

Search for $B_s \rightarrow \phi \eta'$ decays in Run 1+Run 2 dataset of LHCb

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Flavour Changing Neutral Current (FCNC) decays of B_s^0 meson into a pair of charmless mesons has been the subject of much experimental and theoretical interest. The decay process is predominated by the loop-level $\bar{b} \rightarrow \bar{s} s \bar{s}$ process, which is suppressed in the Standard Model. This analysis is aimed to measure the branching fraction of the rare decay mode $B_s^0 \rightarrow \phi \eta'$, which is further suppressed because of the cancellation of final states amplitudes in its form factor, and is not observed yet. This analysis used the full Run 1 and Run 2 dataset of LHCb, corresponding to an integrated luminosity of $3 + 6 fb^{-1}$. Multiple selection methods are applied on the dataset in this analysis, including cut the kinematics of the primary B_s^0 meson and the decay products, and specific vetoes for the peaking components in the background. An MVA classifier is also trained for further separation of signal from combinatorial backgrounds. The signal region of the data is still blinded at this stage, but a CLs analysis is carried out for the sensitivity of the signal with the background model obtained. Either the branching fraction can be measured for the first time with this analysis, or a limit lower than previous works set.

Authors: NEEDHAM, Matthew David (The University of Edinburgh (GB)); OZCELIK, Ozlem (The University of Edinburgh (GB)); LIU, Yiming (The University of Edinburgh (GB))

Presenter: LIU, Yiming (The University of Edinburgh (GB))

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