

Emergent Hadron Mass in QCD: From the Gluon Mass to Observables

Sunday, 19 April 2026 11:30 (30 minutes)

Visible matter is characterised by a single mass scale; namely, the proton mass. The proton's existence and structure are supposed to be described by quantum chromodynamics (QCD), the strong interaction part of the Standard Model; yet, absent Higgs boson couplings, chromodynamics is scale-invariant. Thus, if the Standard Model is truly a part of the theory of Nature, then the proton mass is an emergent feature of QCD; and emergent hadron mass (EHM) must provide the basic link between theory and observation. This presentation will sketch recent progress in elucidating the character of EHM. Special emphasis will be given to the three pillars of EHM namely, the momentum-dependent gluon mass, QCD's process-independent effective charge, and the running quark mass; their role in stabilising strong interaction theory; and their measurable expressions in a diverse array of observables.

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Session Classification: Plenary Theory 8: Strongly Coupled Theory Special Session (Room 567, Chair Xiao-Feng Luo)