

Lattice-QCD Inputs to B2TiP

Silvano Simula with Takashi Kaneko and Andreas Kronfeld

B Mixing

- [FLAG-3](#) already out of date.
- Fold in new Fermilab/MILC [[arXiv:1602.03560](#)]:

$$f_{Bd} \sqrt{B_{B_d}} = 225(11) \text{ MeV} \quad (\text{error of } 4.9\%)$$

$$f_{Bs} \sqrt{B_{B_s}} = 274(10) \text{ MeV} \quad (\text{error of } 3.6\%)$$

$$B_{B_d} = 1.30(10) \quad (\text{error of } 7.7\%)$$

$$B_{B_s} = 1.35(7) \quad (\text{error of } 5.2\%)$$

$$\xi = 1.206(18) \quad (\text{error of } 1.5\%)$$

$$B_{B_s}/B_{B_d} = 1.032(36) \quad (\text{error of } 3.5\%)$$

(FLAG3 + Fermilab/MILC by Simula).

$B \rightarrow \pi l \nu$ Form Factors (and $B \rightarrow K l l, \dots$)

- Separate $B^0 \rightarrow \pi^- l^+ \nu$ and $B^+ \rightarrow \pi^0 l^+ \nu$ in experiment.
- (current summary likely to be taken from [FLAG-3](#))

$B \rightarrow D^{(*)}l\nu$ Form Factors

- Separate $B^0 \rightarrow D^-l^+\nu$ and $B^+ \rightarrow D^0l^+\nu$ in experiment.
- (current summary likely to be taken from [FLAG-3](#))
- Errors on $R(D)$ and $R(D^*)$ from “ $(|f_+|^2+|f_0|^2)/|f_+|^2$ ”.

$\Lambda_b \rightarrow p/\Lambda_b \rightarrow \Lambda_c$ Form Factors

- Status is Detmold, Lehner, Meinel \square .
- (update/forecast in consultation with Stefan M.)

Forecasts

- Reduction in error by a factor 2–3 seems reasonable:
 - which means total QCD errors of $\lesssim 1\%$ in some cases!
 - encouraging—lattice spacings such that light-quark methods are feasible (without extrapolations); cf. f_D to $\sim 0.5\%$ [[arXiv:1407.3772](#), [FLAG-3](#)].
 - challenging—isospin breaking (u/d masses, charges) & further QED effects (EW, structure dep., radiation).