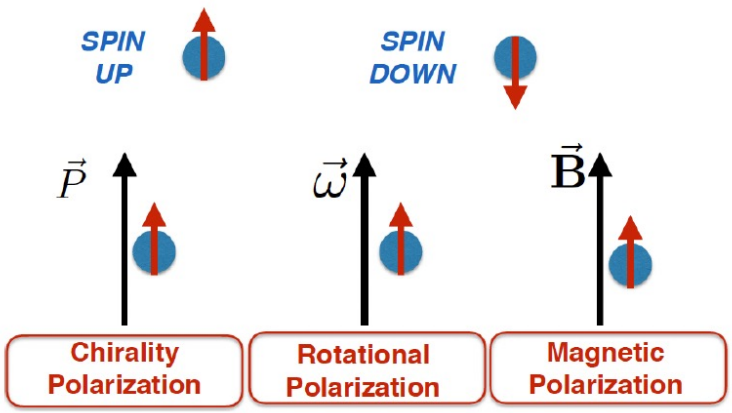
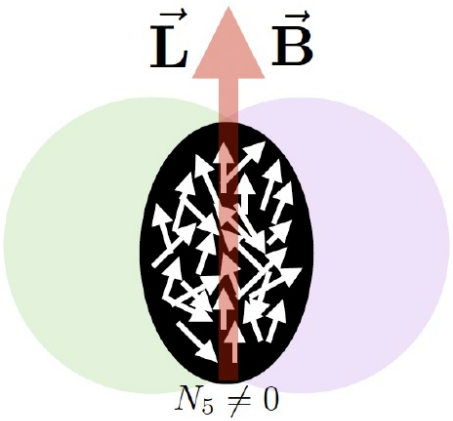
Novel Spin Transport in Hot Dense QCD Fluid

It is only in the past ~5 years that significant attention has started to be paid to the SPIN d.o.f.



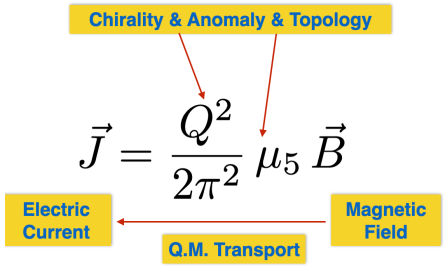


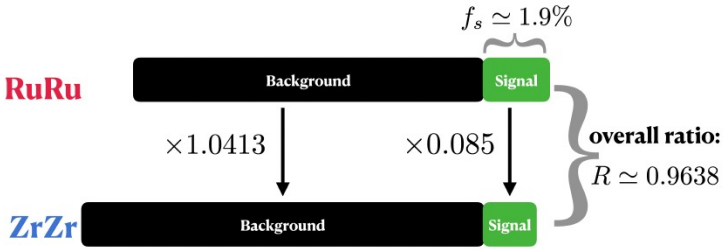
QCD matter under new types of extreme conditions!
Serious interdisciplinary interests and impact!

Jinfeng Liao

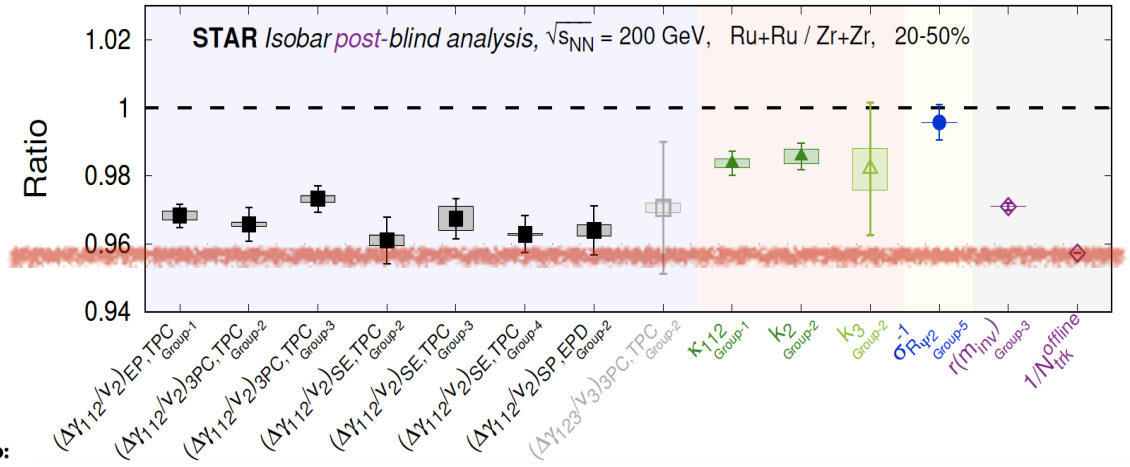
Indiana University, Physics Dept. & CEEM

