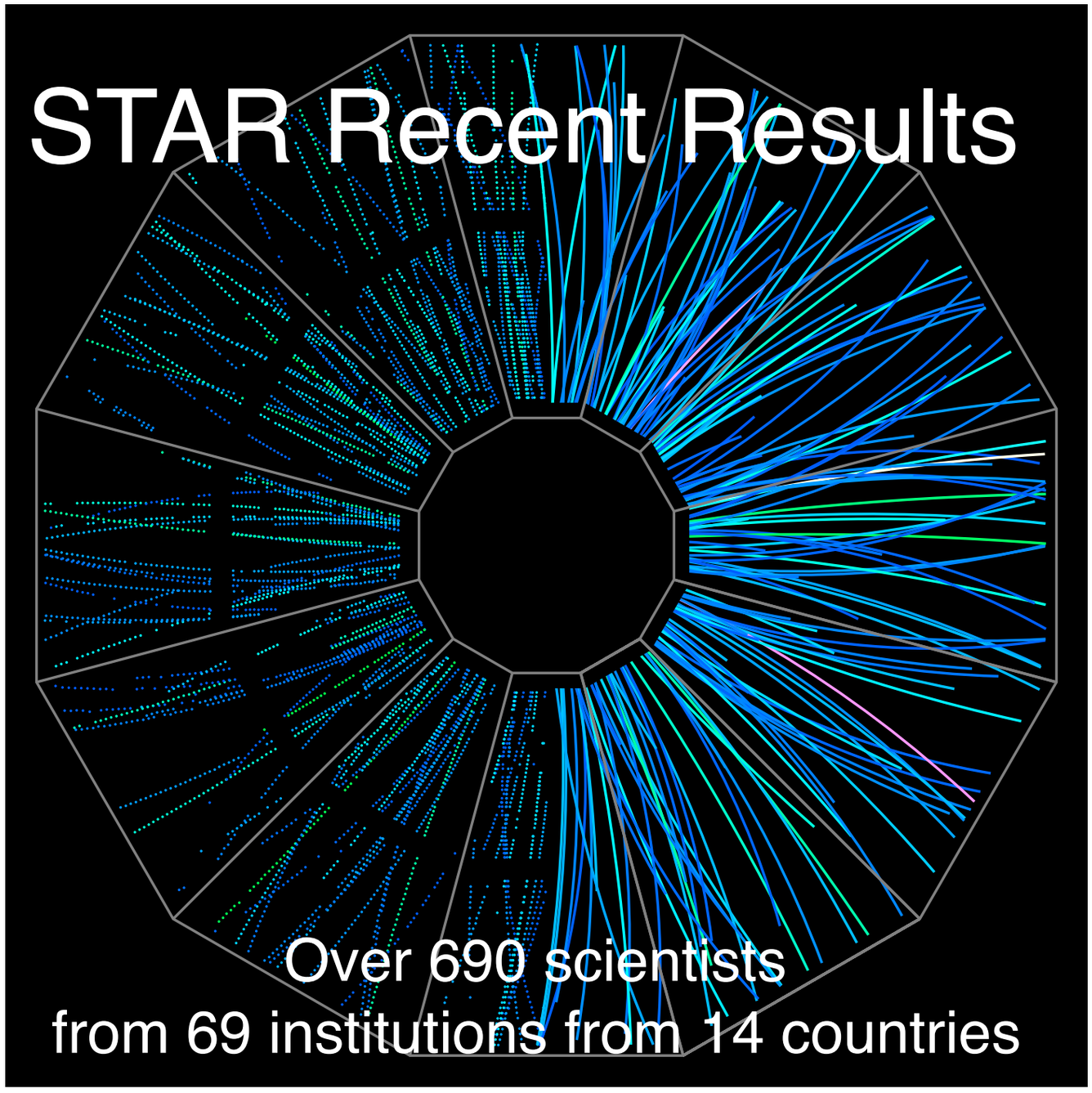
STAR Recent Results



- Status of STAR
  - Accomplishments
  - Publications and citations
- Highlights of recent results
  - Cold QCD
  - Heavy Ions
- Summary of Run-19
- Summary

Helen Caines - Yale - on behalf of the STAR Collaboration

Achievements: 2017-19

Ph.D. Theses: 21 (2017) 15 (2018), 9 (2019)

New Institutions:
Abilene Christian (USA), American University in Cairo (Egypt), Eotvos (Hungary), Fudan (China), Heidelberg (Germany), Huzhou (China), IISER Berhampuer (India), IIT Patna (India), IISER Tirupati (India), Rutgers (USA)

Awards and Recognition

Chinese Academy of Sciences:
Yu-Gang Ma (SINAP)

APS Fellows:
Helen Caines (Yale), Grazyna Odyniec (LBNL), Ernst Sichtermann (LBNL)

Humboldt Research Award:
Elke-Caroline Aschenauer (BNL)

BNL Science and Technology Award:
Elke-Caroline Aschenauer (BNL)

DNP 2019 Thesis Award:
Isaac Upsal (OSU)

2019 DoE Certificate of Appreciation (iTPC):
Flemming Videbaek

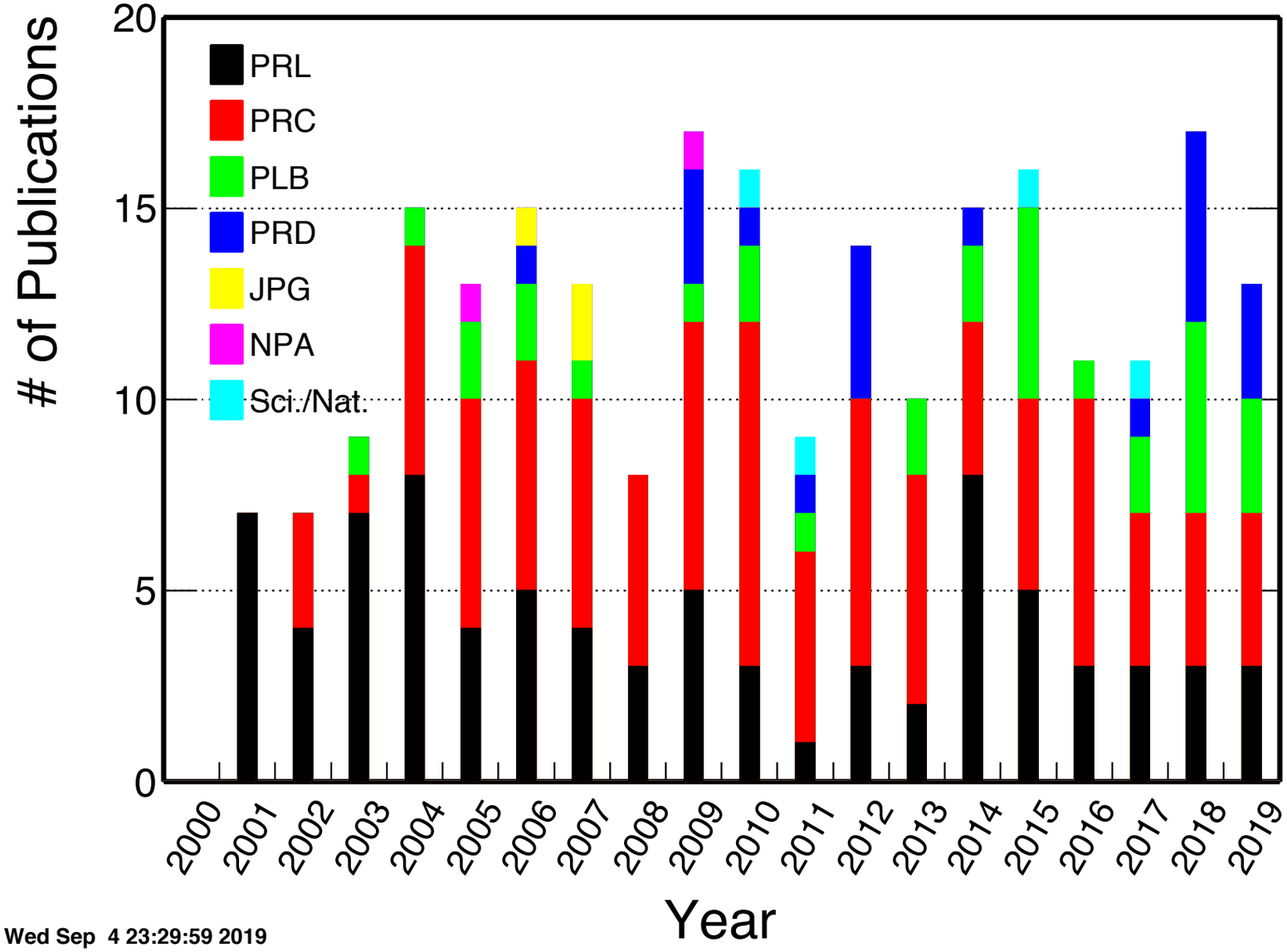
2017&18 RHIC/AGS Thesis Awards:
Zilong Chan (Texas A&M), Ting Lin (Indiana), Jan Rusnak (CTI), Prashanth Shanmuganathan (Kent State)

