

$H \rightarrow \gamma\gamma$ search at low mass with CMS & Electroweak precision test of BSM theories for future colliders

Christian Verollet

April 2, 2026

The first part of my thesis is dedicated to the search for a low-mass resonance around 95 GeV in the diphoton channel with the CMS experiment. In addition to the search, I will also present an update of the S-method for the extraction of the photon energy scale calibration with $Z \rightarrow \mu^+ \mu^- \gamma$ events.

The second part is focused on the electroweak (EW) precision test of specific BSM theories for future colliders. To begin, I will introduce the concept of electroweak radiative corrections and present the results I obtained in the case of an SU(5) asymptotic Grand Unified Theory. By this means, I will be able to introduce a Python package that I created to handle specific integrals that emerge from loop calculations. I will then switch to two other BSM models in which I started to perform EW precision tests, one with Vector Like Quarks and one with a composite Higgs.