Finding Chiral Magnetic Effect (CME)

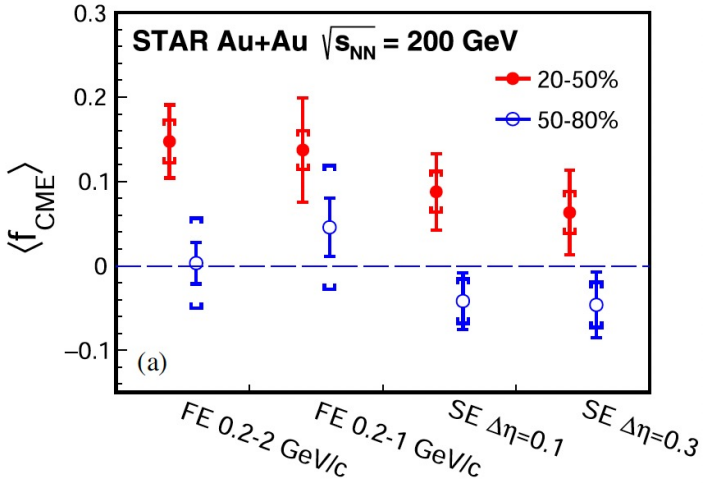




[Khazeev, JL, Shi, arXiv:2205.00120]



The isobar results could be consistent with a finite signal fraction once bulk background difference is accounted for.



It would be a pity if we do not capitalize on the already invested theory/exp efforts as well as anticipated new AuAu data and miss out the CME discovery opportunity.

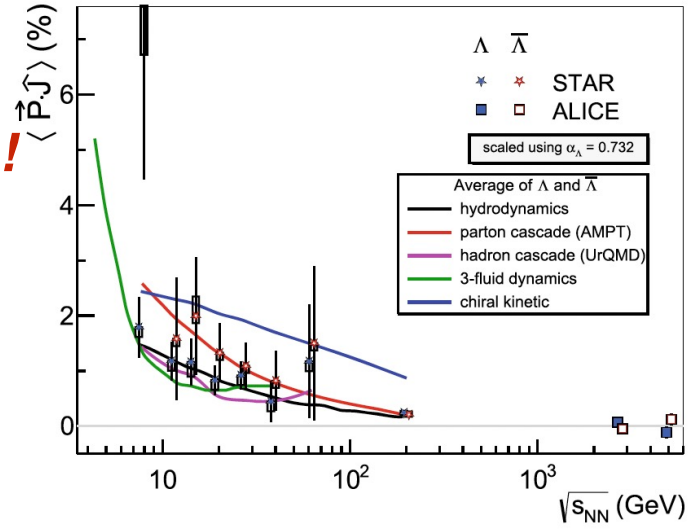
STAR, PRL128, 092301(2022).

Discovery of the Subatomic Swirls

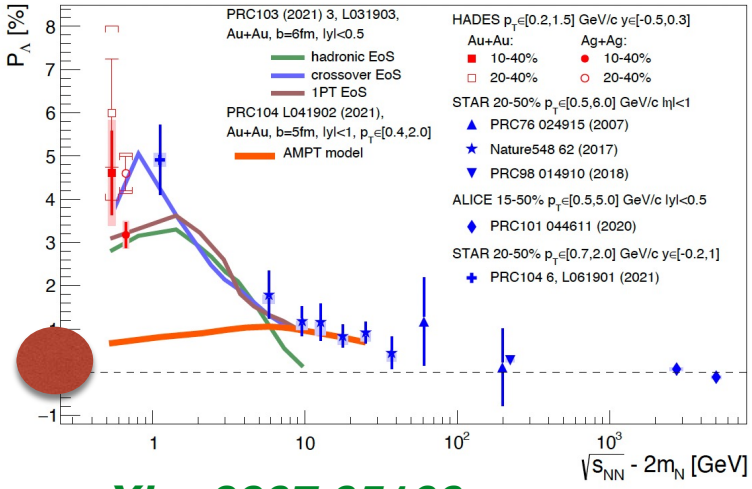
STAR 2017

A wonderful, surprising, "bonus" discovery from beam energy scan program! [perhaps not anticipated from previous LRP]

