



LABORATORY FOR ELEMENTARY-PARTICLE PHYSICS (LEPP)

# Joint Experimental and Theory Seminar in Particle Physics and Cosmology:

## Unveiling New Physics with Photons at LHC CMS Experiment

Since the discovery of the Higgs boson in 2012, the experimental program at the LHC has started to explore previously unreachable kinematical regimes, where potentially new heavy particles can be produced. The ATLAS and CMS experiments can search for new physics in a wide range of final states with the highest sensitivity to date. Among all the possible signatures, final states involving photons, despite the relatively small cross section compared to hadronic signatures, provide a powerful handle in the signal over background discrimination. Such searches find their motivation in a wide panorama of theoretical models such as minimal extensions of the standard model, extradimensions and dark matter. Over the past few years a set of photon reconstruction and identification techniques have been developed and optimized in order to reach the detectors design performance. In this talk the most recent and promising results on searches for new physics with photons in the final state obtained with the CMS experiment at the LHC are presented. One of the most exciting results of LHC Run 2, concerning searches for high mass diphoton resonances, is largely discussed. Complementary analyses involving photons are also shown, such as searches for long-lived particles decaying to photons exploiting a novel technique for delayed photon identification and searches for dark matter produced in association with photons. Possible extensions to these analyses and long term plans in preparation for the high-luminosity phase of the LHC are finally described.



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**Friday, September 22nd, 2017**

**1:00pm**

**401 Physical Sciences Bldg.**