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Measurement of Higgs boson mass and width with on-shell and off-shell productions with CMS

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An important aspect of the Higgs boson is its width—the quantity related to its lifetime and energy spectrum. Methods for measuring the Higgs boson total decay width from the off-shell to on-shell signal strength ratio will be presented for the decays of $H \rightarrow WW \rightarrow 2l2\nu$, $H \rightarrow ZZ \rightarrow 2l2\nu$, and $H \rightarrow ZZ \rightarrow 4l$. Measurement of the Higgs boson width from the on-shell peak using the $H \rightarrow \gamma\gamma$ final state will be presented using the Run2 data collected by the CMS experiment. The Higgs width is constrained using CMS data collected between 2016 and 2018, corresponding to a total integrated luminosity of 138 fb⁻¹.

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