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Heavy-light Meson Decay Constants and Hyperfine Splittings with the Heavy-HISQ Method

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We present preliminary new lattice QCD results for high-precision vector-to-pseudoscalar and tensor-to-vector ratios of decay constants of the $B^{(*)}$, $D^{(*)}$, $B_s^{(*)}$ and $D_s^{(*)}$ mesons, in which many uncertainties cancel, using the heavy-HISQ method. We use the Highly Improved Staggered Quark (HISQ) action for all valence quarks and second generation MILC $n_f = 2 + 1 + 1$ HISQ gluon field configurations, with lattice spacings ranging from $0.15\,\mathrm{fm}$ down to $0.045\,\mathrm{fm}$. Our pion masses range from $\approx 300\,\mathrm{MeV}$ down to the physical value, and our heavy quark masses range from the physical charm up to the physical bottom on the three finest ensembles. These quantities enable powerful tests of Standard Model flavour phenomenology and aid the search for new physics through their sensitivity to beyond-Standard-Model effects.

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