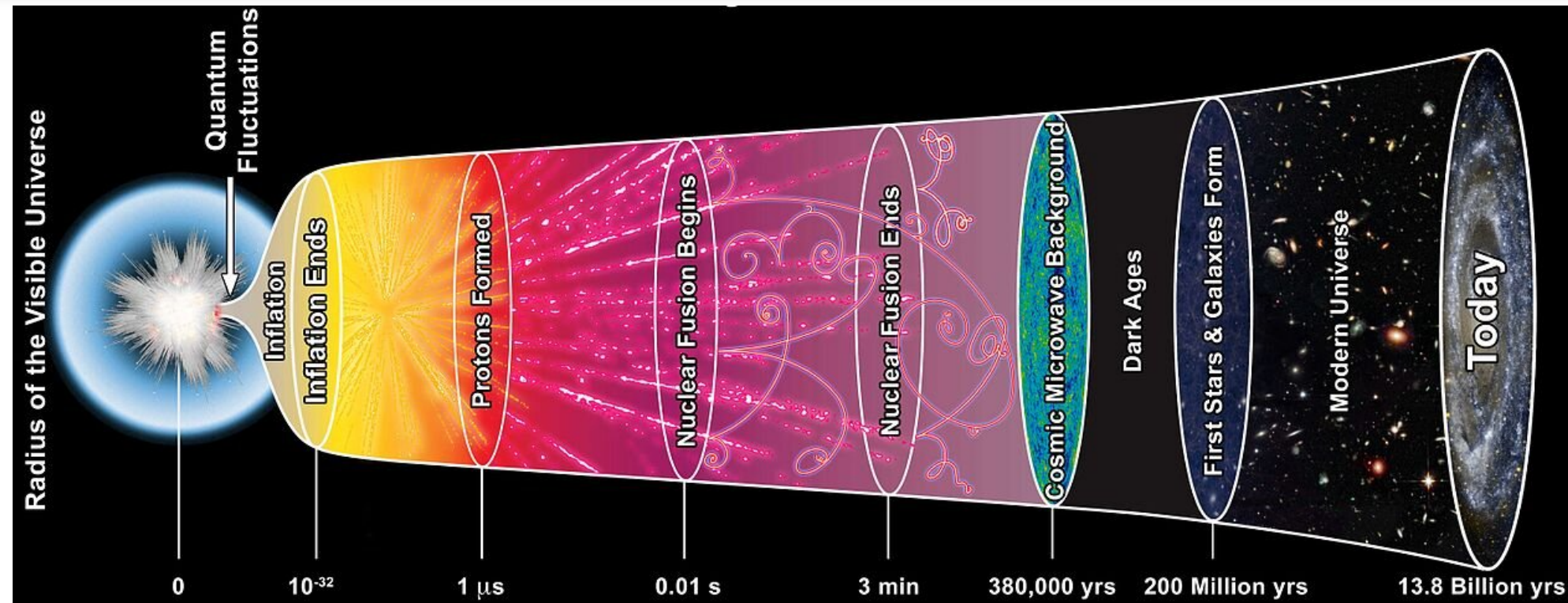


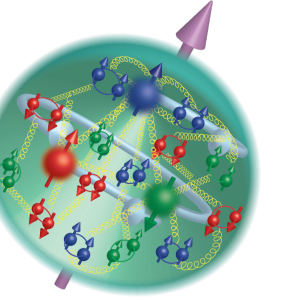
Raza Sabbir Sufian

Retreat for Postdoctoral Research Associates @ BNL

EIC physics from Lattice QCD (e.g. gluon distributions)

