Helicity distributions for the $Z\gamma$ production process at CMS
ABSTRACT

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Particle physics, as it is known today, is a union of electroweak theory and quantum chronodynamics, collectively called the standard model (SM). Despite the tremendous success of the SM, it falls short of answering some of the fundamental questions of the nature, hence, cannot be considered the final theory of particles and their interactions. More and more experiments are being designed to probe the SM at higher energies and intensities, and address its shortcomings.

The Large Hadron Collider was built at CERN to provide proton-proton collisions at 14 TeV center of mass energies. It provides access to the physics that takes place on the smaller scales and higher energies than has ever been achieved in the laboratories. The high energy and intensity provided by the LHC enables us to perform studies that may not have been feasible before.

I will present the first study of the helicity distributions for a $Z\gamma$ di-boson production process at hadron colliders, from the experiment that gave you the Higgs boson and put supersymmetry in coma - CMS. It is a multidimensional angular analysis of two leptons (muons or electrons) and a photon, where leptons originate from a Z boson decay, aiming to measure the helicity amplitudes that govern the process. Angular analyses, in general, are a good way to study the properties of the particles or processes, and this particular analysis may in addition provide the sensitivity to the anomalous couplings that are prohibited by the standard model, and thus probe the new physics domain.