2017 Secretary of Energy Achievement Award:
STAR-BNL Group

2017 Top 100 Science Stories - Discover Magazine:
QGPs vorticity

DoE Science Highlights:
pion and (di)jet A_{LL}, W A_L, D^0 flow, Λ polarization

Publication record



>100 talks/posters presented so far this year

19 talks - Quark Matter 19

24 talks + 5 posters (CEU) - DNP conference

Continued strong publication and presentation record across all Physics Working groups

2018: 17 papers published 3 PRL, 5 PLB, 4 PRC, 5 PRD - Record publication year!

2019: 13 papers published/accepted 3 PRL, 3 PLB, 4 PRC, 3 PRD

8 papers in journal review

5 papers in collaboration review

30 (22+8) active GPCs

STAR citations

Citesummary excluding self-citations or RPP citations

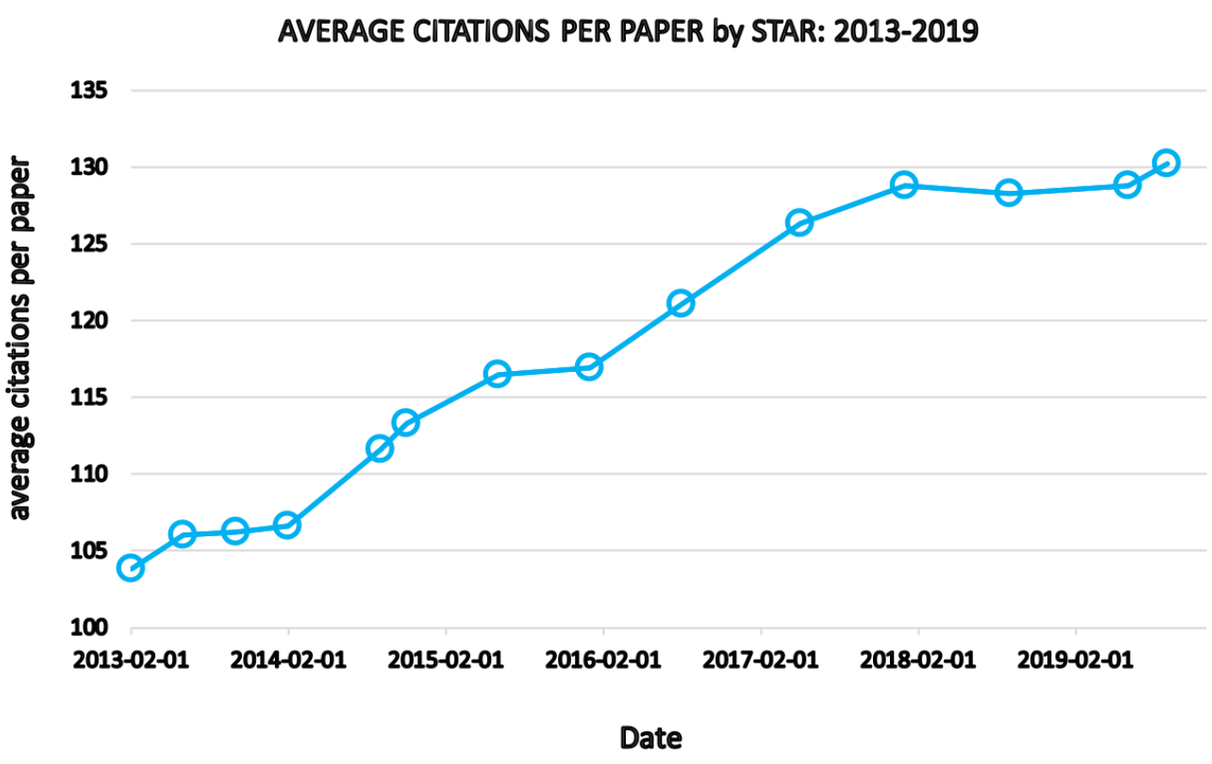
Generated on 2019-09-04

229 papers found, 229 of them citeable (published or arXiv)

Citation summary results	Citeable papers	Citeable papers excluding self cites
Total number of papers analyzed:	229	229
Total number of citations:	29,805	20,032
Average citations per paper:	130.2	87.5
Breakdown of papers by citations:		
Renowned papers (500+)	11	6
Famous papers (250-499)	20	11
Very well-known papers (100-249)	49	32
Well-known papers (50-99)	52	52
Known papers (10-49)	73	84

Citations (as per September 4, 2019)

- 29,805 citations
- 229 peer-reviewed scientific papers
- 2005 white paper: 2930
- average citations/paper: 130.2



Renowned and Famous Papers:

