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Neutral $B_{(s)}$-mixing matrix elements from lattice QCD for the Standard Model and beyond (15' + 5')

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I present the first results from three-flavor lattice QCD for the hadronic matrix elements for neutral $B_{(s)}$-meson mixing in and beyond the Standard Model, including a complete error budget for each matrix element. Because $B_{(s)}$-meson mixing proceeds via flavor-changing neutral currents, it is potentially sensitive to new physics. We compute the complete basis of matrix elements, at leading order in the electroweak operator product expansion, needed to make predictions in the Standard Model and beyond. From our matrix element results we derive a host of phenomenologically interesting quantities, including the most precise determination to date of the CKM matrix elements $|V_{td}|$, $|V_{ts}|$, and their ratio $|V_{td}/V_{ts}|$, as well as Standard Model predictions for $B_{(s)} - \bar{B}_{(s)}$ oscillation frequencies and the rare decay branching fractions $\mathcal{B}(B_{(s)} \to \mu\bar{\mu})$. I will discuss several 2 to 3 standard deviation tensions between Nature and the Standard Model expectations based on our results.

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