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Rare Higgs boson decays with the CMS experiment

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Exclusive rare decays of the Higgs boson into a gauge boson (Z or gamma) + meson (such as J/Psi, eta_c, rho, phi etc.) provide an excellent probe of the Higgs Yukawa coupling to quarks of the first and second generations. While the contribution to the rate of these decays from the diagrams involving Yukawa couplings is negligible in the Standard Model (SM), in theories beyond the SM this contribution could be significantly enhanced and deviations from the SM branching ratios could be observed because of the interference with the dominant diagrams, where meson is formed via Higgs boson decays to Z bosons or photons. This presentation gives an overview of the CMS analyses searching for the $H \rightarrow \gamma/Z + \text{meson}$ decays and discusses interpretation of the search results within various BSM scenarios predicting enhanced couplings of the Higgs boson to charm and light-flavor quarks. We will also cover other rare Higgs boson decay channels, such as $H \rightarrow Z\gamma$ and $H \rightarrow \text{invisible}$.

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