2019: 11 + 20

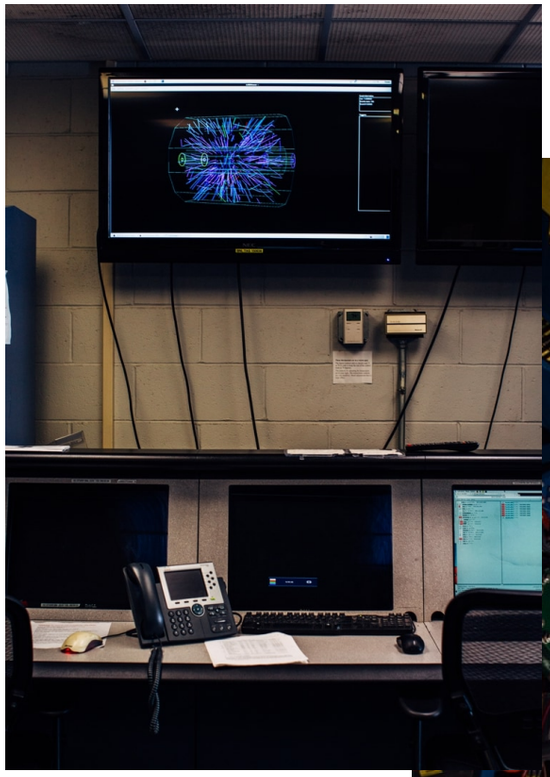
2018: 11 + 19

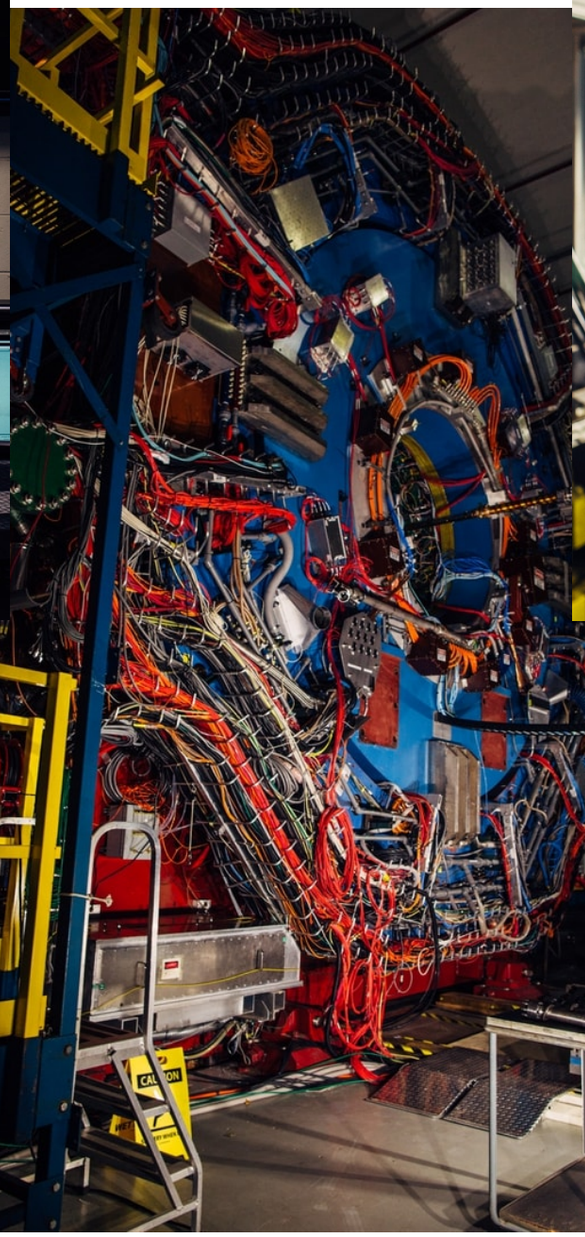
2017: 11 + 14

2016: 11 + 11

Continued steady growth in citations

Recent Highlights





Science Trip … discover the beauty, mystery, wildness and audacity of science.
- Washington Post
Aug 15 2019

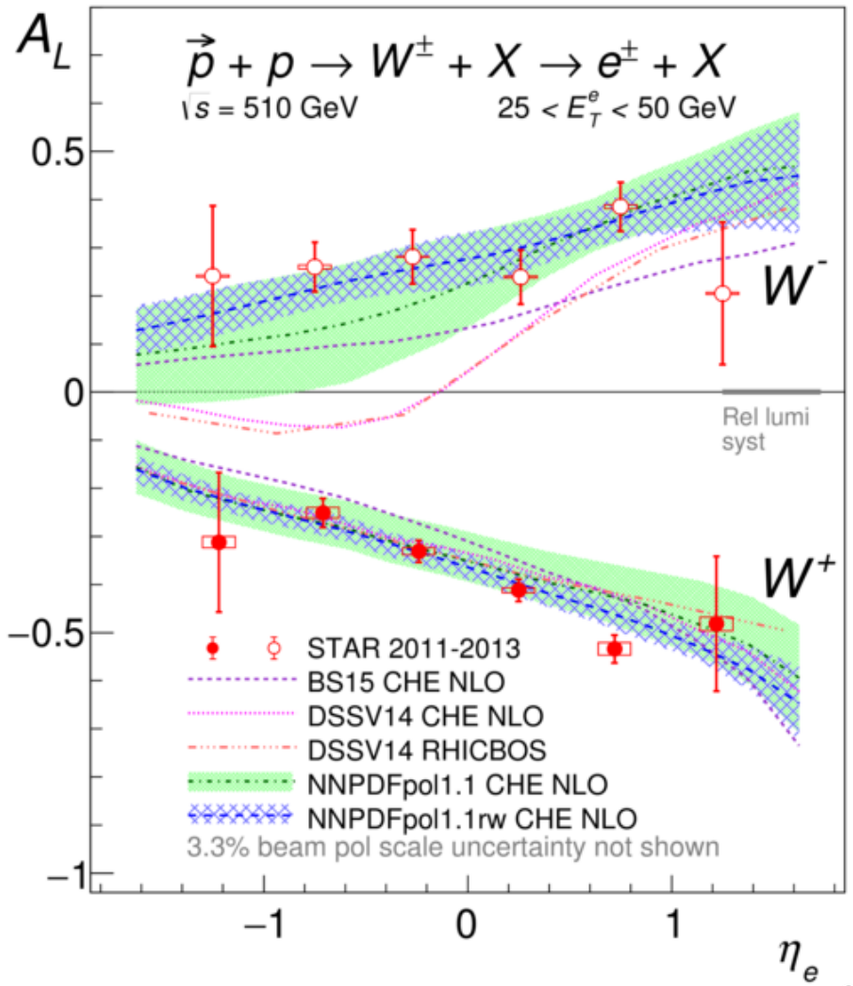
“and then comes the pièce de résistance, a $600 million marvel of engineering buried in a looping dirt berm 2.4 miles long

