

## **Seminar**

### **Development of prototype Saha Active Target Time Projection Chamber**

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Active Target Time Projection Chambers (AT-TPCs) are powerful detectors for low-energy nuclear physics, offering full three-dimensional particle tracking and nearly  $4\pi$  angular coverage while using the detector gas as the reaction target. This thesis presents the development and characterization of a prototype AT-TPC (SAT-TPC) employing a MicroMegas one-dimensional readout and a custom multi-channel data acquisition system. A comprehensive simulation framework was developed to study space-charge effects and determine suitable operating conditions for the VECC K130 Cyclotron. Additionally, advanced tracking algorithms based on the Hough transform and Convolutional Neural Networks were implemented to identify the three- $\alpha$  decay of the Hoyle state in  $^{12}\text{C}$ . The combined hardware, simulation, and algorithmic developments establish a robust AT-TPC platform for precision studies in low-energy nuclear astrophysics.

***Tuesday, Jun 23<sup>rd</sup> 2026***

***14:30 Hrs (Tea / Coffee 14:15 Hrs)***

***Auditorium, TIFRH***