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Muon $g-2$: BMW calculation of the hadronic vacuum polarization contribution

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We compute the leading order hadronic vacuum polarization contribution to the anomalous magnetic moment of the muon. The calculations are performed using four flavors of stout smeared staggered quarks, with quark masses at their physical values. The continuum limit is taken using six different lattice spacings ranging from 0.132 fm down to 0.064 fm. All strong isospin breaking and electromagnetic effects are accounted for to leading order. A controlled infinite volume limit is taken thanks to dedicated simulations performed in box sizes up to 11 fm. Putting all these ingredients together, we find $[(g_\mu - 2)/2]_{\text{LO-HVP}} = 707.5[5.5] \times 10^{-10}$, which has a total uncertainty of 0.8%. Compared to determinations based on the dispersive approach, our result significantly reduces the tension between the standard model prediction for the muon $g - 2$ and its experimental value.

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