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Antiproton-Nucleus Annihilations at Low Energies

The detection of antimatter is primarily based on its annihilation, thus the understanding of the antiproton-nucleus ($\bar{p}A$) interaction is crucial. Despite its significance, current models - compared mainly to experimental results from LEAR - show deviations from low-energy measurements by large factors, suggesting that the annihilation mechanism is not yet fully understood.
This work presents a study of $\bar{p}A$ annihilations at rest on a variety of solid targets will provide detailed information on the total multiplicity, energy, and angular distribution of various prongs, as well as their dependence on nuclear mass. The 1-3 µm thick target foils allow heavily ionizing particles to escape, enabling the investigation of possible final state interactions triggered by the primary annihilation mesons and their branching ratios.
The detection system covers most of the solid angle around the 1 cm² target and consists of seven Timepix4 ASICs coupled to silicon sensors, allowing for precise tracking, time and energy measurements. A vertex reconstruction algorithm will be applied to tag individual events and discriminate between antiprotons annihilating on target and those elsewhere.
Data collection for the experiment is set to commence in the summer of 2025, and preliminary results will be presented in this talk.

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