

Cold QCD Physics Program with

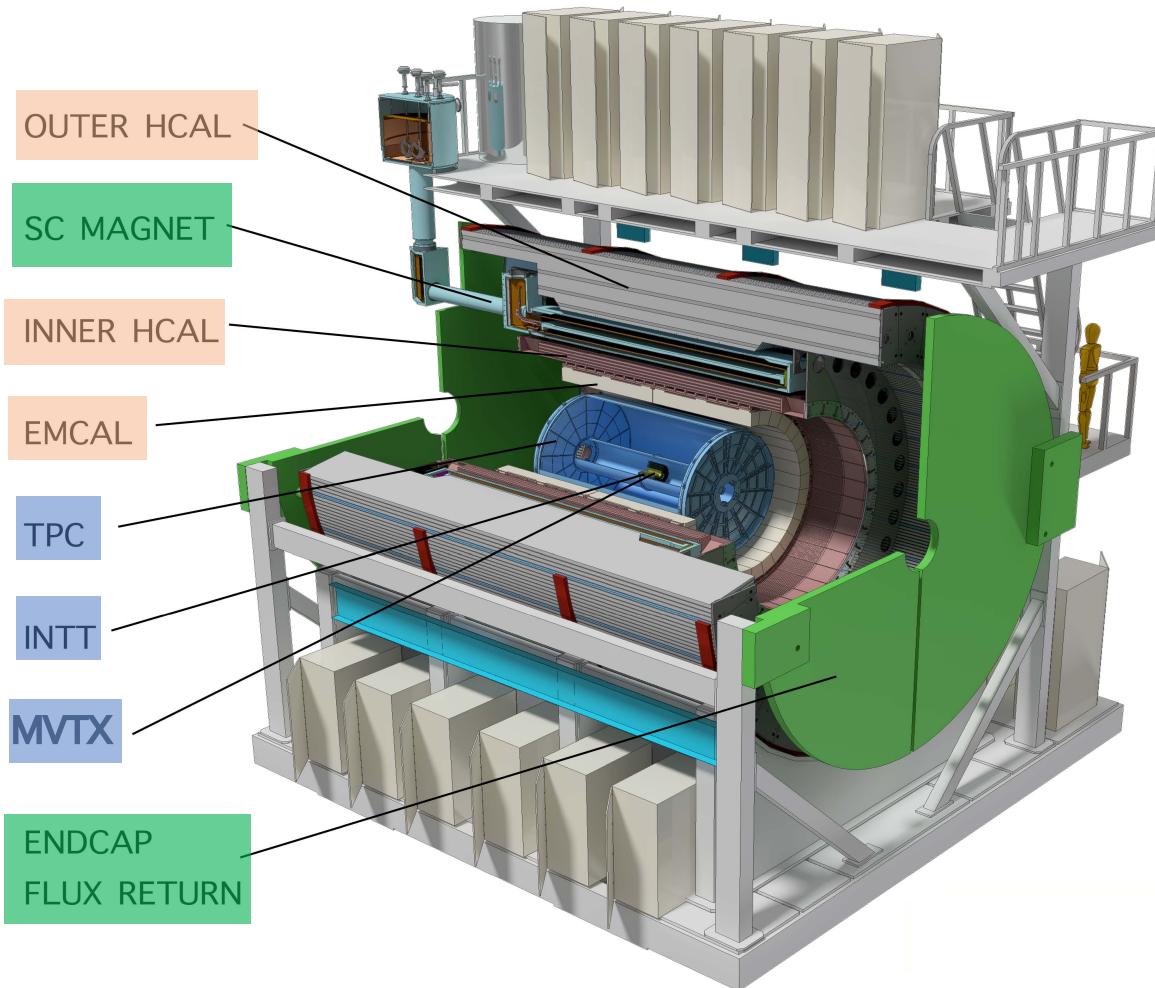


A. Bazilevsky (BNL)



sPHENIX Detector

A major upgrade of PHENIX detector for the RHIC facility at BNL (USA)



$|\eta| < 1.1$ and 2π in ϕ :

EMCal & HCal

Jets, photons

Tracking in solenoidal field 1.4T

$h^\pm, J/\Psi, \Upsilon$

15 kHz DAQ

+ Streaming Readout for Tracking

Starting taking data in 2027!



