

# [PhD results] Implementation of the Matrix Element Method at NLO for the measurement of the Higgs self coupling

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Following the discovery of the Higgs boson, one of the next major achievements at LHC is to observe the production of Higgs pairs and to measure the Higgs tri-linear coupling  $\lambda_{3H}$ .

Due to the rarity of di-Higgs production, measuring  $\lambda_{3H}$  has proven to be highly challenging.

The MEM is a statistically optimal multivariate method that maximizes the utilization of both the experimental and theoretical information available to an analysis. Most MEM studies have been limited to leading-order (LO) accuracy, with extensions to next-to-leading-order (NLO) explored only in specific cases due to the additional complexities introduced by virtual and real contributions.

To contribute to the measurement of  $\lambda_{3H}$  from LHC data in the  $gg \rightarrow HH \rightarrow b\bar{b}\gamma\gamma$  channel, we developed a MEM framework during my PhD by working on a new NLO implementation.

If time allows, I will also link my PhD work to the one I aim to develop during my Post-doc position at TDLI (3 ATLAS analysis, and phenomenology of the Higgs boson).

**Primary author:** TARTARIN, Matthias (TDLI/SJTU)

**Presenter:** TARTARIN, Matthias (TDLI/SJTU)

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