

The Search for Evidence of Vector Boson Scattering Between a Photon and a W Boson with the ATLAS Detector

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It is known that the unique shape of the Higgs potential assumed in the Standard Model results in spontaneous symmetry breaking in physics at low energies, but the exact role of the Higgs in electroweak symmetry breaking (EWSB) has yet to be experimentally established. This gap in understanding also leaves the possibility that new physics phenomena could contribute to EWSB. One particularly powerful approach to search for new physics phenomena is in the study of the self-couplings of electroweak gauge bosons. In the Standard Model, the interactions between gauge bosons are completely specified by the non-Abelian $SU(2) \times U(1)$ structure of the theory. Any deviations from this expectation would indicate the presence of new physics phenomena at unprobed energy scales. The large data samples collected by the ATLAS experiment at the LHC make it possible to now explore extremely rare processes involving the interaction between four gauge bosons.

In this talk I will discuss the search for evidence of one of these rare processes, namely, the vector boson scattering between a W boson and a photon, whose production cross-section has never before been measured by the ATLAS collaboration. This measurement comes with exciting challenges related to the proper modelling of the detector response to jets and adequate modelling of the large QCD background at high dijet mass. I will discuss data-driven and machine learning approaches to overcoming these challenges.

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Please select: Experiment or Theory

Experiment

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