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Probing ^{11}Be Structure with Transfer Reactions in the AT-TPC

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The commissioning of transfer reaction measurements in inverse kinematics in the SOLARIS solenoid with the Active Target Time Projection Chamber (AT-TPC) was successfully completed in the summer of 2021 at the NSCL. The goal of this experiment was to demonstrate the possibility of performing transfer reaction measurements at low beam intensities (between 100 Hz - 1 kHz) using the high luminosity provided by the AT-TPC. A beam of ^{10}Be was accelerated to 9 MeV/u in the ReA6 linac and delivered to the AT-TPC placed inside SOLARIS, which provided a 3 Tesla magnetic field. The AT-TPC was filled with pure deuterium gas at 600 Torr. Although multiple reaction channels were simultaneously detected, we focus on the $^{10}\text{Be}(d,p)$ channel that populates bound and unbound states in ^{11}Be , with a particular interest towards the 3.4 MeV resonance for which the parity is still an open question. We present the preliminary analysis of the $^{10}\text{Be}(d,p)$ channel, including angular momentum transfer identification and determination of spectroscopic factors from comparison with DWBA calculations. The AT-TPC has since collected data on multiple transfer reactions, including those derived from $^{16}\text{C}+d$, $^{16}\text{C}+p$, $^{15}\text{C}+d$, $^{15}\text{C}+p$, $^{12}\text{Be}+p$, and $^7\text{Be}+d$ at around 12 MeV/u, from which a few selected preliminary results will also be presented.

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