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## C6: Using weighted averaging methods in measurements of $SU(3)_f$ symmetry breaking in $B$ meson decay constants

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Measurements of flavour physics anomalies, such as those in the CKM matrix elements, rely on minimising systematic errors from the relevant parameters derived from experiment and theory. One method of determining  $V_{ub}$  requires both  $B \rightarrow \ell\nu$  branching fractions from experiment and  $B$  decay constants from lattice QCD calculations, such as  $f_B$  and  $f_{B_s}$ .

This work will present the efforts from UKQCD/QCDSF/CSSM in calculating  $f_B$  and  $f_{B_s}$  on controlled  $SU(3)_f$ -breaking ensembles, specifically focusing on the evaluation of  $B$  meson observables as a weighted average across multiple fitting regions. Due to the chosen anisotropic clover-improved action for the heavy  $b$ -quark, the tuning of the free parameters to physical  $B_{(s)}$  and  $B_{(s)}^*$  properties requires a large number of correlator fits on each ensemble. This increases the effort in choosing optimal fitting ranges, as well as compounding biases in the choice of range. The use of an automated weighted averaging technique over multiple fitting ranges allows for timely tuning of the  $b$ -quark and reduces the impact of systematic errors from fitting range biases in calculations of  $f_B$  and  $f_{B_s}$ .

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