



Canadian Association
of Physicists

Association canadienne
des physiciens et physiciennes

Contribution ID: 3806 Type: Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)

(G*) Simulation studies of the radial time projection chamber for the ALPHA-g antihydrogen gravity experiment

Monday 19 June 2023 17:30 (15 minutes)

The ALPHA-g experiment at CERN aims to test the fundamental symmetry between matter and antimatter by precisely measuring the effect of Earth's gravity on antihydrogen atoms. To achieve this goal, the experiment uses a radial Time Projection Chamber (rTPC) as the primary detector for particle tracking. The rTPC provides a high spatial resolution of the antihydrogen annihilation vertices, which is crucial for a measurement of the interaction between antimatter and Earth's gravitational field. This presentation will discuss a simulation study of the rTPC's performance, which aims to quantify its spatial resolution, efficiency, and response to various experimental parameters. The study highlights the essential role of simulations in understanding systematics for future precision measurements. Specifically, the results demonstrate the importance of simulation studies in optimizing the performance of the rTPC and lays the groundwork for future investigations of the detector's tracking and vertex reconstruction algorithms.

Keyword-1

Antimatter

Keyword-2

Simulation studies

Keyword-3

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Session Classification: (DNP) M3-4 Testing the Standard Model at low and intermediate energies | Tester le modèle standard à des énergies faibles et intermédiaires (DPN)

Track Classification: Technical Sessions / Sessions techniques: Nuclear Physics / Physique nucléaire (DNP-DPN)