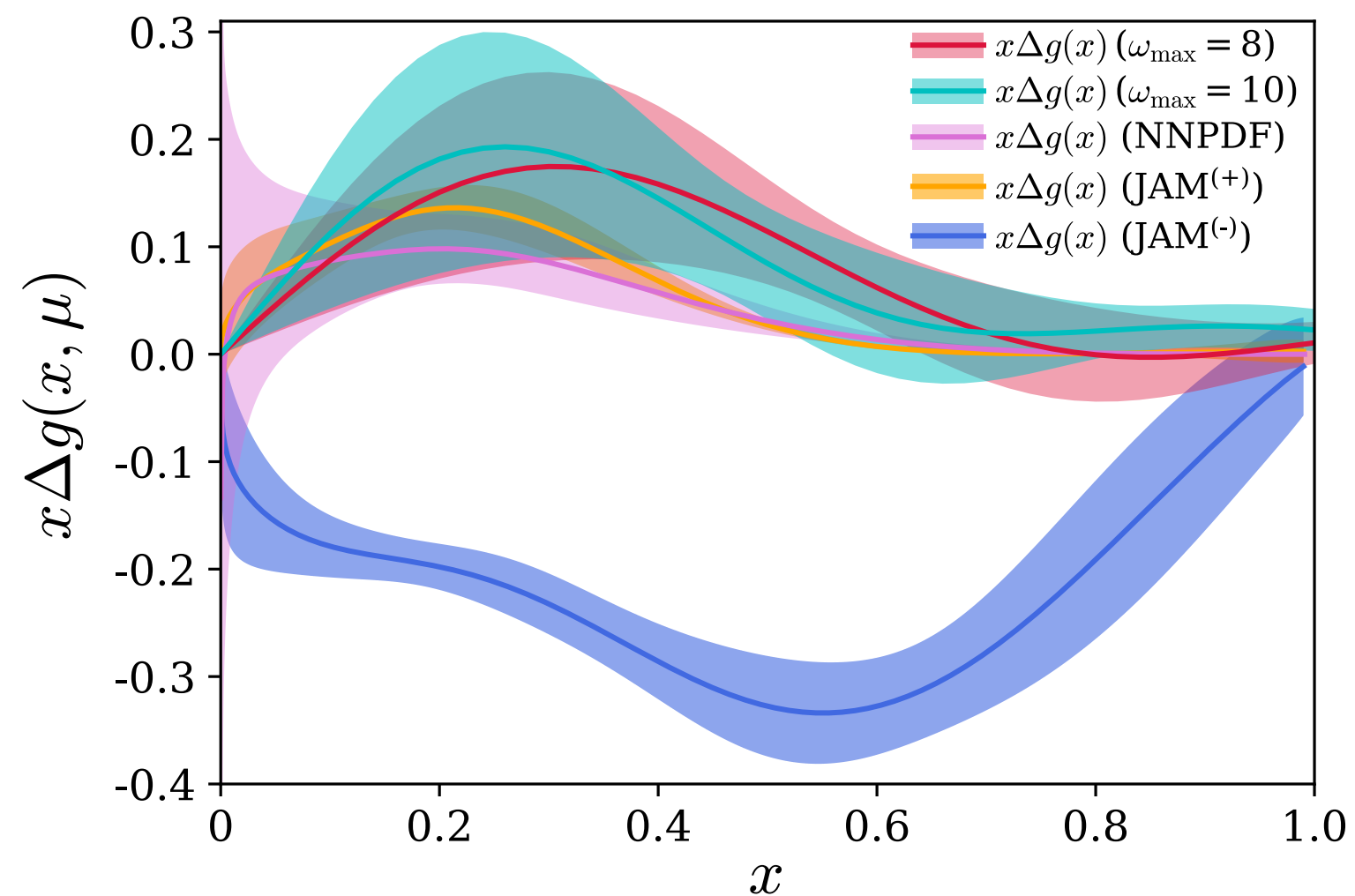


- ▶ How do the nucleon mass & spin arise?
- ▶ What are the emergent properties of dense systems of gluons?



