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Search of New Physics at LHCb in leptonic and semileptonic decays of neutral B meson

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The semileptonic and leptonic decays of the B_s^0 meson are key processes in the LHCb physics program, offering complementary windows onto the structure of the Standard Model (SM) and possible signs of new physics. The channel $B_s^0 \to D_s^* \mu \nu_\mu$ provides direct sensitivity to hadronic form factors, which encode the strong interaction dynamics governing the transition between heavy and light quarks. Precision measurements of these form factors test lattice QCD calculations, reduce theoretical uncertainties in flavor observables, and improve the modeling of backgrounds in rare decay searches. In parallel, the rare purely leptonic decay $B_s^0 \to \mu^+ \mu^-$ is highly suppressed in the SM and serves as an incisive probe of virtual contributions from physics beyond the SM. LHCb's high B_s^0 production rates and excellent muon identification capabilities uniquely enable detailed studies of both classes of processes. In this presentation, an overview of the current status of the two analyses will be given, highlighting their relevance for advancing precision flavor physics at the LHC.

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