

Supplementary material for LHCb-PAPER-2022-035

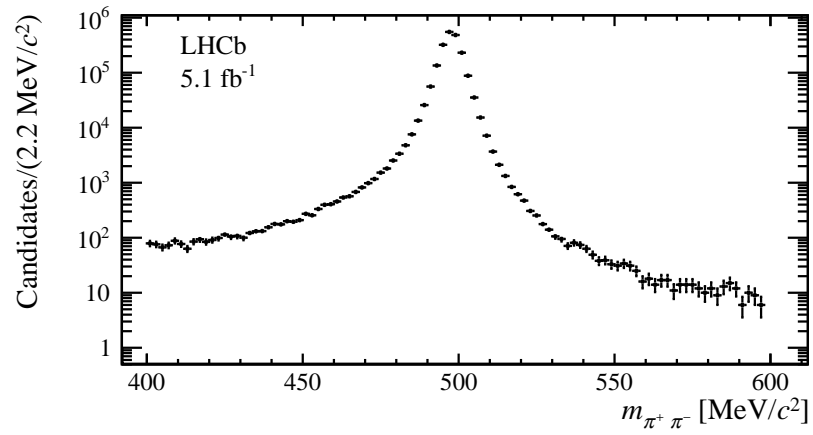


Figure 1: Invariant-mass distribution for the $K_S^0 \rightarrow \pi^+ \pi^-$ selected candidates in the full dataset. The background level is estimated to be at the 1% level or below.

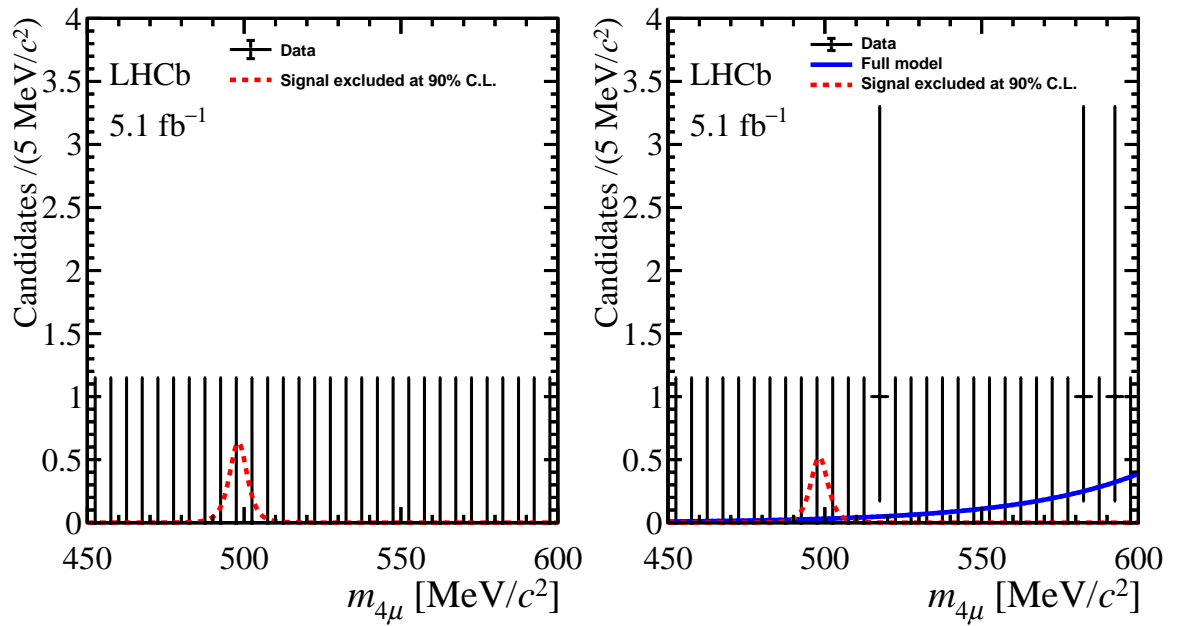


Figure 2: Invariant-mass distribution of the observed $K_S^0 \rightarrow \mu^+ \mu^- \mu^+ \mu^-$ candidates in the (left) xTOS trigger category, and (right) TIS trigger category. The blue lines represent the simultaneous fit to both categories, using the exponential functions to represent the background. The expected $K_S^0 \rightarrow \mu^+ \mu^- \mu^+ \mu^-$ signal for the branching fraction excluded at 90% C.L. is shown with a dotted red line.