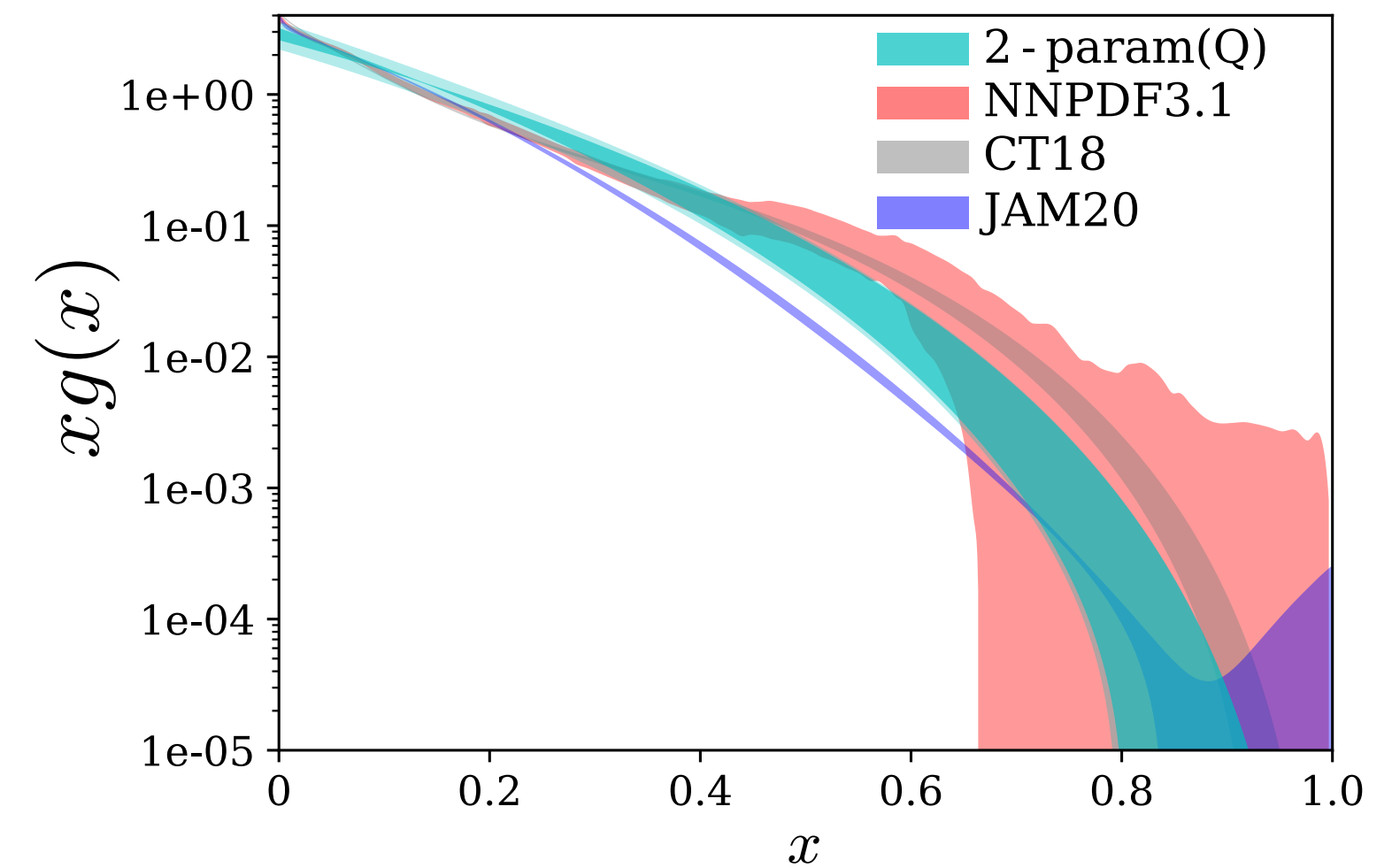
● Application of Lattice QCD and Machine Learning to understand the gluon that binds us all

Gluon helicity distribution



Tanjib Khan, Tianbo Liu, RSS (2023)

