

Probing the SM electroweak sector through the $Z\gamma\gamma$ production

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The electroweak (EW) sector of the SM describes electromagnetic and weak interactions mediated by the massless photon and the massive W and Z bosons. Final states with multiple gauge bosons are important probes for the predictions of the EW sector, such as gauge-boson self-interactions arising through the non-Abelian structure of the $SU(2)_L \times U(1)_Y$ symmetry. The simultaneous production of three EW gauge bosons is challenging to measure due to small production cross sections. However, the vast amount of data recorded in Run 2 of the LHC during 2015–2018 makes the measurement of many triple gauge boson production channels feasible for the first time.

This talk motivates why it is interesting to study the production of multiple EW gauge bosons and gives an overview of the current landscape at the LHC for such processes. The focus lies on the measurement of $Z\gamma\gamma$ production at a centre-of-mass energy of 13 TeV, where p - p collision recorded with the ATLAS detector are analysed. The steps which are necessary to disentangle the signal process from potential sources of background contamination are presented and the cross section results are discussed. Effective field theory is introduced as a tool to constrain new physics effects of higher-dimensional operators.