



Contribution ID: 103

Type: ORAL

Towards an asymmetric detector at HALHF

Thursday 10 October 2024 15:27 (20 minutes)

The Hybrid Asymmetric Linear Higgs Factory (HALHF) proposes a shorter and cheaper design for a future Higgs factory. It reaches a $\sqrt{s} = 250$ GeV using a 500 GeV electron beam accelerated by an electron-driven plasma wake-field, and a conventionally-accelerated 31 GeV positron beam. Assuming plasma acceleration R&D challenges are solved in a timely manner, the asymmetry of the collisions brings additional challenges regarding the detector and the physics analyses. An ILD-based, asymmetric detector was implemented in Geant4 to cope with the forward boosted topologies and accommodate the beam backgrounds. This contribution will show the first physics results using a fully simulated asymmetric detector for HALHF, and compare the performance against some flagship Higgs Factory analyses.

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Session Classification: Parallel - WG3

Track Classification: WG3: WG3 - Detector R&D