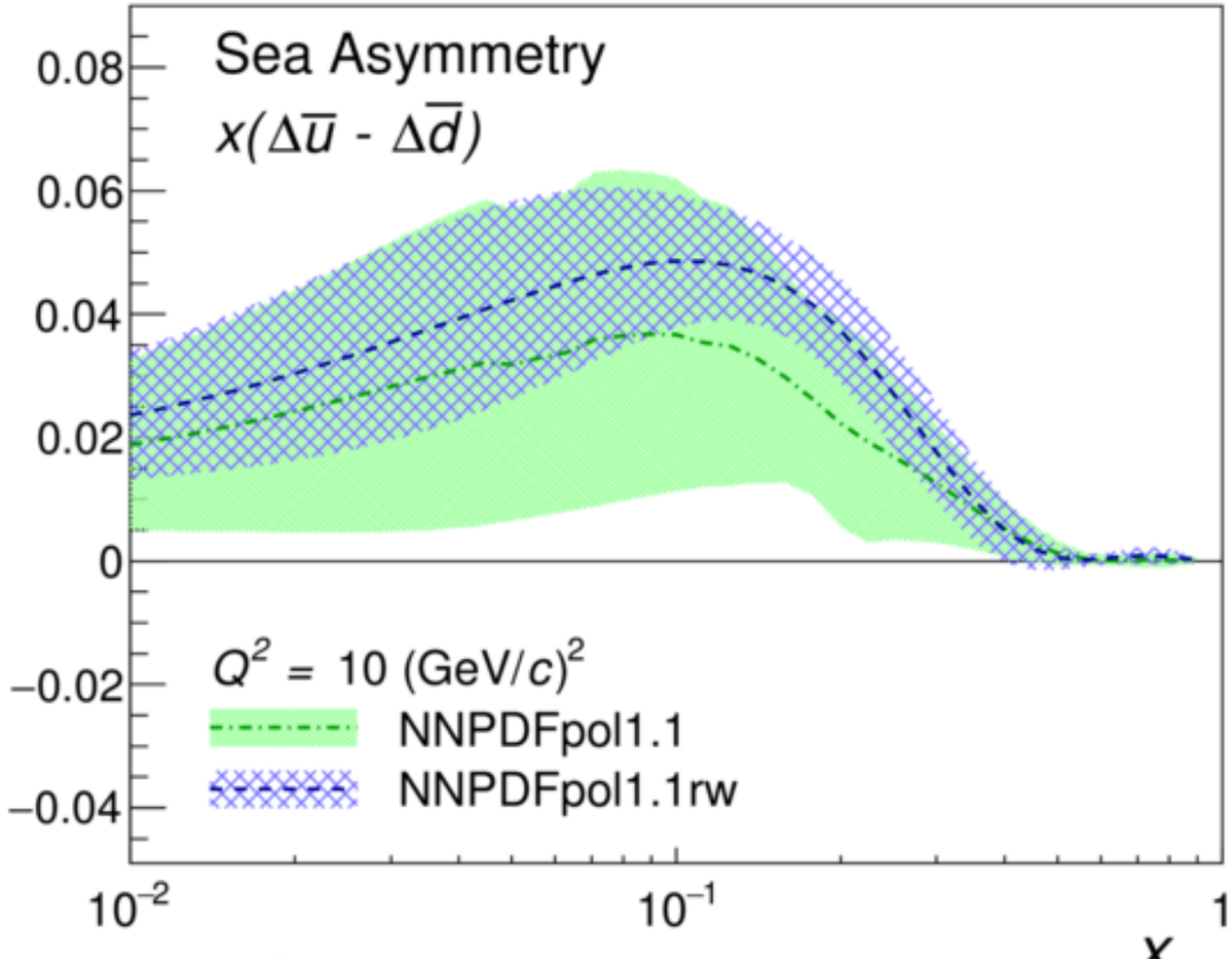
Behold the Relativistic Heavy Ion Collider.”

Sea quark contribution to proton spin

PRD **99** (2019) 051102

W± production access to flavored quark and anti-quark polarization





Significant preference for $\Delta\bar{u}(x, Q^2) > \Delta\bar{d}(x, Q^2)$ over 0.05 < x < 0.25 at Q^2= 10 (GeV/c)^2

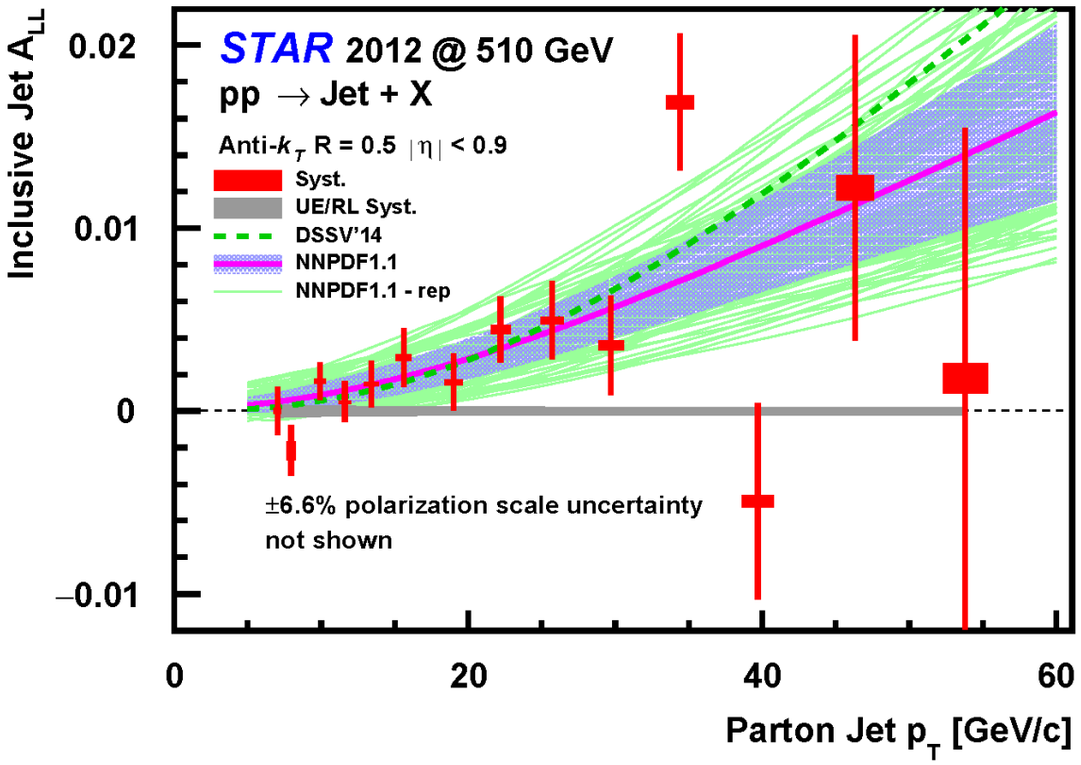
Opposite to flavor asymmetry observed in spin-averaged quark-sea distributions

Completion of NSAC Milestone HP8:"Measure flavor-identified q and contributions to the spin of the proton via the longitudinal-spin asymmetry of W production"

Significant press coverage - including science magazine

Probing gluon spin via inclusive jets and dijets

PRD **100** (2019) 052005



A_{LL} results sensitive of $0.015 < x < 0.2$

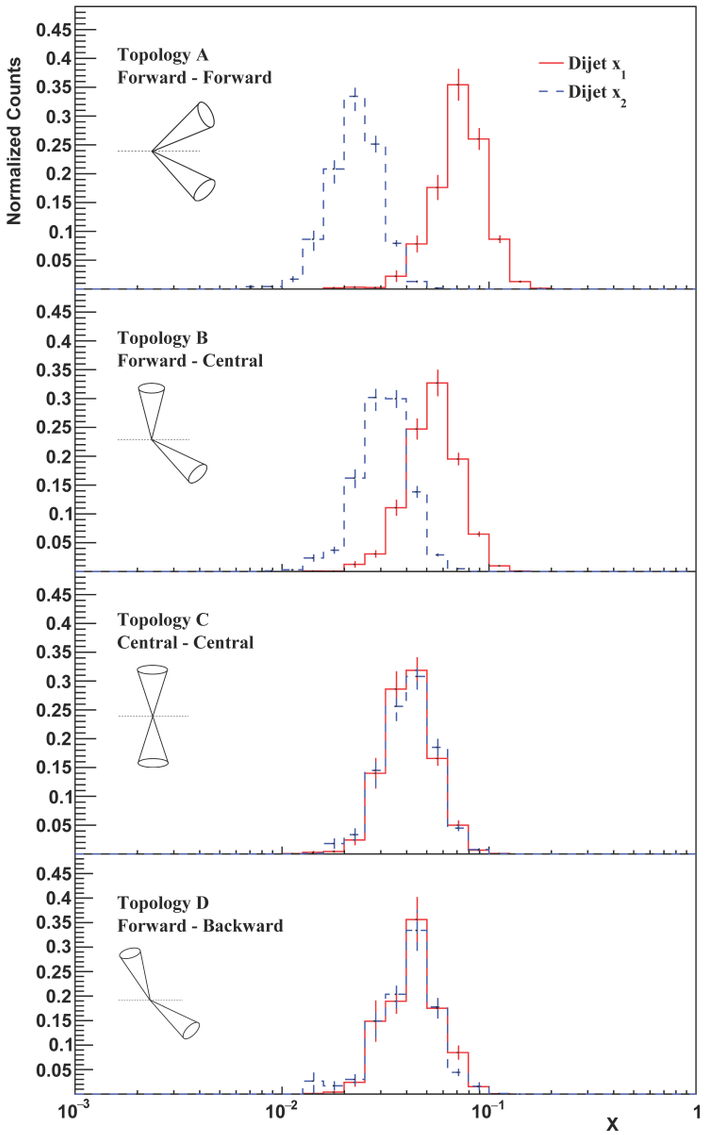
Inclusive jets: key new constraints on magnitude of gluon polarization

