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Experimental study of $^{25-28}$O with SAMURAI (Invited)

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The neutron drip line is one of the most fundamental nuclear properties and its shape on the nuclear chart reflects evolution of nuclear structure. It is experimentally known that ^{24}O (N=16) is the most neutron-rich bound nucleus in oxygen isotopes while additional six neutrons can bound in ^{31}F (N=22) for fluorine isotopes. The origin of the sudden change of the drip line, called oxygen anomaly [1], is unclear because many theories predict bound ^{26}O and/or ^{28}O, and cannot describe the location of the drip line for oxygen isotopes. Recent theoretical study [1] suggests that three nucleon forces play an important role in determining the neutron drip line of the oxygen isotopes. On the other hand, experimental data of the unbound oxygen isotopes beyond the drip line are not sufficient to examine theoretical studies quantitatively.
Aiming at clarifying the mechanism of the oxygen anomaly, invariant mass spectroscopy of the unbound oxygen isotopes $^{25-28}$O has been performed. The experiment was carried out with the large acceptance spectrometer SAMURAI at RIBF. The unbound oxygen isotopes were produced by proton removal reactions from high intense RI beams provided by BigRIPS. Decay products were detected in coincidence by SAMURAI. Results of the study of the oxygen isotopes as well as recent activities at SAMURAI will be shown in the presentation.

[1] T. Otsuka et al., Phys. Rev. Lett. 105, 032501 (2010).

[2] T. Kobayashi et al., Nucl. Instrum. Methods Phys. Res., Sect. B317, 294 (2013).

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