# Study of unbound oxygen isotopes $^{25}O$ and $^{26}O$ using SAMURAI

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Unbound states of the neutron-rich oxygen isotopes $^{25}O$ and $^{26}O$ have been studied by the invariant-mass method by using SAMURAI[1)] with the aim to elucidate the mechanism of the neutron drip line anomaly in oxygen and fluorine isotopes. Another interesting topic is the possible two-neutron radioactivity of the $^{26}O$ ground state, predicted by a theoretical study.[2)] Experimentally, only the upper limit of the ground-state energy[3,4)] and lifetime with a large error[5)] are currently available.

Details of the experimental setup are described in our previous report.[6)] Figure 1 shows a mass identification plot of outgoing $Z = 8$ charged particles observed in the breakup of $^{27}F$ on a carbon target. Particle identification is performed by the $B\rho$-$\Delta E$-TOF technique. The magnetic rigidity $B\rho$ is determined by the positions and angles at the entrance and exit of the SAMURAI magnet measured by means of the MWDCs (BDC1,2 and FDC1,2). Combining the $B\rho$ value with energy loss $\Delta E$ and TOF measured by a plastic scintillator hodoscope (HODF), outgoing particles can be clearly identified. The mass resolution $\Delta A = 0.18$ (FWHM), corresponding to $13\sigma$ separation, is achieved for $^{24}O$.

Figure 2 shows a preliminary decay energy spectrum of $^{24}O+n$ observed in the breakup of $^{27}F$. The sharp peak near the neutron decay threshold corresponds to the $^{26}O$ ground state and the peak at approximately 0.8 MeV corresponds to the ground-state resonance of $^{25}O$. Since the obtained statistics is much larger than that obtained in the previous experiments,[3,4)] a better constraint on the $^{26}O$ ground-state energy can be obtained. Analysis is currently in progress.

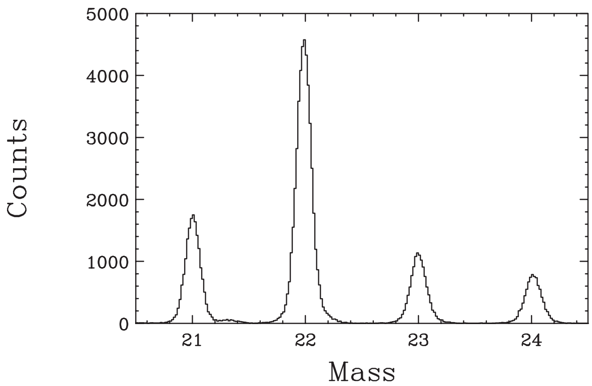


Fig. 1. Mass spectrum of outgoing $Z = 8$ particles in the breakup of $^{27}F$.

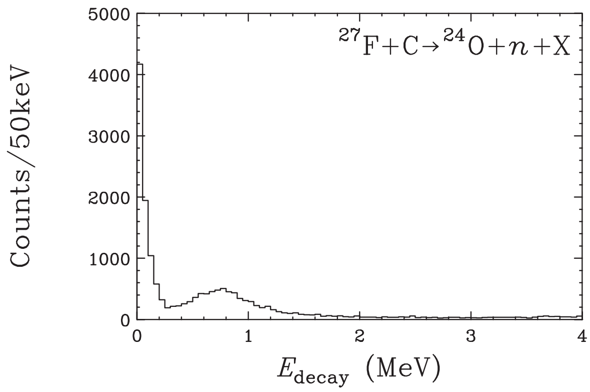


Fig. 2. Decay energy spectrum of $^{24}O+n$ in the breakup of $^{27}F$.

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