. The energies and widths of 7He resonances are calculated in the channels of elastic scattering of neutron by 6He nucleus in the ground and first excited 2+ states. With Daejeon16 we obtain generally smaller or the same resonance energies and widths than with JISP16; however, the results obtained with these NN interactions agree with each other and with available experimental data on 3/2_1^-, 1/2−, and 5/2− resonances in 7He. We obtain also wide overlapping resonances 3/2_2^-, 3/2+, and 5/2+ which make up an experimentally observed resonance of unknown spin-parity at the energy of 6.2 MeV with the width of 4 MeV [5].
We perform also NCSM calculations with Daejeon16 of the 9Li nucleus and use the SS-HORSE to improve description of its bound state energies and to obtain asymptotic normalization coefficients in these states. The ground state energy is well described while the excitation energy of the first excited state is overestimated. Resonant 9Li states are examined in the channels of elastic scattering of neutrons by 8Li in the ground and first excited states. We obtain 5/2−, 3/2−, and 7/2− resonances with energies and widths in good correspondence with experimentally observed resonances in 9Li which spin-parities are unknown.

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The speaker is a student or young scientist

No

Section

1. Nuclear structure: theory and experiment

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