

Contribution ID: 5

Canadian Association of Physicists

Association canadienne des physiciens et physiciennes

Type: Oral (Non-Student) / Orale (non-étudiant(e))

Inequality-based QCD Constraints on the Hadronic Vacuum Polarization Contribution to Muon g-2

Friday 13 June 2025 10:15 (15 minutes)

With recent updates on the experimental measurement of the muon's anomalous magnetic moment $(a_{\mu} = (g-2)_{\mu}/2)$ at Fermilab, the discrepancy between experimental results and Standard Model predictions is heightened to 5.0σ . Along with the dependencies between the theoretical predictions from lattice QCD and data-driven methods, we establish upper and lower bounds for the hadronic vacuum polarization (HVP) contribution to the leading-order (LO) muon's anomalous magnetic moment $(a_{\mu}^{\text{HVP,LO}})$ using the finite-energy QCD sum-rules (FESR) and H\"older inequalities.

Our results are evaluated up to five-loop order in perturbation theory in the chiral limit, LO in light-quark mass corrections, next-to-leading order in dimension-four QCD condensates, and LO in dimension-six QCD condensates, offering a path toward resolving the current tension in future investigations of the muon's anomalous magnetic moment.

Keyword-1

QCD Sum Rules

Keyword-2

Muon Anomalous Magnetic Moment

Keyword-3

Author: LI, Siyuan

Co-authors: Prof. STEELE, Tom (University of Saskatchewan); Prof. HO, Jason (Dordt University); Prof. KLEIV, Robin (Thompson Rivers University); RAZA, R; WILLIAMS, K

Presenter: LI, Siyuan

Session Classification: (PPD) F1-1 Particle physics at colliders II and muon g-2 | Physique des particules aux collisionneurs II et muon g-2 (PPD)

Track Classification: Technical Sessions / Sessions techniques: Particle Physics / Physique des particules (PPD)