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Measurement of differential and integrated fiducial cross sections for Higgs boson production in the four-lepton decay channel in pp collisions at $\sqrt{s} = 7, 8$ and 13 TeV

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Integrated fiducial cross sections for the production of four leptons via $H \rightarrow 4\ell$ decays ($\ell = e, \mu$) are measured in pp collisions at $\sqrt{s} = 7$ TeV, $\sqrt{s} = 8$ TeV and $\sqrt{13}$ TeV. Differential fiducial cross sections are also measured with $\sqrt{s} = 8$ TeV data. Measurements are performed with data corresponding to integrated luminosities of 5.1 fb^{-1} at 7 TeV, and 19.7 fb^{-1} at 8 TeV and 2.6 fb^{-1} at 13 TeV, collected with the CMS experiment at the LHC. Differential cross sections are determined as functions of the transverse momentum and rapidity of the four-lepton system, accompanying jet multiplicity, transverse momentum of the leading jet, and difference in rapidity between the Higgs boson candidate and the leading jet. A measurement of the $Z \rightarrow 4\ell$ cross section, and its ratio to the $H \rightarrow 4\ell$ cross section is also performed with 8 TeV data. All cross sections are measured within a fiducial phase space defined by the requirements on lepton kinematics and event topology. The integrated $Z \rightarrow 4\ell$ fiducial cross section is measured to be $0.56^{+0.67}_{-0.44}$ (stat.) $^{+0.21}_{-0.06}$ (sys.) fb at 7 TeV, and $1.11^{+0.41}_{-0.35}$ (stat.) $^{+0.14}_{-0.10}$ (sys.) fb at 8 TeV. The measurements are found to be compatible with theoretical calculations based on the standard model.

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