

Prospects of lattice-QCD calculations

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Plans from JLQCD

[Takashi]

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- New ensemble generation at a smaller lattice spacing ($a \sim 0.04$ fm) with Möbius domain-wall fermion. Also add physical point simulations at coarser lattices (like $a \sim 0.08$ fm).
 - Improved statistics & lattice spacing runs for $B \rightarrow \pi\nu$, $B \rightarrow D^{(*)}\nu$ at recoil as large as possible.
 - More realistic calculation of inclusive $D_{(s)}$ semileptonic decay rates + exploratory study for B mesons.

Plans from ETM Collaboration

[Silvano]

- Extended Twisted-Mass (Europe now extends to Philadelphia)
- 2+1+1-flavor sea with twisted-mass Wilson fermions
- accurate determination of the b -quark mass
- (better) evaluation of the susceptibilities for B decays
- simulations of four-point functions for inclusive decays of $B_{(s)}$ mesons
- calculation of the leptonic decay rate of $B_{(s)}$ mesons in QCD+QED
 - i.e., beyond the decay constant (cf., Rome-Southampton kaon)

Plans from RBC/UKQCD

[Oliver]

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- RIKEN-Brookhaven-Columbia and United Kingdom QCD Collaborations
 - 2+1-flavor sea with domain-wall fermions; valence DWF or RHQ
 - All-DWF semileptonic D decays (ongoing) and B decays (future), latter with the “heavier-than-charm” approach (cf., HPQCD).
 - All-DWF B mixing: SU(3) breaking ratio ξ (ongoing); with JLQCD all five matrix elements (planned); lifetimes (exploratory).
 - RHQ+DWF semileptonic B decays—CKM and rare (ongoing, with a future ensemble with physical pions); pseudoscalar child *and* vector child in narrow width approximation.

Plans from Fermilab/MILC

[Aida]

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- Fermilab Lattice and MILC Collaborations
 - MILC = MIMD Lattice Computation
 - 2+1+1-flavor sea with (rooted) highly-improved staggered quarks (HISQ)
 - Push lattice-QCD to the QED wall for B and D leptonic & quark masses (done), B and D semileptonic (in progress), and B mixing (future).
 - +1-point functions for QED corrections to leptonic and semileptonic decays; four-point functions for long-distance D mixing; staggered corrections to Lellouch-Lüscher for $B \rightarrow K^*$
 - Also HVP for $g-2$; nucleon matrix elements for neutrino physics,

Plans from HPQCD

[Judd]

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- 2+1+1-flavor sea with (rooted) HISQ; from MILC
 - Semileptonic form factors for $B_s \rightarrow \Phi$, $B \rightarrow K^*$, $B_c \rightarrow D_s^*$, $B_{(s)} \rightarrow D_{(s)}^{**}$
 - $B^{(*)}$ and $D^{(*)}$ tensor decay constants.
 - Update on $B_c \rightarrow J/\psi$, including tensor form factors.
 - Tensor form factors for $B \rightarrow D^{(*)}$.