

Searches for Higgs boson pair production at ATLAS

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ATLAS is one of the main experiments at the Large Hadron Collider, with focus on Standard Model (SM) measurements and searches for new physics at the TeV scale.

One of the most active fields currently is the search for Higgs boson pair production. Models with an extended Higgs sector predict that Higgs boson pairs are produced via the decay of new heavy scalars. Models with extra dimensions predict the existence of spin-2 resonances that can decay to DiHiggs. Some models beyond the SM suggest increased rates of the decay of new resonances to a 125 GeV Higgs boson and another scalar with a different mass. The Standard Model predicts the non-resonant production of DiHiggs via the Higgs boson self-coupling λ . Such a measurement would allow to establish the shape of the Higgs potential. Deviations of λ from the SM prediction however can lead to increased DiHiggs rates and would indicate new physics.

During the last years, DiHiggs searches have profited from refined analysis techniques with an extensive usage of machine learning as well as advancements in particle identification, especially in the area of b-tagging, leading to much improved sensitivities. This talk will present a selection of these ATLAS searches for both resonant and non-resonant DiHiggs production, with a focus on new results. The latest DiHiggs combinations will also be discussed.

Primary author: SCHAARSCHMIDT, Jana (University of Washington (US))

Presenter: SCHAARSCHMIDT, Jana (University of Washington (US))

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