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All HISQ $B \rightarrow K$ form factors

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We present preliminary HPQCD results for $B \rightarrow K$ form factors $f_{0,+T}(q^2)$ using the HISQ action for all valence quarks on the MILC $N_f = 2 + 1 + 1$ gauge field ensembles. The ensembles used cover five lattice spacings, include the physical pion mass, and span a range of heavy quark masses from m_c to near m_b . Our “heavy-HISQ” approach allows us to map form factor heavy-quark dependence, extract results for both $D, B \rightarrow K$, and perform tests of heavy quark effective theory. Using the fully relativistic HISQ action for all quarks allows the weak current to be normalized non-perturbatively, eliminating the previously dominant uncertainty from perturbatively matching NRQCD-HISQ weak currents. In 2104.09883 we determine $D \rightarrow K$ form factors $f_{0,+}(q^2)$ (and a sub-percent determination of $|V_{cs}|$ - see Will Parrott’s talk at this conference) and report here on $f_T(q^2)$. Preliminary phenomenological implications and next steps in our all-HISQ heavy-light form factor campaign will be discussed.

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