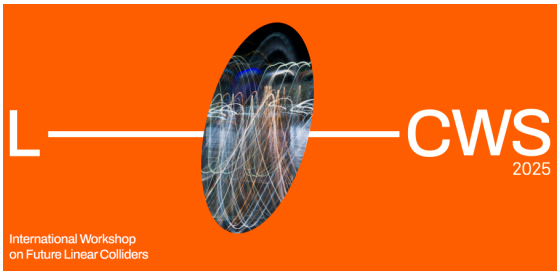

Contribution ID: **110** Type: **Talk**

Higgs Self-Coupling Measurement with an XFEL Photon-Photon Collider

Wednesday 22 October 2025 12:40 (15 minutes)

A photon-photon collider presents outstanding physics opportunities that complement and extend the capabilities of a linear *e+e-* collider. This is due to three key defining features: i) the Higgs boson is produced in the s-channel, in contrast to *e+e-* where an additional Z boson has to be produced, ii) photons allow for full control of the polarization of the initial state, enabling a rich physics program of CP violation, and iii) at 280 GeV CoM energy (as opposed to 550 GeV in *e+e-*), a photon-photon collider mode can produce pairs of Higgs bosons and directly measure the Higgs potential with sensitivity complementary to the *e+e-* mode and to future 10 TeV pCoM hadron colliders.

In this talk, we present the first feasibility study for measuring the Higgs self-coupling with an X-ray FEL photon-photon collider. All physics backgrounds as well as the residual e-gamma and *e+e-* backgrounds characteristic of gamma-gamma colliders were simulated using CAIN and WHIZARD Monte Carlo, and ran through a Delphes ILC-like detector simulation. We discuss the Higgs self coupling expected precision and its complementary with a 550 GeV *e+e-* linear collider (LCF) and a 100 TeV hadron collider (FCC-hh)

Authors: SCHWARTZMAN, Ariel Gustavo (SLAC National Accelerator Laboratory (US)); AMPUDIA CASTELAZO, Santiago (SLAC National Lab); BARKLOW, Tim (SLAC National Accelerator Laboratory (US))

Presenter: SCHWARTZMAN, Ariel Gustavo (SLAC National Accelerator Laboratory (US))

Session Classification: Higgs and Electroweak Physics

Track Classification: Physics: Higgs and Electroweak Physics