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## A novel, precise measurement of $B_s^0$ and $D_s^-$ lifetimes at LHCb

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The LHCb collaboration reports on a new measurement of the flavor-specific  $B_s^0$  lifetime and of the  $D_s^0$  lifetime based on semileptonic decays. Using proton-proton collisions at center-of-mass energies of 7 and 8 TeV, and corresponding to  $3.0 \text{ fb}^{-1}$  of integrated luminosity,  $B_s^0 \rightarrow D_s^{(*)-} \mu^+ \nu_\mu$  decays are partially reconstructed in the  $K^+ K^- \pi^- \mu^+$  final state. Based on a novel approach, the lifetimes are determined from the variation in the  $B_s^0$  signal yield as a function of decay time, relative to that of  $B^0$  decays that are reconstructed in the same final state, and whose lifetime is precisely known. The use of kinematically similar  $B^0$  decays as a reference allows the reduction of the uncertainties from partial reconstruction and lifetime-biasing selection criteria. The results greatly improve over the current determinations. Our approach circumvents the systematic limitations typically associated with lifetime measurements using semileptonic decays in hadron collisions and paves the way toward a fruitful program of similar measurements.

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