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Alpha knockout reaction from light to heavy nuclei

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The proton-induced α knockout reaction, $(p, p\alpha)$, is a powerful probe of the α formation in the nucleus [1]. We have shown that a modern theoretical calculation of the α amplitude in the ^{20}Ne ground state combined with the $(p, p\alpha)$ reaction calculation by the distorted wave impulse approximation can quantitatively reproduce the existing experimental data [2]. On the other hand, quantitative reproductions of the α knockout cross section from ^{24}Mg, ^{28}Si, ^{32}S, ^{40}Ca, ^{48}Ti, etc., are still theoretically challenging. Stimulated by the α knockout reaction experiment from Sn(tin) isotopes [3], the universality of the α formation throughout the nuclear chart is also an interesting question. In this contribution, from a reaction theory point of view, I will review the recent progress in the α formation phenomena studied by the $(p, p\alpha)$ reaction and our recent achievement which showed a possibility that the α knockout reaction may be a good probe for the α formation on the surface of the α decay nuclei [4].

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