Cold QCD with sPHENIX-barrel

Many **polarized** and **unpolarized** measurements in **p+p** and **p+A** possible utilizing jet, heavy flavor and direct photon strength of sPHENIX barrel

Polarized:

Hadron A_N , pp vs pA	h
Transversity \times Collins FF:	h in jet
Transversity \times Interference fragmentation:	di-h
Sivers asymmetry:	γ -jet, jet-jet
Gluon dynamics (Twist-3):	γ , HF (D0 etc.)

Unpolarized:

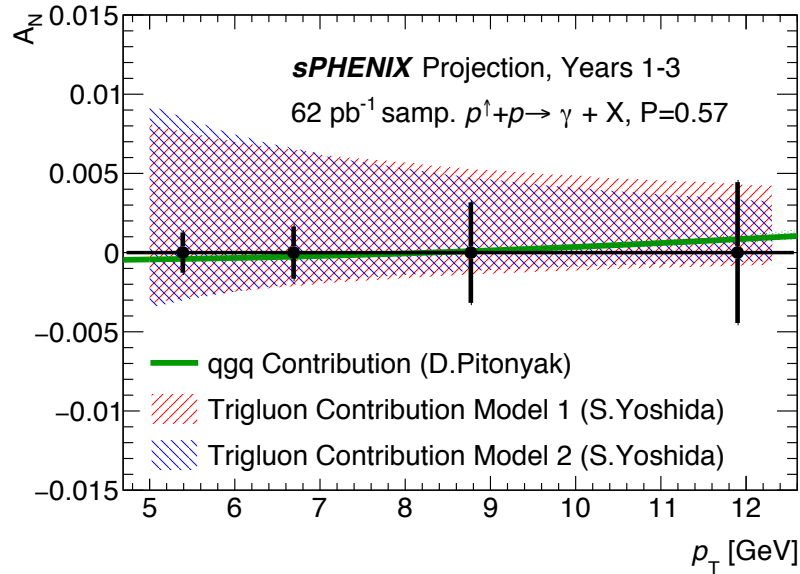
Quarkonia polarization:	J/ψ , Υ
Nuclear PDF	h , jet, di-jet, γ -jet, DY
Hadronization, pp vs pA:	h in jet, γ -jet, di-jet