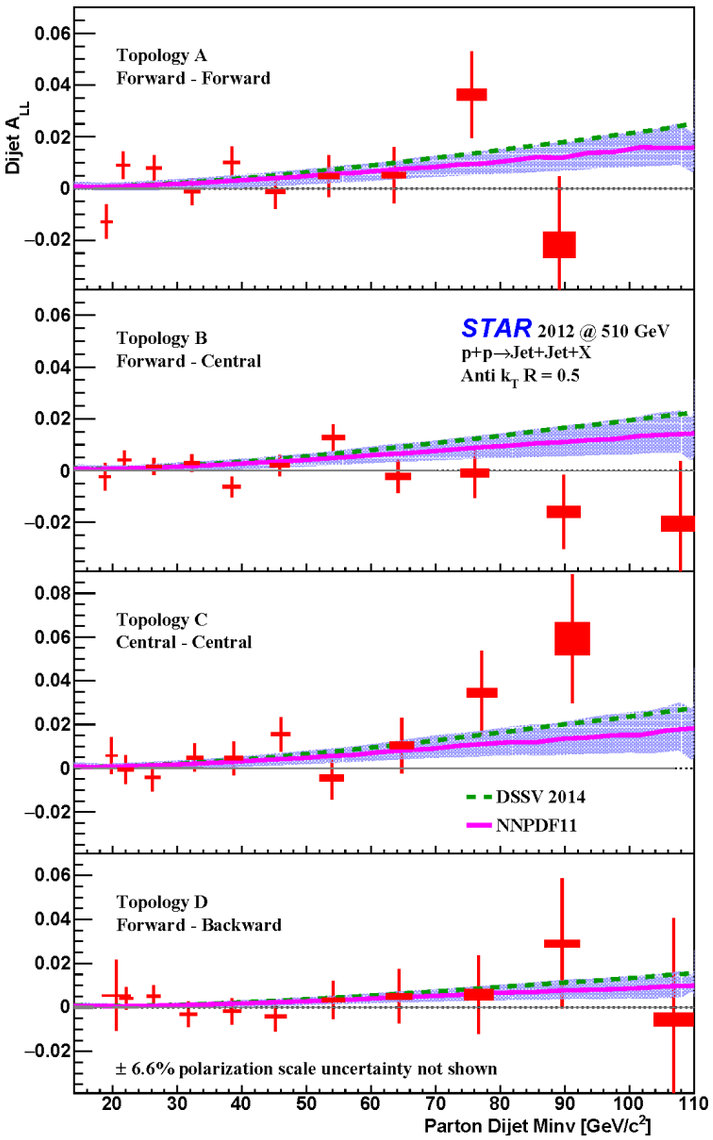
Dijets:

different topologies access different x regions

important new constraints on shape of $\Delta g(x)$

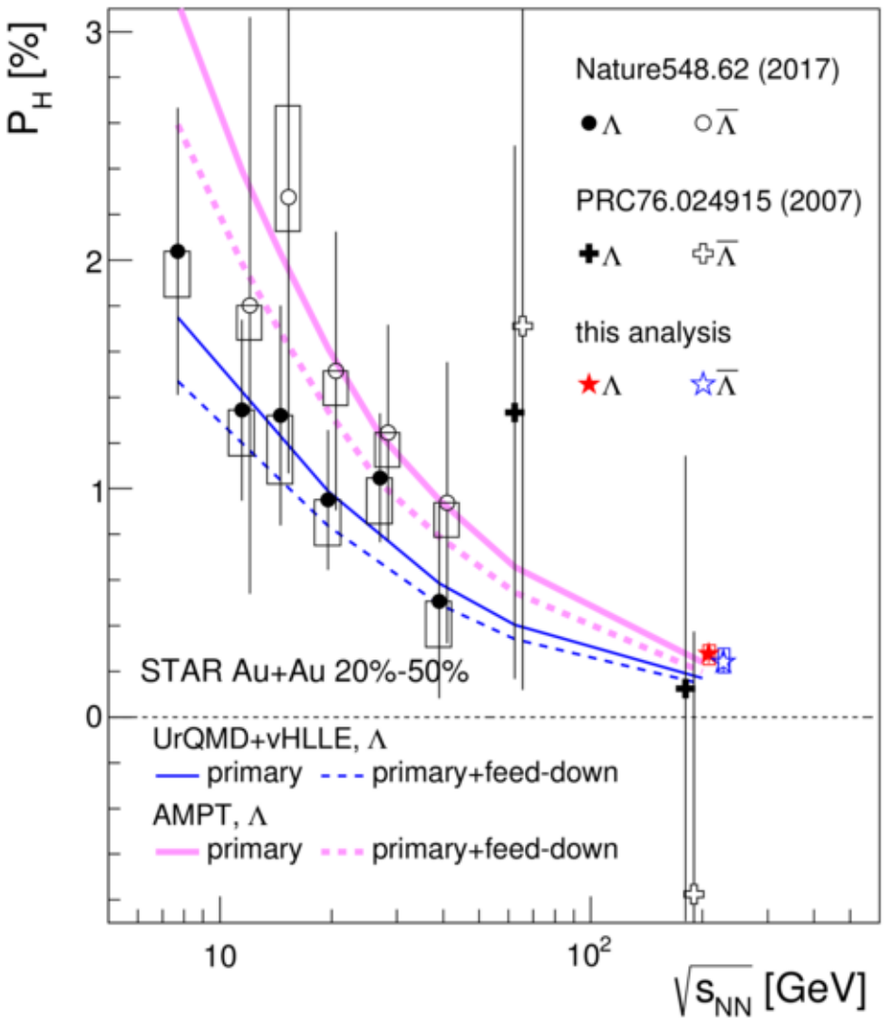
Region x <0.05 previously largely unconstrained by data in global analyses of polarized PDFs





Λ polarization in Au-Au at 200 GeV

PRC **98** (2018) 014910



arXiv: 1905.11917 accepted PRL

First observation of local quadrupole structure of polarization along beam direction

