

Application of Symbolic Regression to Mass Measurement in $H \rightarrow WW$ Dilepton Channels

Thursday, 8 September 2011 14:00 (25 minutes)

We derive a kinematic variable that is sensitive to the mass of the Standard Model Higgs boson (M_H) in the $H \rightarrow WW^* \rightarrow l l \nu \bar{\nu}$ channel using symbolic regression method. Explicit mass reconstruction is not possible in this channel due to the presence of two neutrinos which escape detection. Mass determination problem is that of finding a mass-sensitive function that depends on the measured observables. We use symbolic regression, which is an analytical approach to the problem of non-linear regression, to derive an analytic formula sensitive to M_H from the two lepton momenta and the missing transverse momentum. Using the newly-derived mass-sensitive variable, we expect Higgs mass resolutions between 1 to 4 GeV for M_H between 130 and 190 GeV at the LHC with 10 fb^{-1} of data.

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Session Classification: Thursday 08 - Data Analysis –Algorithms and Tools

Track Classification: Track 2 : Data Analysis - Algorithms and Tools