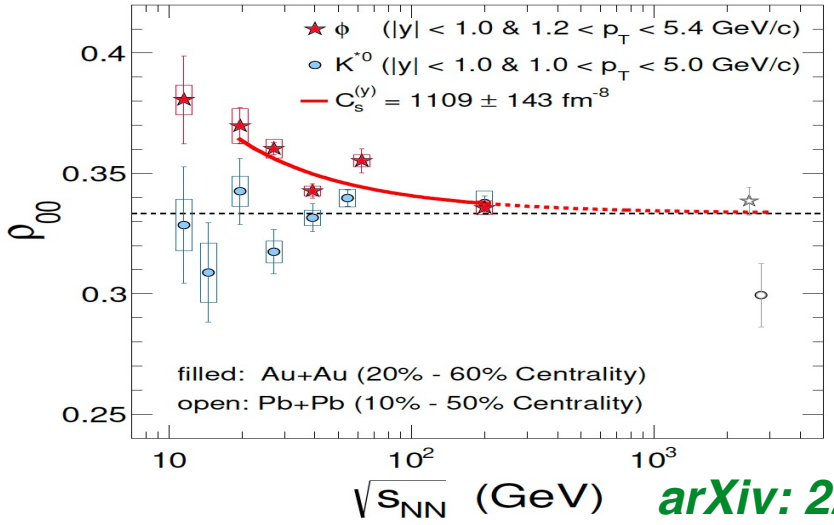
Polarization signal: O(10GeV) >> O(100GeV)



More surprises getting into the O(1GeV) regime:



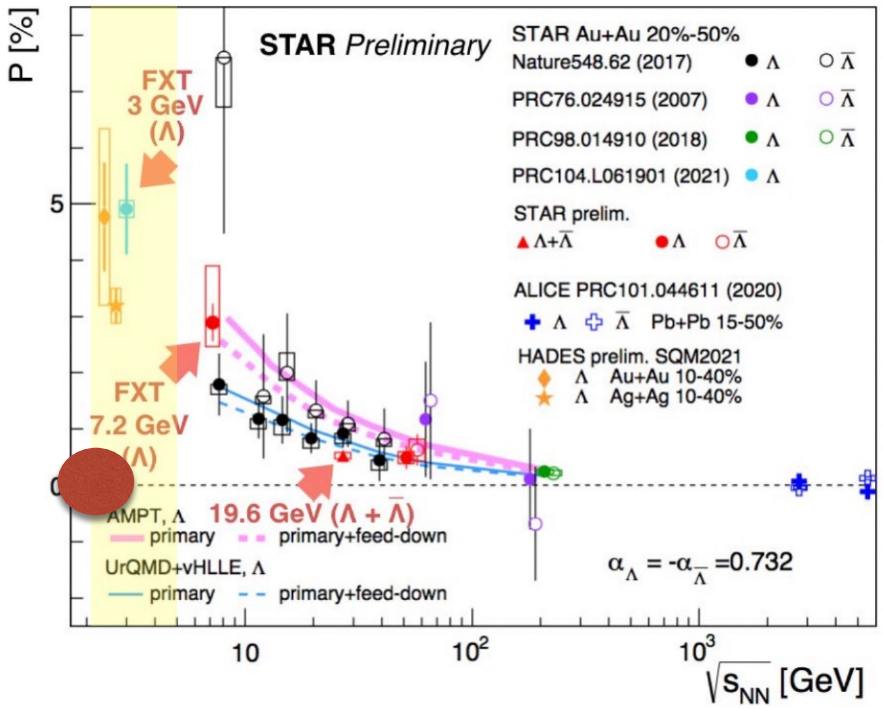
arXiv: 2207.05160



arXiv: 2204.02302

We are not done yet in locating the most vortical fluid!

A New Frontier: Spinning QCD



[Talk by X. Dong]
[US-CBM white paper: 2209.05009]

How is initial angular momentum transported into fireball?

How is angular momentum subsequently passed onto final hadrons?

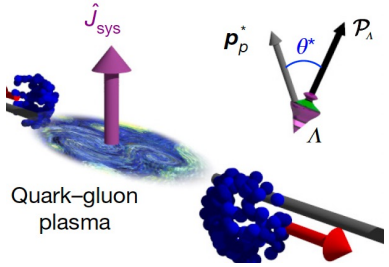
CBM@FAIR has the capability to help figure these out.

General remarks: spinning QCD as a new frontier!

Proton

$$\frac{\mathbf{J}}{B} = \frac{1}{2}$$

$$\frac{\mathbf{J}}{B} = 10^{2\sim3}$$



Heavy Ion