Opposite trend to AMPT predictions

- AMPT: X. Xia, H. Li, Z. Tang, Q. Wang, arXiv:1803.0086

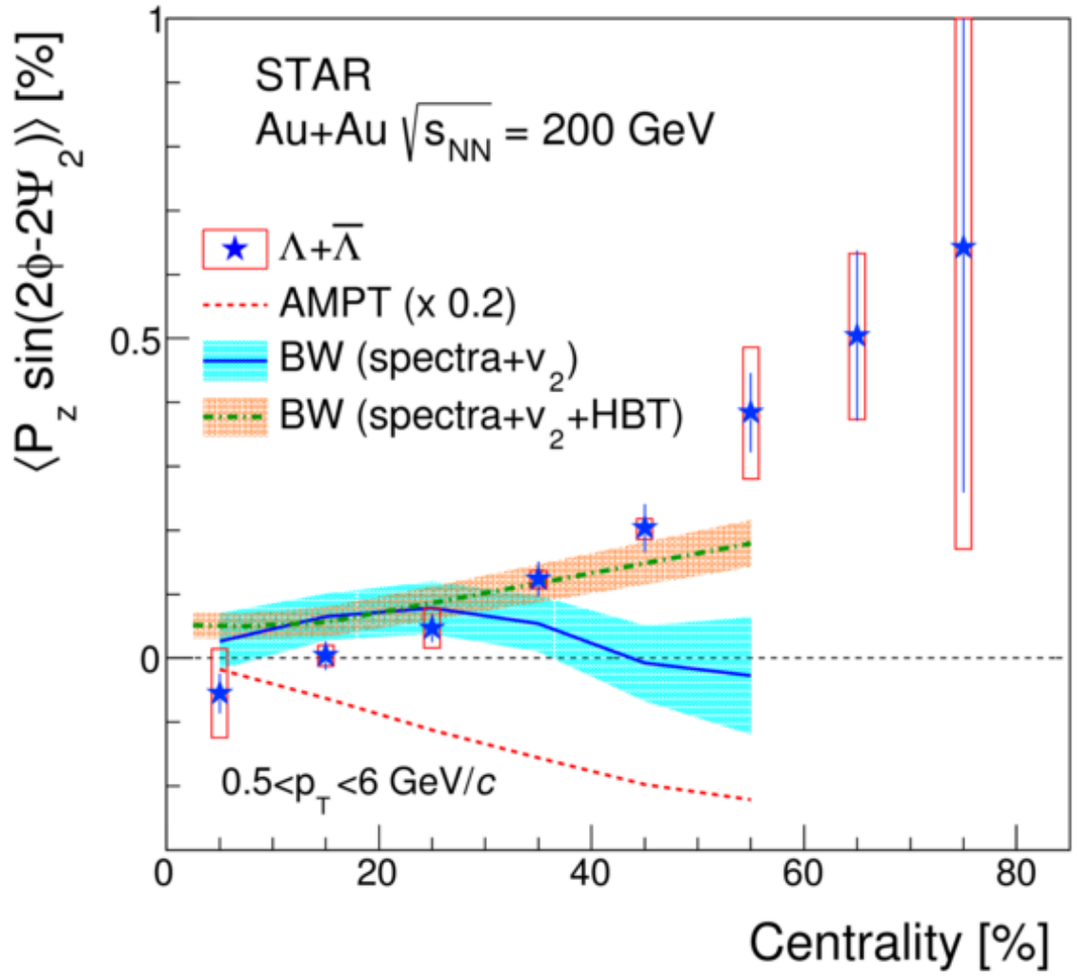
No significant p_T dependence

First direct observation of non-zero polarization at top RHIC energies

5-7σ significance

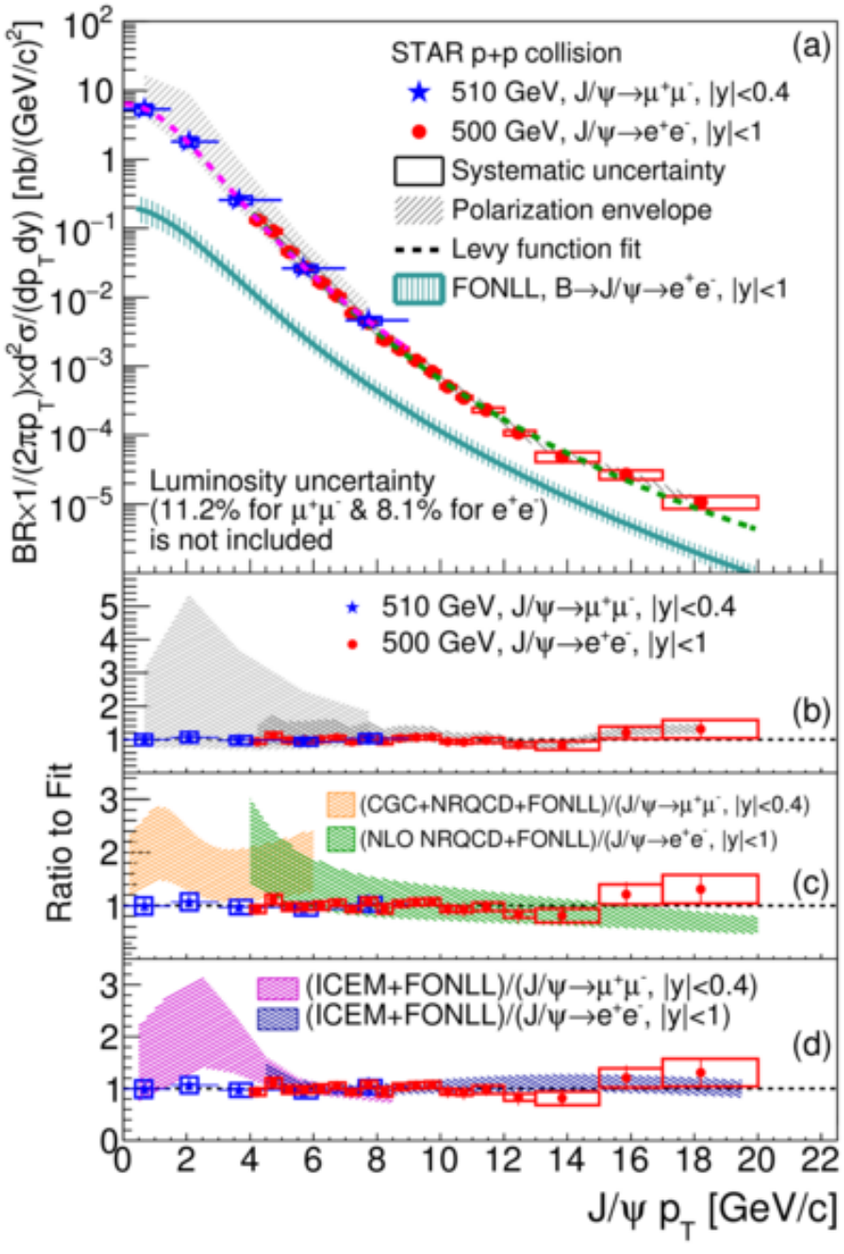
- comparable to 7.7-39 GeV combined result

