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Measurement of the Higgs STXS and couplings using diphoton channel with ATLAS full Run 2 data

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Measurements of Higgs boson production cross-sections are carried out in the diphoton decay channel using 139 fb^{-1} of pp collision data at $\sqrt{s}=13 \text{ TeV}$ collected by the ATLAS experiment at the LHC. The analysis is based on the definition of 101 distinct signal regions using machine-learning techniques. The inclusive Higgs boson signal strength in the diphoton channel is measured to be $1.04 \pm 0.10 - 0.09$. Cross-sections for gluon-gluon fusion, vector-boson fusion, associated production with a W or Z boson, and top associated production processes are reported. An upper limit of 10 times the Standard Model prediction is set for the associated production process of a Higgs boson with a single top quark, which has a unique sensitivity to the sign of the top quark Yukawa coupling. Higgs boson production is further characterized through measurements of Simplified Template Cross-Sections (STXS). In total, cross-sections of 28 STXS regions are measured. The measured STXS cross-sections are compatible with their Standard Model predictions, with a p-value of 93%. The measurements are also used to set constraints on Higgs boson coupling strengths, as well as on new interactions beyond the Standard Model in an effective field theory approach. No significant deviations from the Standard Model predictions are observed in these measurements, which provide significant sensitivity improvements compared to the previous ATLAS results.

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Classification de Session: Standard Model