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## Alpha-clusters studies in light nuclei using SOLARIS AT-TPC

In light nuclei, the quantum states formed near the cluster-separation threshold favor a large degree of cluster configurations. The  $^{10}\text{Be}$  is a well-known cluster nucleus, with a set of states having very large  $\alpha$  widths and very small neutron strengths, consistent with the valence neutrons orbiting around the  $2\text{-}\alpha$  cores. The cluster decay branching ratios and cluster content are largely uncertain. We recently performed a  $^{10}\text{Be}+d$  experiment with the newly commissioned SOLARIS in AT-TPC (Active Target Time Projection Chamber) mode. The AT-TPC was filled with pure deuterium gas at 600 Torr. A cocktail beam of  $^{10}\text{Be}$  at 9.6 MeV/u from the ReA6 was delivered to the AT-TPC placed inside the SOLARIS solenoid energized at 3T. Charged particles emitted from multiple reaction channels (d,p), (d,d'), (d,t), (d, $^3\text{He}$ ), (d, $\alpha$ ) were identified with their magnetic rigidity and energy-loss profiles. The 7.54-MeV  $2^+$  resonance state in inelastically scattered  $^{10}\text{Be}$  is observed, which is just 0.133 MeV above the alpha-decay threshold. The decay of inelastically scattered  $^{10}\text{Be}^* \rightarrow ^6\text{He} + ^4\text{He}$  allows us to determine the competition with neutron decay. The 7.54-MeV state could belong to a rotational band built on the below threshold  $0_2^+$  at 6.18 MeV as bandhead. Preliminary results from the data analysis will be presented.

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