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 fb$^{-1}$ and 19.6 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 $0.78^{+0.28}_{-0.26}$ times the standard model, and the best-fit mass is $125.4\pm0.5(stat)\pm0.6(syst.)$ 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 $1.11^{+0.32}_{-0.30}$ at 124.5 GeV. Both the measured cross-section and couplings are consistent with a standard model Higgs boson.