

## **Additional di-Higgs non-resonant searches, HL-LHC projections and resonant searches in the HH and SH final states (24+6)**

After the discovery of the Higgs boson in 2012 by the ATLAS and CMS Collaborations, a new era for particle physics and cosmology opened up. One of its most intriguing properties, the Higgs boson self-coupling, with implications on the vacuum stability of the universe, remains unobserved. The improvement of the trigger selections and machine learning techniques are of paramount importance to maximize the sensitivity to observe this signal, being HH production a factor 1000 smaller than single H production according to the Standard Model predictions. The non-resonant multileptons analysis as well as the ATLAS projections for the HL-LHC on the self-coupling constant measurement will be discussed. With the current analysis projections, evidence of Higgs boson pair production is expected to be reached at the end of the HL-LHC, combining 3000/fb of ATLAS and CMS data and is therefore the HL-LHC physics driver.

In addition, ATLAS searches for new resonances decaying into a pair of scalar particles, being either two Higgs boson (HH) or a new scalar and a Higgs boson (SH) will be reported.

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