Title: Search for new resonances in high-mass diphoton final states using 139/fb of proton-proton collisions collected with the ATLAS detector

Keywords: Beyond the Standard Model, Standard Model

Abstract:
Since the discovery of the 125 GeV Higgs boson at the LHC, studies of the Higgs sector have become an important topic of the ATLAS physics program. There are many potential extensions of the Standard Model (SM) that predict new high-mass states decaying into two photons. Among which, two types of signal models are considered: a spin-0 resonance which was predicted in theories with an extended Higgs sector such as the two-Higgs doublet models (2HDM), and a spin-2 graviton excitation of a Randall-Sundrum model with one warped extra dimension. The diphoton final state played an important role when the H(125) Higgs boson was discovered, and is chosen for this search as it provides a clean experimental signature with excellent invariant mass resolution and moderate backgrounds.

This talk presents the search for new resonances decaying into two photons, using pp collisions collected with the ATLAS detector at LHC. 139/fb of pp collision data at a centre-of-mass energy of 13 TeV collected in 2015, 2016, 2017 and 2018 is used, bringing around a factor 2 improvement compared to the previous result. Pairs of isolated photon candidates with invariant mass above 150 GeV are selected. Further analysis improvements come from the reoptimisation of the event selection, which is harmonized between the spin-0 and spin-2 searches.