Unpolarized gluon distribution



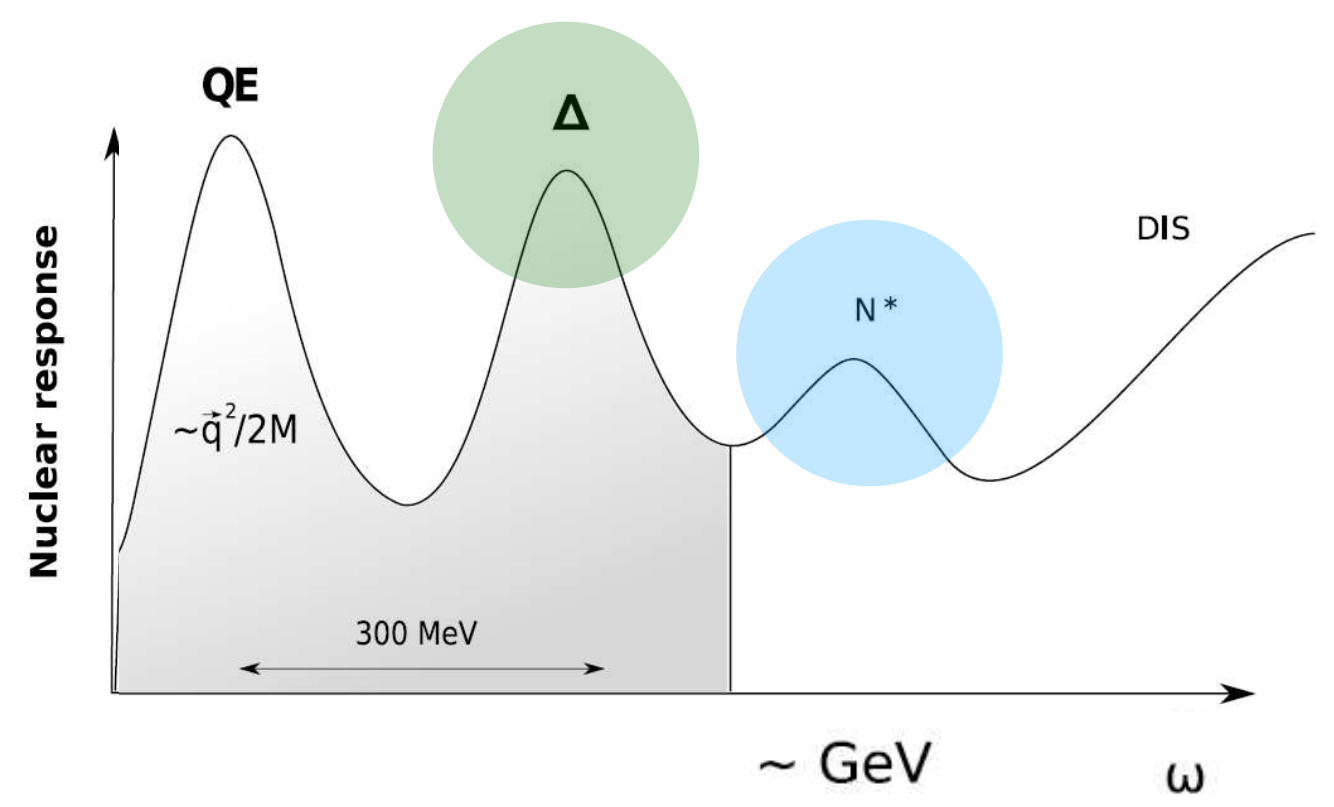
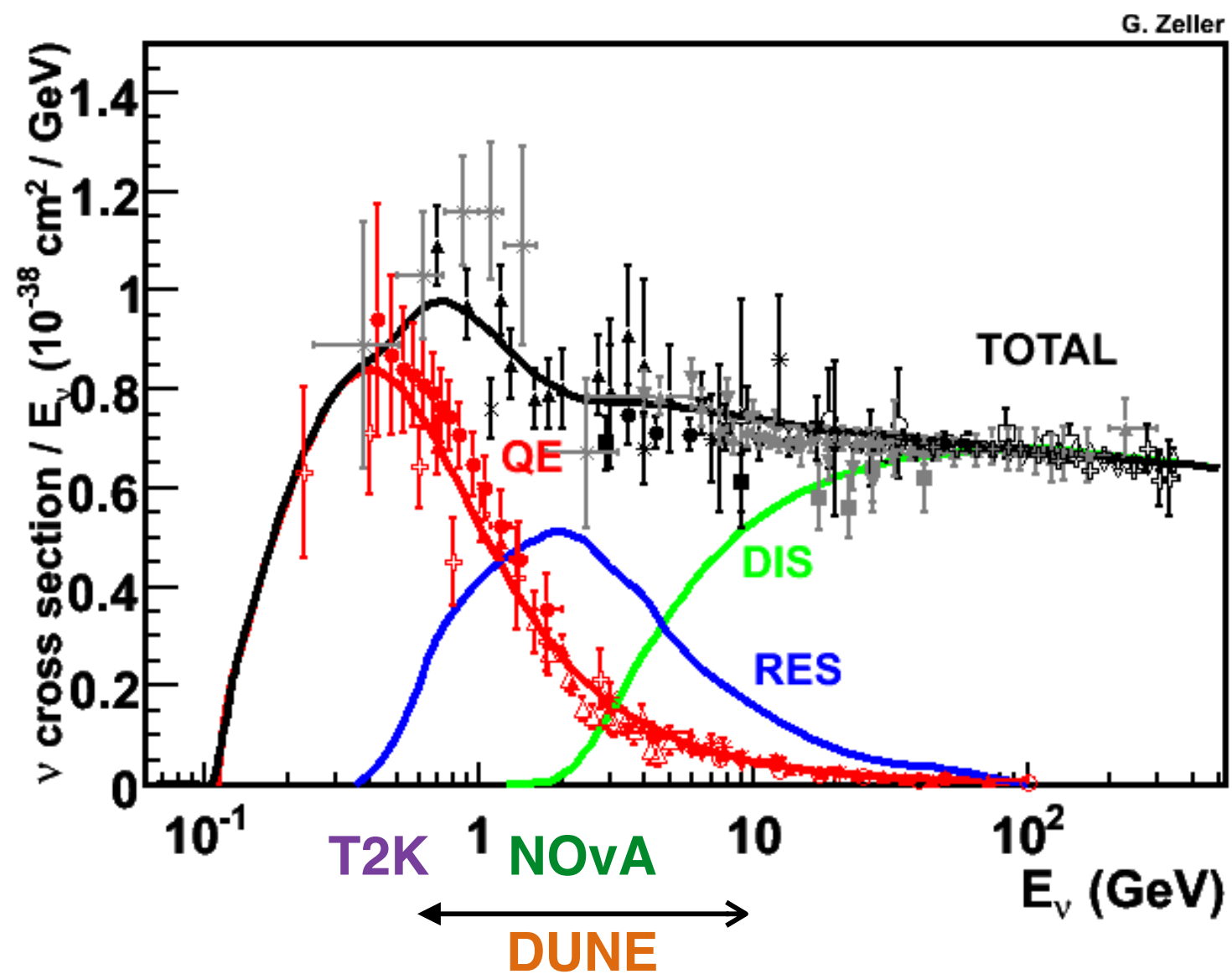
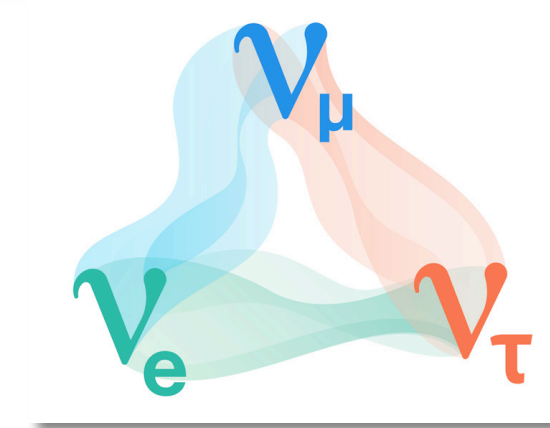
Khan, RSS, et al (HadStruc)(2021)