Photon and HF A_N

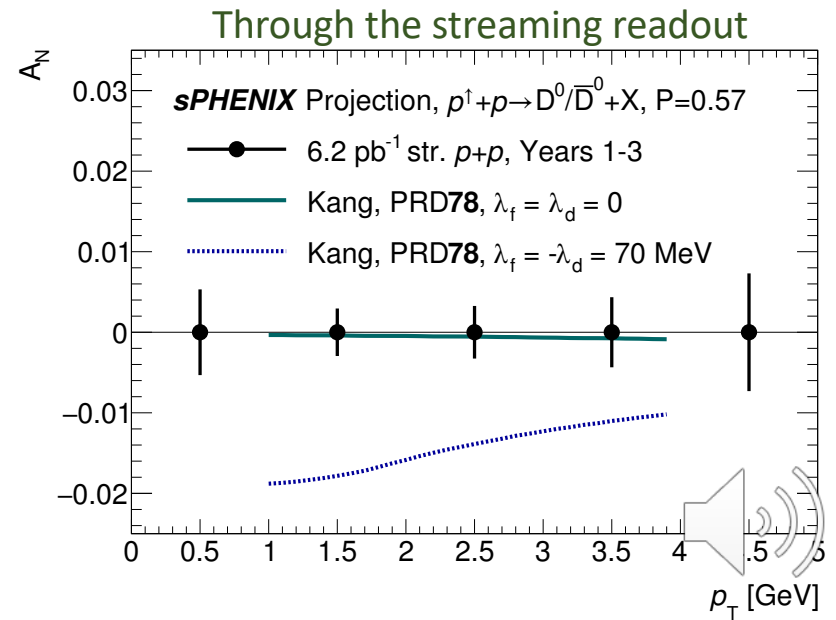
Glueon dynamics
within the nucleon

Sensitive to tri-gluon Twist-3 correlation functions



Dir. Phot. A_N

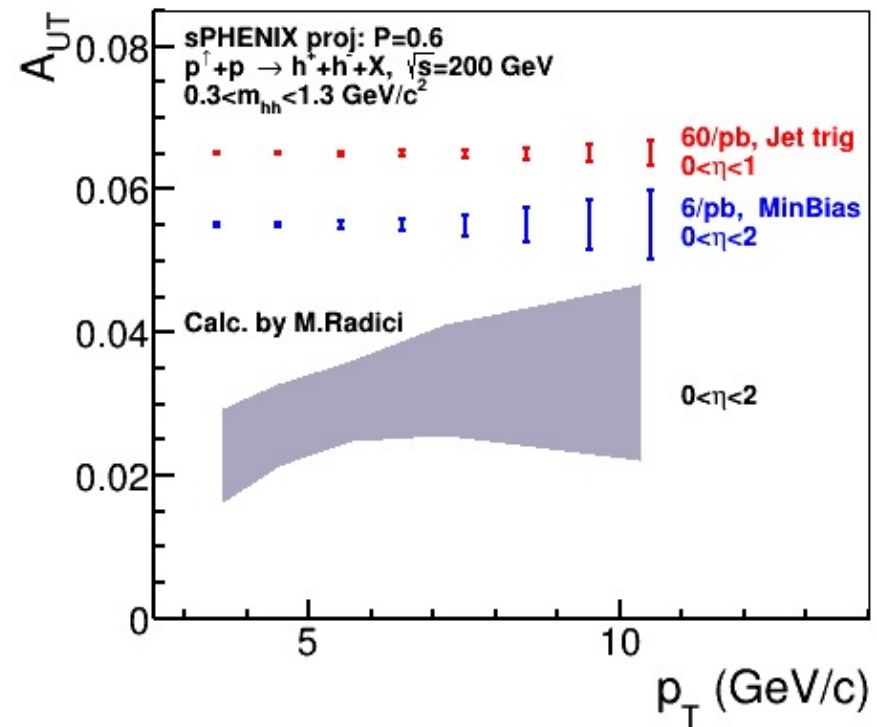
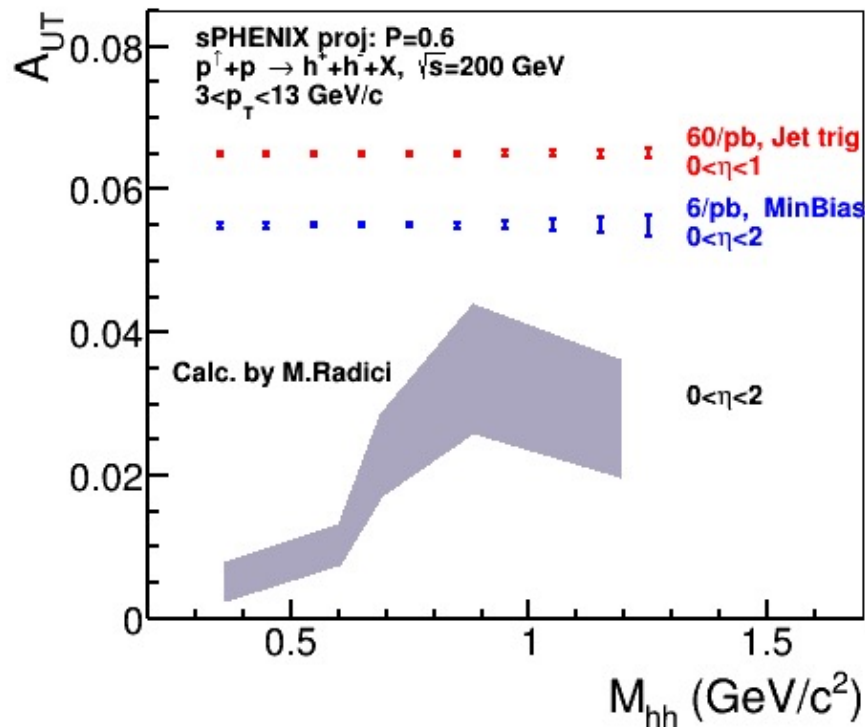
D0 A_N



