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Hadronic inputs to the $(g-2)_\mu$ puzzle

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Collaboration

Abstract content

The anomalous magnetic moment of the muon $(g-2)\mu$ is one of the most precisely studied observables of the Standard Model. However, there is a long standing discrepancy of three to four standard deviations between its value obtained from direct measurements and the Standard Model prediction. Since the deviation might hint at physics beyond the Standard Model, new experiments are planned to measure $(g-2)_\mu$ with even better accuracy.

The theory prediction of $(g-2)_\mu$ consists of three main parts, taking into account the effects of QED, weak, and strong interactions. While QED and weak contributions can be described by perturbative means to very high accuracy, the contributions of the strong interaction currently dominate the error of the Standard Model prediction. To increase their precision, experimental information is needed as input. The largest hadronic contribution is due to the hadronic Vacuum Polarization. It can be related to the measurement of the inclusive hadronic cross sections in e^+e^- annihilation. The second largest hadronic contribution stems from hadronic Light-by-Light scattering. It cannot be easily related to measurable quantities and has been evaluated based on hadronic models. Recently data driven approaches based on dispersion relations have been proposed. In both cases transition form factors of pseudoscalar mesons are needed as experimental input.

In this presentation we will discuss recent and future measurements of relevant hadronic cross sections and transition form factors.

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