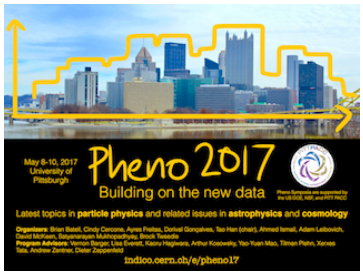

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Higgs to light jets decay at the LHC

Monday 8 May 2017 14:45 (15 minutes)

We study the Higgs boson (h) decay to two light jets at the 14 TeV High-Luminosity-LHC (HL-LHC), where a light jet (j) represents any non-flavor tagged jet from the observational point of view.
% On the theory side, j is a gluon as expected in the Standard Model}.
The decay mode $h \to gg$ is chosen as the benchmark since it is the dominant channel in the Standard Model (SM), but the bound obtained is also applicable to the light quarks $(j = u, d, s)$. We estimate the achievable bounds on the decay branching fractions through the associated production Vh $(V = W^{\pm}, Z)$. Events of the Higgs boson decaying into heavy (tagged) or light (un-tagged) jets are correlatively analyzed.
%
We find that with 3000 fb^{-1} data at the HL-LHC, we should expect approximately 1σ statistical significance on the SM $Vh(gg)$ signal in this channel. This corresponds to a reachable upper bound $\mathrm{BR}(h \to jj) \leq 4\ \mathrm{BR}^{SM}(h \to gg)$ at 95% confidence level.
A consistency fit also leads to an upper bound
%
$\mathrm{BR}(h \to cc) < 15\ \mathrm{BR}^{SM}(h \to cc)$ at 95% confidence level.
%
The estimated bound may be further strengthened by
adopting multiple variable analyses, or adding other production channels.

Summary

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