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Non-Resonant Higgs Boson Pair Production and Self-Coupling Measurements with the ATLAS Experiment

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Higgs boson pair production (HH) plays a central role in probing the Higgs boson self-interactions, which are key to understanding the shape of the Higgs potential and the mechanism of electroweak symmetry breaking. This talk presents the latest results from the ATLAS experiment on non-resonant Higgs boson pair production, based on the full Run 2 dataset collected at $\sqrt{s} = 13$ TeV, with the inclusion of available Run 3 results where available. These analyses provide sensitivity to the Higgs boson self-coupling and the quartic VVHH coupling, offering key tests of the Higgs sector beyond single-Higgs measurements. Constraints are also derived from higher-order electroweak corrections to single Higgs boson production, and a combination of single and di-Higgs results is used to obtain the most precise determination of the self-coupling to date.

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