B5-01 Invited

Lattice QCD calculation of form factors describing the rare decays $B-\rightarrow K^* \mu^+\mu^-$ and $B_s-\rightarrow \phi \mu^+\mu^-$

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Rare B meson decays are being measured to test the standard model. I will talk about a lattice QCD calculation of $B^\rightarrow K^* \mu^+\mu^-$ and $B_s\rightarrow \phi \mu^+\mu^-$ form factors at the high-$q^2$ region. We use full-QCD configurations including 2+1 flavors of sea quarks. Using these form factors, we calculate the differential branching fractions and angular distributions of the rare decays $B^0\rightarrow K^* \mu^+\mu^-$ and $B_s\rightarrow \phi \mu^+\mu^-$ in the standard model and compare with experiments.

B5-02 Invited

Theoretical issues in calculating the leading hadronic contribution to the muon $g-2$

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While calculating the hadronic contributions to the muon anomalous magnetic moment is possible, there are various theoretical challenges that arise when doing so. We focus on those that arise in the leading hadronic contribution, and discuss the issues that arise as well as (possible) solutions.

B5-03 Invited

Quark Contributions to the Nucleon Mass and Spin from Lattice QCD.

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We report our work on the contents of nucleon mass and spin from dynamical lattice QCD. The calculation is performed with overlap valence quarks on 2+1-flavor domain-wall fermion gauge configurations. Nucleon propagator and the quark loops are both computed with stochastic grid sources, while low-mode substitution and low-mode averaging methods are used respectively which substantially improve the signal to noise ratio. The quark spin is calculated from the anomalous Ward identity where the axial form factor can be obtained from the pseudo-scalar form factor and the local topological charge operator.

B5-04

More Results on the Computational Efficiency of Staggered Wilson Fermions

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Recent results from our ongoing investigations of staggered Wilson fermions are presented. We extend our previous studies of quantifying the computational efficiency on a $16^3 \times 32$ lattice to two $20^3 \times 40$ lattices. We find that the efficiency increases noticeably when decreasing the lattice spacing while keeping the physical volume fixed. In the case of increasing volume and fixing the lattice spacing, we also observe a small increase. Moreover, we discuss numerical results on the spectrum of both the staggered and usual Wilson Dirac operator in quenched backgrounds on varying lattice sizes up to $16^3 \times 32$. It is found that on larger lattices the physical branch improves significantly, thus resolving a paradox regarding the computational efficiency of staggered overlap fermions encountered in earlier results.