Strong centrality dependence



J/ψ production in pp and Au-Au

arXiv:1905.06075, accepted PRD



pp differential cross-section reasonably reproduced by theory

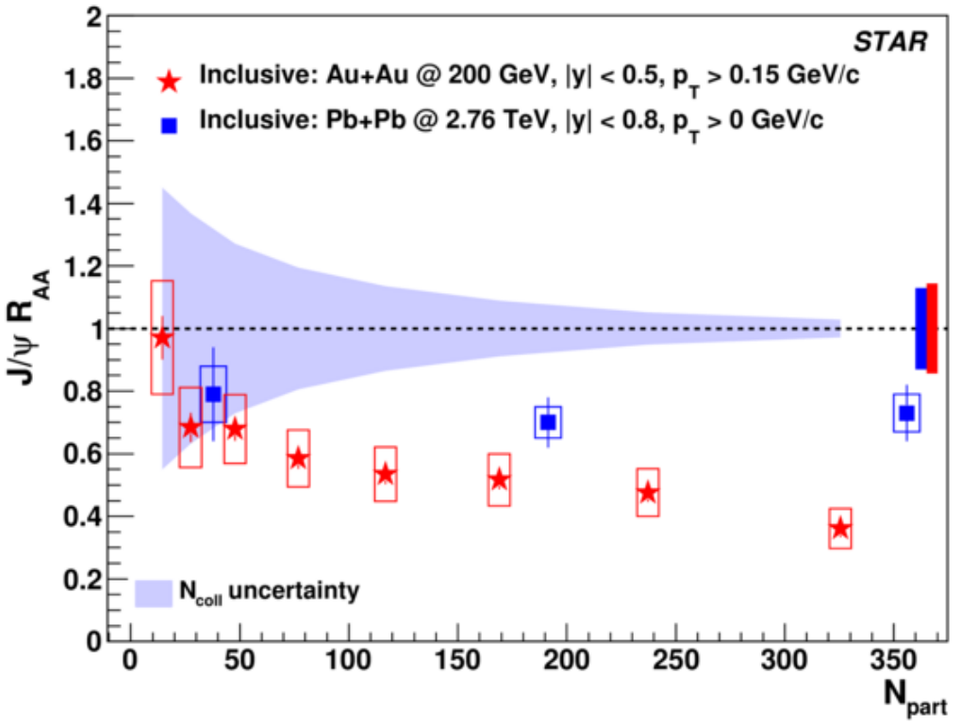
ψ(2S)/J/ψ - no obvious collision energy dependence

Increasing suppression with increasing centrality

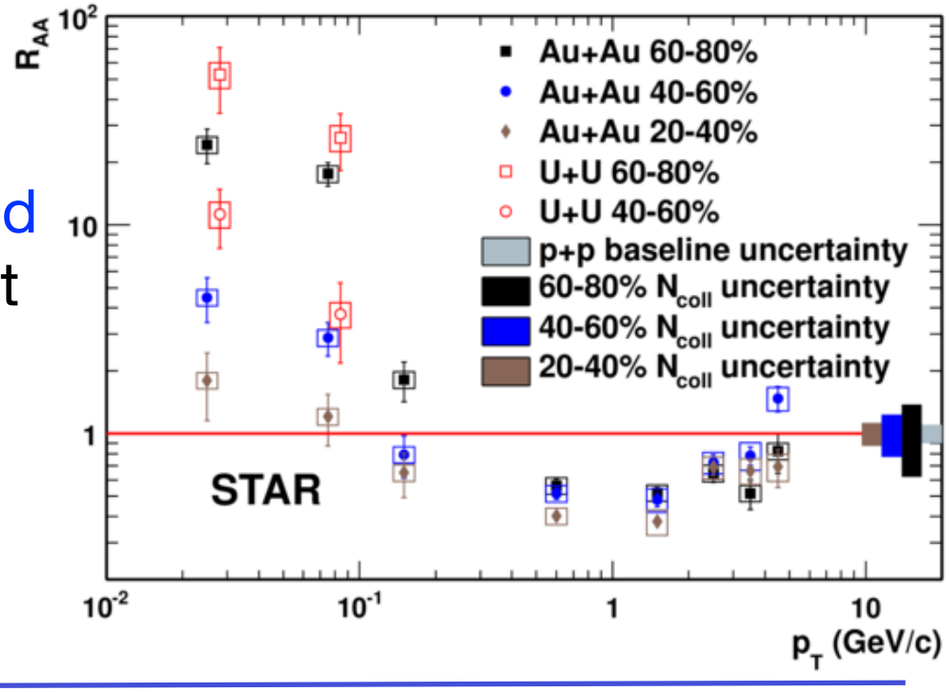
- Consistent with:
  - color screening at RHIC
  - Little to no $c\bar{c}$ recombination

Include MTD data from Run 13-16

Significant excess at low p_T in peripheral Au-Au and U+U collisions - Coherent photo-nucleus interactions?



arXiv:1904.11658, accepted PRL



Charm-medium interactions

PRC **99** (2019) 034908

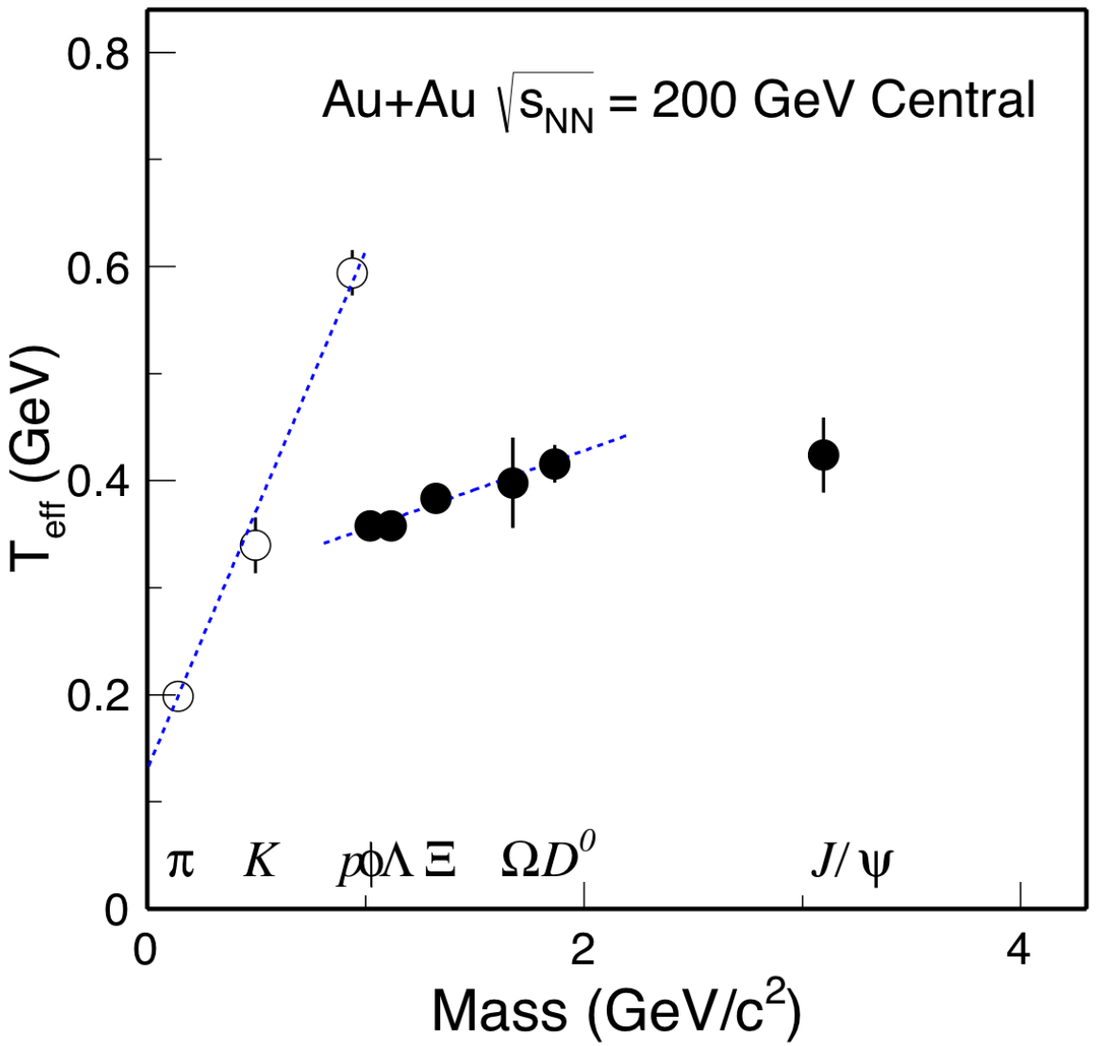
HFT data :

