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Antihydrogen detection with the radial time projection chamber in the ALPHA-g antimatter gravity experiment

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The ALPHA-g experiment at CERN aims to precisely measure the effect of Earth's gravitational field on antihydrogen atoms, providing a unique test of the weak equivalence principle with antimatter. A key component of the ALPHA-g apparatus is the radial time projection chamber (rTPC), which is designed to detect the annihilation of antihydrogen atoms when they come into contact with matter. The accurate detection and reconstruction of these events is crucial for determining the gravitational behavior of antihydrogen. This presentation will discuss a study of the rTPC's performance, with a focus on position- and rate-dependent efficiencies and potential asymmetries that are relevant for future precision gravity measurements.

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