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Prospects of triggering $H/Z \rightarrow \phi \gamma$ and $H/Z \rightarrow \rho \gamma$ at $\sqrt{s}=14\text{TeV}$ at the High Luminosity (HL-LHC)

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Following the discovery of the Higgs boson by the ATLAS and CMS experiments at the LHC, began the zeal for measuring its coupling with other Standard Model (SM) particles. The Higgs Yukawa couplings to light quarks (u,d,s) are currently unknown and the study of inclusive decays of the Higgs boson to these states are extremely challenging due to the large multijet background. In this scenario, rare exclusive decays of the Higgs boson into a light meson and a photon are thought to be important indirect probes for such couplings. In this study we have looked into $H \rightarrow \phi \gamma \rightarrow k^+ k^- \gamma$ and $H \rightarrow \rho \gamma \rightarrow \pi^+ \pi^- \gamma$ decays in the context of High Luminosity LHC (HL-LHC). While the SM predicts these couplings to be very small, potential deviations are predicted in several models beyond the SM. The rates and efficiency associated with these channels at Level1(L1) trigger level in HL-LHC will be presented. This analysis allows to have a perspective of the prospects of triggering such events at HL-LHC which has the benefits of inclusion of tracking at L1 and 10 fold increase in luminosity. As a benchmark, analogous decays of the Z boson into ϕ/ρ and a photon at branching fractions much lower than the Higgs boson are also studied owing to the large Z boson production cross section.

Session

Future Experiments and Detector Development

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