- ▶ Ongoing: quark/gluon distributions in the pion, rho meson, photon structure, quantum phases on QC

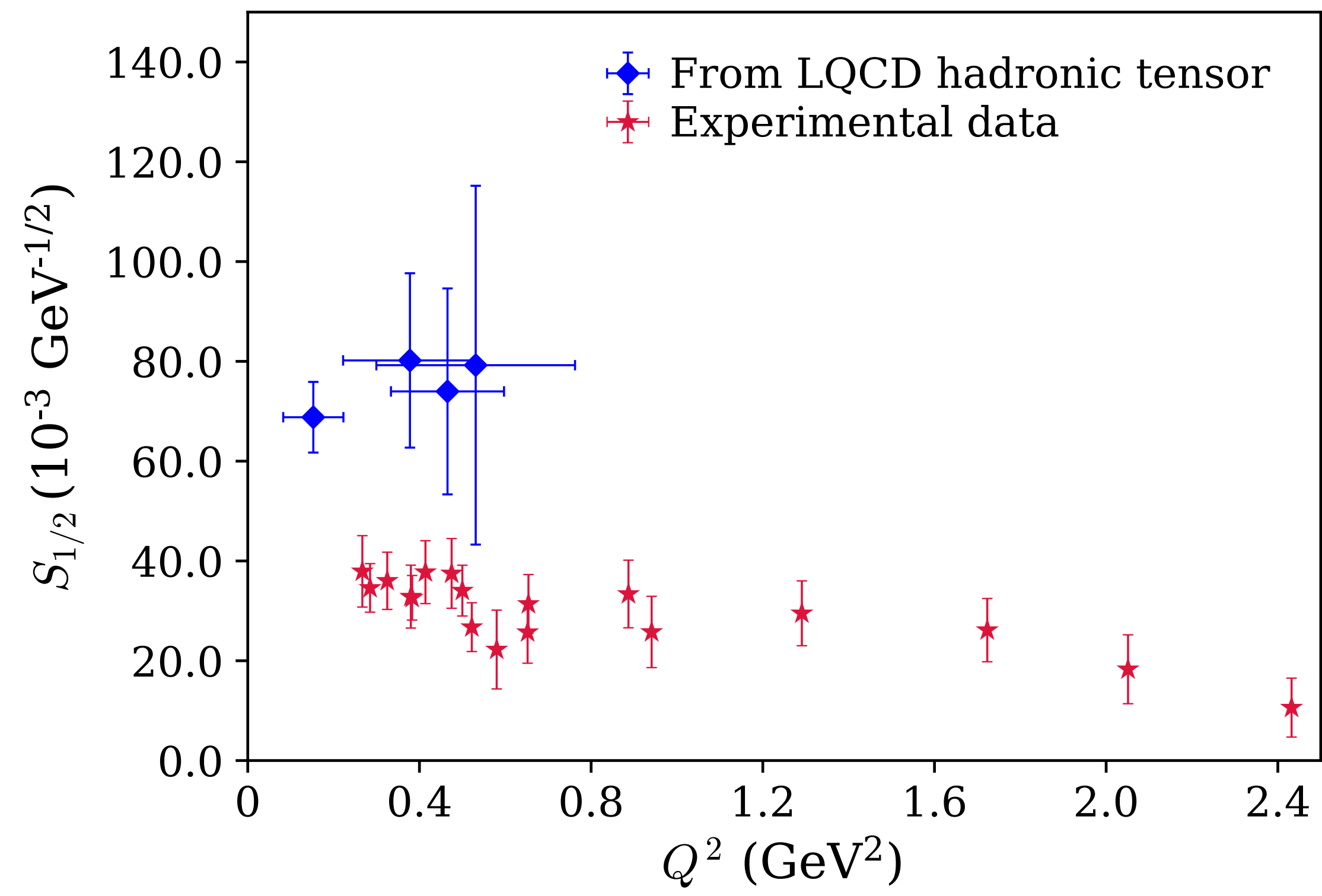
Neutrino physics from hadronic tensor in Lattice QCD

● Long baseline neutrino oscillation experiments: Hyper-K, DUNE, ...

The BIG question: why the universe is the way it is?



Longitudinal helicity amplitude for $\gamma^* p \rightarrow N(1440)P_{11}$ transition



JLab Experimental data
 V. Mokeev, et al [2023]
 V. Burkert [2018]

[In preparation & extending formalism for DIS region]

Thank you!