

## NEW PERSPECTIVES IN CONFORMAL FIELD THEORY AND GRAVITY

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## Investigating the Higgs self-couplings through triple Higgs production

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Experimental information on the trilinear Higgs boson self-coupling  $\kappa_3$  and the quartic self-coupling  $\kappa_4$  will be crucial for gaining insight into the shape of the Higgs potential and the nature of the electroweak phase transition. While Higgs pair production processes provide access to  $\kappa_3$ , triple Higgs production processes, despite their small cross sections, will provide valuable complementary information on  $\kappa_3$  and first experimental constraints on  $\kappa_4$ . In this work, we consider triple Higgs production at the HL-LHC, employing efficient Graph Neural Network methodologies to maximise the statistical yield. We show that it will be possible to establish bounds on the variation of both couplings from the HL-LHC analyses that significantly go beyond the constraints from perturbative unitarity. We also discuss the prospects for the analysis of triple Higgs production at future high-energy lepton colliders operating at the TeV scale.

### Summary

**Presenter:** STYLIANOU, Panagiotis (T (Phenomenology))

**Session Classification:** Parallel Session Wednesday: Phenomenology II

**Track Classification:** Particle Phenomenology