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# Digital Twin-Enabled Modelling of Antimatter Beam Control: Insights from AEgIS to EuPRAXIA

*Monday, 14 July 2025 11:00 (15 minutes)*

The AEgIS experiment at CERN investigates the behaviour of antimatter under gravity, requiring precise spatial and temporal control of antiprotons (and other antimatter particles) using electrostatic and magnetic traps. In this contribution, a CST Studio Suite-based modelling workflow developed to simulate and optimize antiproton trapping configurations, including field homogeneity, electrode geometries, and potential well depth will be presented. These simulations have been instrumental in guiding hardware design decisions and layout choices for the experiment for the experimental campaigns.

This talk will discuss an early-stage implementation of a Digital Twin approach, where high-fidelity field simulations inform the design, operation, and eventual control of beamline components. The methods and insights developed are transferable to plasma accelerator contexts, particularly in optimizing trapping, focusing, and guiding systems under complex boundary conditions. By highlighting simulation-driven decision-making in a high-precision antimatter setup, the goal is to stimulate dialogue on integrating similar modelling pipelines into future plasma-based accelerator facilities, such as EuPRAXIA.

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