

# EVIDENCE OF THE HIGGS BOSON DECAYING TO TWO PHOTONS

Abstract

by

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A search for the standard model Higgs decaying to two photons will be presented. The analysis will cover  $5.1 \text{ fb}^{-1}$  and  $19.6 \text{ fb}^{-1}$  of LHC proton-proton collisions collected at a center of mass energy of 7 and 8 TeV, with the CMS detector. The search reveals an excess of events near 125 GeV that is consistent with the standard model Higgs boson. The significance of the excess is  $3.2\sigma$  at 125 GeV, where  $4.1\sigma$  is expected. The best-fit cross-section is  $0.78_{-0.26}^{+0.28}$  times the standard model, and the best-fit mass is  $125.4 \pm 0.5(\text{stat}) \pm 0.6(\text{syst.})$  GeV. The excess is also present in a cut-based cross-check analysis with a significance of  $3.9\sigma$ , where  $3.5\sigma$  is expected, which corresponds to a best-fit cross-section of  $1.11_{-0.30}^{+0.32}$  at 124.5 GeV. Both the measured cross-section and couplings are consistent with a standard model Higgs boson.