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Inclusive Search for Standard Model Higgs Boson Production in the WW Decay Channel using the CDF II Detector

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The search for the Standard Model (SM) Higgs boson at the Tevatron has been highly successful in driving the first Higgs exclusions since LEP. This search by CDF is performed using the full Run2 dataset and looks specifically in the Higgs to WW final state of two charged leptons (e, μ) and two neutrinos from the collision of $p - \bar{p}$ pairs at $\sqrt{s} = 1.96$ TeV. This version of the analysis implements several improvements. Track and calorimeter isolation quantities for the leptons were recalculated to prevent mutual spoilage when two candidates are in close proximity to each other. To maximize signal acceptance, events with same-sign dileptons and trileptons are included as separate regions to account for associated Higgs production with a Z or W boson via vector boson fusion. Additionally, events with low dilepton invariant mass are included in a separate region to further improve acceptance. The search excludes at the 95% C.L. a SM Higgs boson in the mass range between $148 \text{ GeV}/c^2$ and $175 \text{ GeV}/c^2$ and is also one of the main contributors to the Tevatron's sensitivity to the low mass SM Higgs boson.

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