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Phenomenology with Lattice NRQCD b Quarks.

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Lattice NRQCD is a relatively inexpensive formalism that can be used to simulate b quarks on the lattice at their physical mass. The HPQCD collaboration has used radiatively-improved NRQCD for b quarks in bottomonium to determine the decay rate to leptons of the ground-state Upsilon and its first radial excitation in lattice QCD. Using time moments of vector bottomonium current-current correlators, we present our determination of the b quark mass in the $\overline{\text{MS}}$ scheme.

We use NRQCD b quarks and HISQ light quarks – with masses down to their physical values – in the semileptonic B to π decay at zero recoil to calculate $f^0(q^2_{\text{max}})$. Our results are consistent with the soft pion theorem for this decay, which relates the meson decay constants to the form factor by $f^0(q^2_{\text{max}}) = f_B/f_\pi$ in the massless pion limit.

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