

## Combination of searches for Higgs boson pair production in ATLAS

This talk would present a combination of searches for Higgs boson pair production using the ATLAS Run2 data sets. The upper limit on the production rate at 95% confidence level(CL) is 2.9 times the Standard Model (SM) prediction, with an expected limit of 2.4 assuming no Higgs boson pair production. Constraints on the Higgs boson self-coupling modifier,  $\kappa_\lambda = \lambda_{HHH}/\lambda_{HHH}^{SM}$ , and quartic HHVV coupling modifier,  $\kappa_{2V} = g_{HHVV}/g_{HHVV}^{SM}$ , are derived individually, fixing the other parameter to its SM value. The observed constraints are  $-1.2 < \kappa_\lambda < 7.2$  and  $0.57 < \kappa_{2V} < 1.48$  at 95% CL, with expected values of  $-1.6 < \kappa_\lambda < 7.2$  and  $0.41 < \kappa_{2V} < 1.65$  in SM case. Strongest constraints to date are provided on several effective interactions within the Higgs Effective Field Theory, offering insights into potential deviations from SM predictions.

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