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Spectroscopy of neutron-rich Li isotopes with ACTAR TPC

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Neutron-rich lithium nuclei are ideal systems for studying the interplay between many-body correlations and the properties of the particle continuum. For example, ^{11}Li and ^{12}Li have a large neutron-to-proton imbalance and a very low neutron-separation energy, and their structure is expected to be influenced by coupling to the continuum. Only a few theoretical models implement the continuum, as the Gamow Shell Model. The structure study of ^{12}Li was measured through a one-neutron transfer reaction using an active target ACTAR-TPC, serving both as a thick gaseous target and as a detection medium for particle tracking, resulting in an overall enhancement of the experimental resolution compared to a conventional thick-target experiment. The goal of the experiment is to measure the location of the first p- and d-wave resonances and to deduce the nature of the low-energy states in ^{12}Li. The measured states will provide crucial information on the relative positions of the 0p1/2, 0d5/2, and 1s1/2 orbitals at N=9, as well as an important test of three-nucleon forces. This was the first experiment to measure the particles stopped inside the active volume of the detector with ACTAR-TPC. This talk will present preliminary results on the spectroscopy of ^{8}Li, a stable beam that was available during a maintenance in the experiment. This will work as a benchmark for the future analysis on the ^{11}Li beam.

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