

Lattice calculation of the R-ratio smeared with Gaussian kernels

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The ratio $R(s)$ of the cross-sections for $e^+e^- \rightarrow$ hadrons and $e^+e^- \rightarrow e^+e^-$ is a valuable energy-dependent probe of the hadronic sector of the Standard Model. Moreover, the experimental measurements of $R(s)$ are the inputs of the dispersive calculations of the leading hadronic vacuum polarization contribution to the muon $g-2$ and these are in significant tension with direct lattice calculations and with the muon $g-2$ experiment. In this talk we discuss the results of our first-principles lattice study of $R(s)$. By using a recently proposed method for extracting smeared spectral densities from Euclidean lattice correlators, we have calculated $R(s)$ convoluted with Gaussian kernels of different widths Δ and central energies up to 2.5 GeV. Our theoretical results have been compared with the KNT19 compilation of experimental results smeared with the same Gaussian kernels and a tension (about three standard deviations) has been observed for $\Delta \sim 600$ MeV and central energies around the ρ resonance peak.

Presenter: DE SANTIS, Alessandro (Istituto Nazionale di Fisica Nucleare)

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