Transversity \times Interference Fragmentation

Transversity
Tensor Charge

MinBias: Through the streaming readout

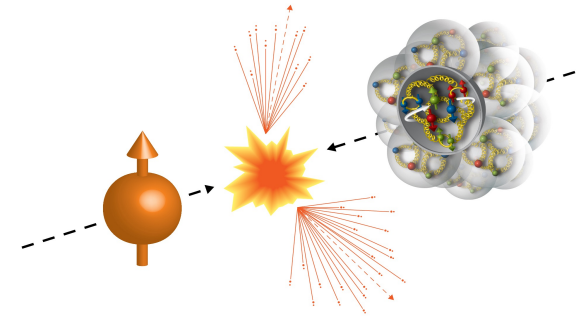


Non-zero asymmetry measured by STAR
Enormous constraining power from sPHENIX



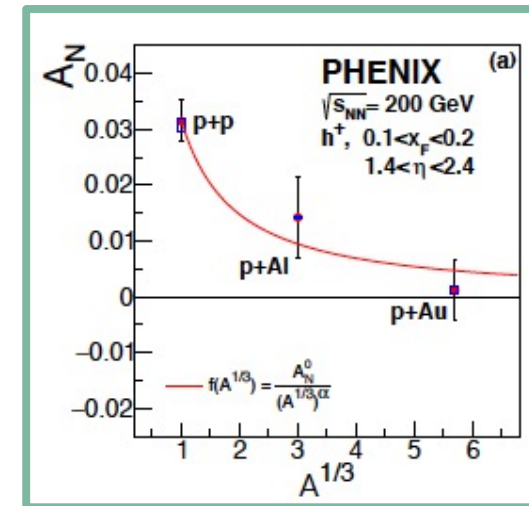
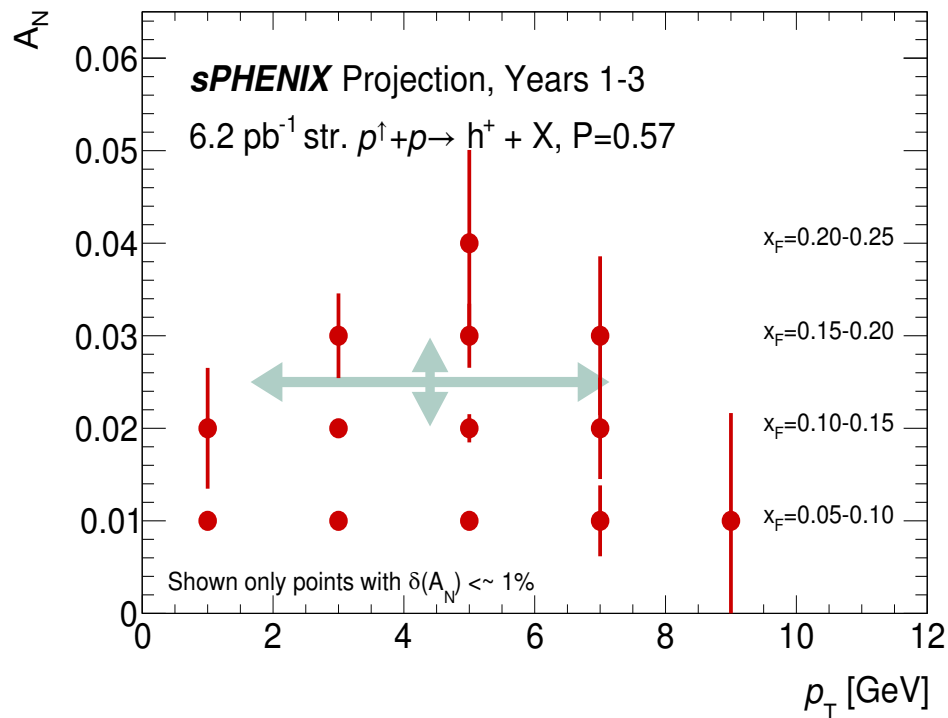
h^+ A_N , pp vs pA

Nature of hadron A_N in pp and its nuclear modification



Through the streaming readout

PRL123, 122001 (2019)



Not yet explained by theory

Collins and IFF asymmetries may also bring surprises
 sPHENIX will measure them with high precision, pp vs pA



Stay tuned

Join us in this exciting journey

