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## **Probing the nature of electroweak symmetry breaking with Higgs boson pair-production at ATLAS**

*Tuesday, 28 November 2023 09:35 (15 minutes)*

In the Standard Model, the ground state of the Higgs field is not found at zero but instead corresponds to one of the degenerate solutions minimising the Higgs potential. In turn, this spontaneous electroweak symmetry breaking provides a mechanism for the mass generation of nearly all fundamental particles. While the Standard Model makes a definite prediction for the Higgs boson self-coupling and thereby the shape of the Higgs potential, enhanced rates and modified kinematic properties of Higgs boson pair (HH) production are a smoking-gun signature for new physics. In the case of SUSY, this may appear as new loop contributions in non-resonant HH production or via new scalar resonances decaying to two Higgs bosons. In this talk, the latest searches for Higgs boson pairs by the ATLAS experiment are reported, with emphasis on the results obtained with the full LHC Run 2 dataset at 13 TeV. In the case of non-resonant HH searches, results are interpreted both in terms of sensitivity to the Standard Model and as limits on the Higgs boson self-coupling. Extrapolations of recent HH results towards the High Luminosity LHC upgrade are also discussed. Search results on new resonances decaying into pairs of Higgs bosons are also reported.

### **You are**

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