Direct reactions and spectroscopy with hydrogen targets: past 10 years at the RIBF and future prospects

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## **Study of the heaviest fluorine isotopes**

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The nuclear shell model is one of the remarkable accomplishments in nuclear physics. Intriguingly, nuclear structure changes significantly in highly asymmetric nuclei. A particularly notable region in the chart of nuclei is the island of inversion around the neutron-rich neon to magnesium isotopes. I will discuss the structure of the neutron-rich fluorine isotopes, specifically 28F, 29F, and 30F, located at the southern shore of the island of inversion. The detailed spectroscopy reveals shell evolution and loss of magicity at neutron number N=20 in these isotopes as well. We performed the high-resolution invariant-mass spectroscopy of the neutron-unbound nuclei 28F, 30F, and of two-neutron decays in 29F for the first time at the SAMURAI setup.

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