

## Investigating neutron-proton pairing in sd-shell nuclei via $(p,3\text{He})$ and $(3\text{He},p)$ transfer reactions

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Pairing correlations, influencing almost every feature of ground and low-lying states in nuclei, lie at the heart of nuclear physics. Understanding the mechanism of neutron-proton (np) pairing in  $N=Z$  nuclei has been a long-sought goal in nuclear structure since the early sixties. Despite large efforts in both theoretical and experimental studies, the fundamental nature and the interplay between  $T=0$  and  $T=1$  pairs are still the subject of debate. Cross section measurement of np-pair transfer is considered as a sensitive probe for the insight into  $T=0$  and  $T=1$  np pairing collectivity and its mechanism [1-3].

We therefore carried out systematic np-transfer measurements spanning  $N=Z$  sd-shell nuclei using  $(p,3\text{He})$  and  $(3\text{He},p)$  reactions at RCNP Osaka University. In particular, we study the cross-section ratio of the lowest  $0+$  and  $1+$  states as an observable to quantify the interplay between  $T=0$  (isoscalar) and  $T=1$  (isovector) pairing strengths. The experimental results are compared to second-order distorted-wave Born approximation calculations with proton-neutron amplitudes obtained in the shell-model formalism using the universal sd-shell interaction  $B$ . Our results suggest underestimation of the nonnegligible isoscalar pairing strength in the shell-model descriptions at the expense of the isovector channel. In this talk, we will present this work [4].

### References:

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