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## Alpha knockout reaction as a probe for alpha formation in light to heavy nuclei

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The proton-induced  $\alpha$  knockout reaction,  $(p, p\alpha)$ , is a powerful probe of the  $\alpha$  formation in nuclei. It has been shown that a modern theoretical calculation of the  $\alpha$  amplitude in the  $^{20}\text{Ne}$  ground state combined with the  $(p, p\alpha)$  reaction calculation by the distorted wave impulse approximation can quantitatively reproduce the experimental data [1]. On the other hand, quantitative reproductions of the  $\alpha$  knockout cross section from medium to heavy nuclei are still challenging [2]. Stimulated by the theoretical prediction [3] and the  $\alpha$  knockout reaction experiment of Sn isotopes [4], the universality of the  $\alpha$  formation throughout the nuclear chart is also an interesting subject.

In this contribution, from a reaction theory point of view, I will present the recent progress in the  $\alpha$  formation phenomena studied by the  $(p, p\alpha)$  reaction and our recent achievement which showed the possibility that the  $\alpha$  knockout reaction may be a good probe for the  $\alpha$  formation on the surface of the  $\alpha$  decay nuclei [4]. I will also discuss the future perspectives of the  $\alpha$  knockout reaction with regard to the ONOKORO project, which is being carried out mainly at RIKEN, RCNP and HIMAC in Japan.

- [1] K. Yoshida et al., Phys. Rev. C 94, 044604 (2016) [arXiv:1603.00638].
- [2] Yasutaka Taniguchi et al., Phys. Rev. C 103, L031305 (2021). [arXiv:2101.04820].
- [3] S. Typel, Phys. Rev. C 89, 064321 (2014).
- [4] Junki Tanaka et al., Science 371, 260 (2021).
- [5] Kazuki Yoshida and Junki Tanaka, Phys. Rev. C 106, 014621 (2022). [arXiv:2111.07541]

### Collaboration

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