



Contribution ID: 81

Type: **Invited**

Trace Anomaly and Sigma Terms of Baryons from Lattice QCD

Friday, 29 November 2024 11:30 (30 minutes)

The origin of hadron masses remains a fundamental question in QCD. While most of the proton's mass arises from strong interactions, with only a small fraction stemming from quark masses, it is natural to ask if this phenomenon extends to other baryons with heavier quark content. In this talk, we explore how quark masses and the trace anomaly contribute to the masses of baryons containing light, strange, and charm quarks. Our lattice calculations show that baryon masses align with experimental data to within 1%, with gluon trace anomaly contributions across baryons are similar within 10% assuming the anomalous dimension $\gamma_m \sim 0.3$.

This study reveals a potential universality in trace anomaly contributions across baryons, shedding light on the underlying nonperturbative mechanisms responsible for hadronic mass generation.

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Session Classification: Plenary