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First measurements with new high-resolution neutron detector NEXT.

An efficient neutron detection system with good energy resolution is needed to characterize decays of neutron-rich nuclei where beta-delayed neutron emission is a dominant decay mode. Precision neutron spectroscopy probes nuclear structure effects in neutron-rich nuclei and is essential to exploit the opportunities in new generation radioactive beam facilities. A new high-resolution neutron detector, Neutron dEtector with Xn Tracking(NEXT) has been constructed, characterized, and tested in decay and reaction experiments. Its essential capability is the interaction position localization, which enables improvement in energy resolution without compromising detection efficiency in the neutron time-of-flight measurement. First measurements were performed with beta-delayed neutron emitters using NEXT at Argonne National Laboratory(ANL), focussing on fission fragments.
At National Superconducting Cyclotron Laboratory(NSCL), NEXT was used alongside the VANDLE array to study light drip-line nuclei at and below the island of inversion with first-ever neutron spectroscopy performed for several isotopes. The results from beta-delayed neutron emission measurements for Nitrogen and Oxygen isotopes near the neutron drip line will be presented.

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