Search for the Standard Model Higgs Boson in the $H \to WW \to ℓνq′q$ Decay Channel

HUONG NGUYEN, University of Virginia, D0 COLLABORATION — A search for the standard model Higgs boson ($H$) is performed using data corresponding to 9.7 fb$^{-1}$ of $p\bar{p}$ collisions at $\sqrt{s} = 1.96$ TeV collected by the D0 detector at the Fermilab Tevatron collider. We consider final states containing one lepton ($e$ or $μ$), missing transverse energy, and exactly two or three jets. Our search is primarily sensitive to the processes $H \to W^+W^- \to ℓνq′q$, where the $H$ is produced by either gluon fusion or weak-boson fusion, and where one $W$ decays leptonically into a charged lepton plus neutrino and the other $W$ decays hardronically into a pair of quarks. The search is also sensitive to other Higgs boson channels with different production process, but similar final states such as $WH \to ℓνbb$. To improve the signal sensitivity, we focus on making optimal use of available kinematic information by dividing the data into orthogonal sub-samples and identifying specific kinematic variables to perform a multivariate analysis for each sample.