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PAX (antiProtonic Atom X-ray spectroscopy)

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The PAX experiment is a new effort to improve the study of x ray transitions in antiprotonic atoms for testing Bound State QED (BSQED). By selecting transitions between circular Rydberg states, where the bound antiproton resides orders of magnitude closer to the nucleus than an electron, while avoiding any nuclear overlap with its wavefunction, the dominant uncertainties that limit the accuracy of measurements in HCI are neutralized. Employing novel microcalorimeter detector technologies, namely Transition Edge Sensors (TES), PAX aims at testing BSQED by measuring these transitions at levels of accuracy up to two orders of magnitude greater than previous efforts with Germanium detectors. We present preliminary results from PAX's May 2025 test beam at CERN, including TES compatibility with an accelerator environment, and first measurements of select antiprotonic atoms. We also discuss signal treatment, spectral reconstruction, charged particle background subtraction, and next steps.

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