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Muon g-2: data combination, fitting and systematic bias

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The anomalous magnetic moment of the muon, a_μ, stands as an enduring precision test of the Standard Model. With the hadronic contribution providing the largest uncertainty to the standing 3.3σ discrepancy between theoretical and experimental estimates, the combination of $e^+e^- \to$ hadrons cross section data in the determination of $a_\mu^{\text{had, LOVP}}$ must be statistically reliable to achieve a precise estimate to a_μ^{SM}. Recent studies have highlighted the prospect of systematic biases that can arise through the fitting of global normalisation uncertainties. An analysis of the existing fitting method shows that although it has the potential to incur a bias, previous results are still reliable. However, it necessary to produce a new, unbiased iterative fitting procedure: the R_m^I method. Applying this new method in the determination of the dominant $e^+e^- \to \pi^+\pi^-$ hadronic contribution yields an unbiased result of $a_\mu^{\pi^+\pi^-}(0.305 \leq \sqrt{s} \leq 2\,\text{GeV}) = (504.42 \pm 2.24) \times 10^{-10}$. We then apply the R_m^I method to other dominant hadronic channels as an indication of the impact on a full analysis of the determination of $a_\mu^{\text{had, LOVP}}$

Primary author: Mr KESHAVARZI, Alex (University of Liverpool)

Presenter: Mr KESHAVARZI, Alex (University of Liverpool)

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