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Measurements of interaction cross sections for $^{22\text{-}35}$Na isotopes

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Interaction cross sections (σ_I) for Na isotopes from stability line to the vicinity of the neutron drip line have been measured at around 240*A* MeV. The σ_I for $^{33\text{-}35}$Na have been measured for the first time. The experiment was carried out by using BigRIPS at RIBF.

The halo and skin structures at the nuclear surface have attracted much interest. These exotic structures were discovered by measurements of interaction cross sections[1,2]. In this work, we measured σ_I for Na isotopes including the nuclei that are located in or near the so-called "island of inversion". Figure 1 shows the mass number dependence of σ_I for $^{22\text{-}35}$Na isotopes on C targets. Starting at mass number 28, the present data deviate from systematics for stable nuclei with increasing mass number. The tendency of σ_I for $^{22\text{-}31}$Na isotopes corresponds with that of nuclear deformation parameter β_2. From the present data, the root mean square nuclear matter radii $\langle r_m^2 \rangle^{1/2}$ were determined by using Glauber-type calculation. These $\langle r_m^2 \rangle^{1/2}$ are almost in agreement with theoretical calculation by relativistic mean field model (RMF) [3]. A monotonic growth of the neutron skin thickness has been observed as the neutron number increases in Na isotopes. This results are consistent with results in ref. 2. Moreover, the shell structures of neutron excess Na isotopes will be discussed.

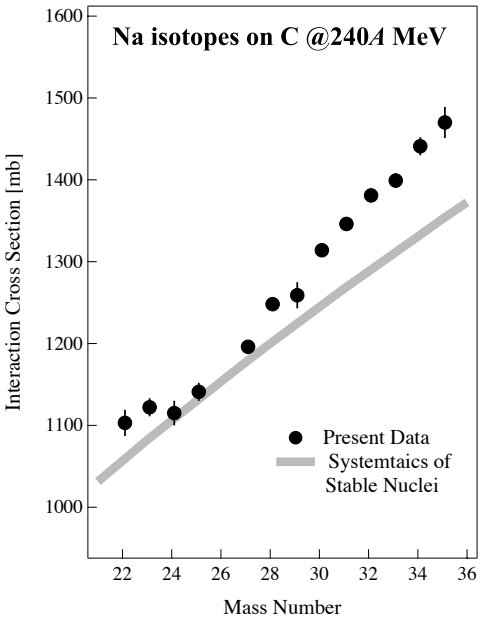

Figure 1: The observed mass number dependence of interaction cross sections for Na isotopes on C targets.

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[2] T. Suzuki et al., Phys Rev. Lett. 75, 3241 (1995).
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