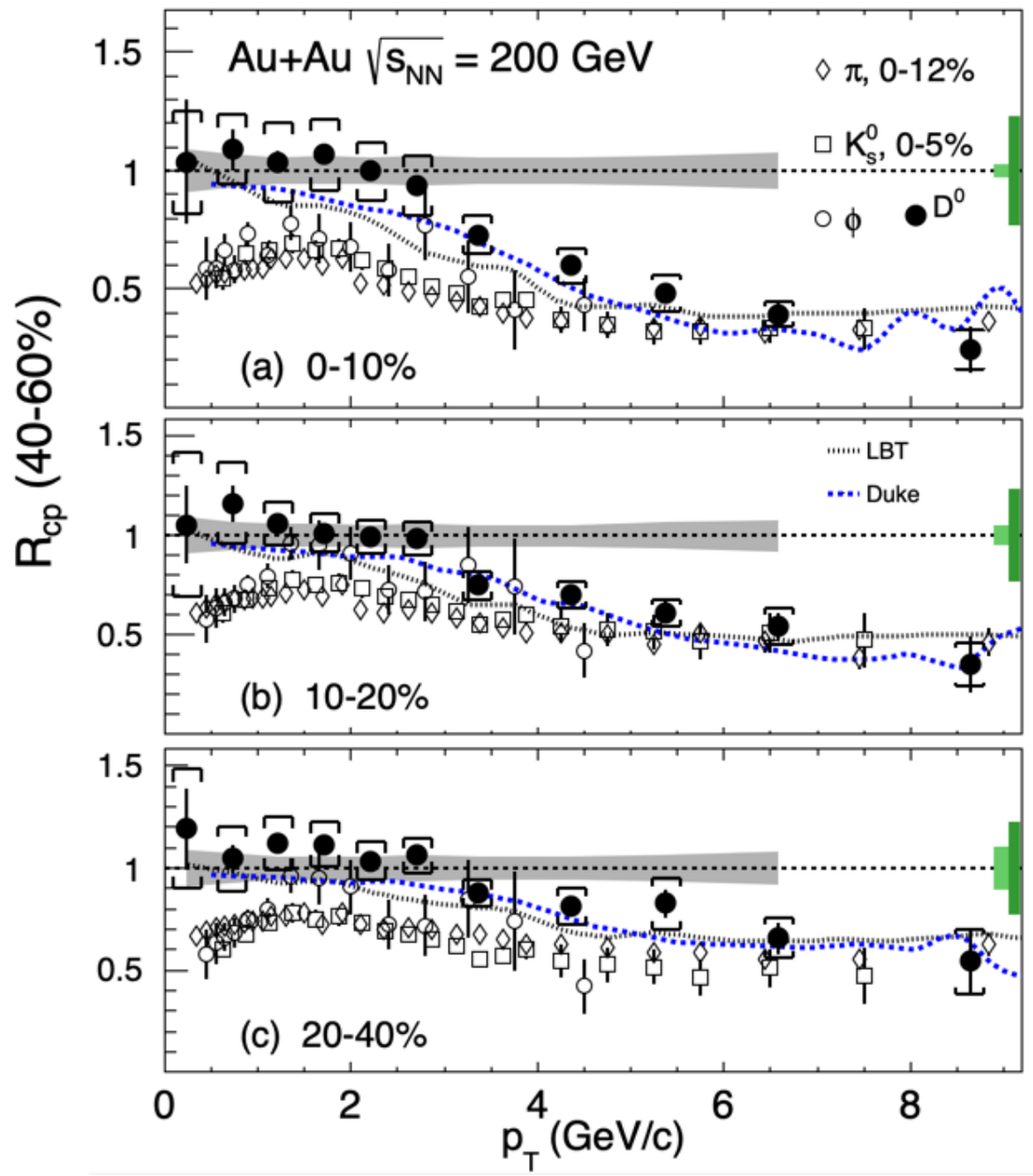
Greatly enhanced precision especially at low p_T

R_{CP}:

Comparable to light hadrons for p_T > 5 GeV/c

- charm quarks lose significant energy traversing QGP





D^0 gain less radial collectivity than π, K, p

Similar kinetic freeze-out as multi-strange particles

D^0 collectively flowing with medium but freeze-out from system early

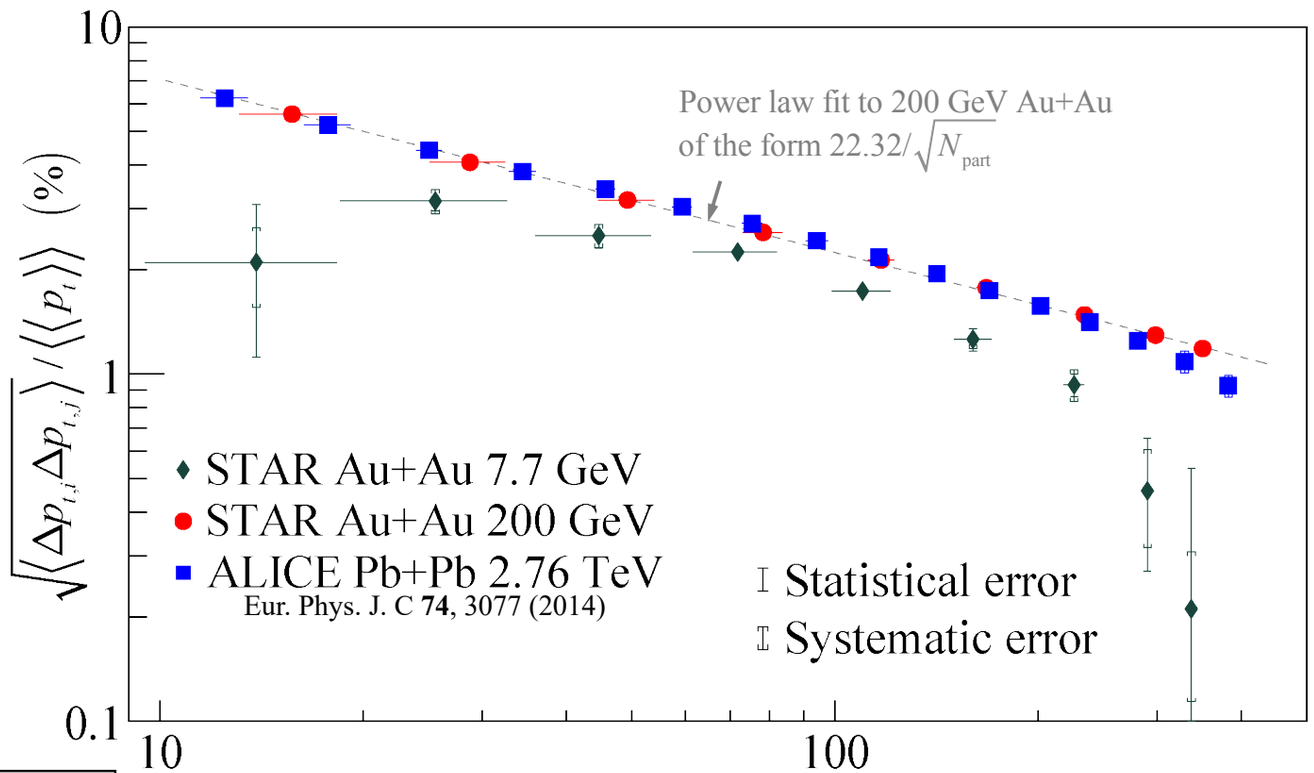
Partial thermalization of source

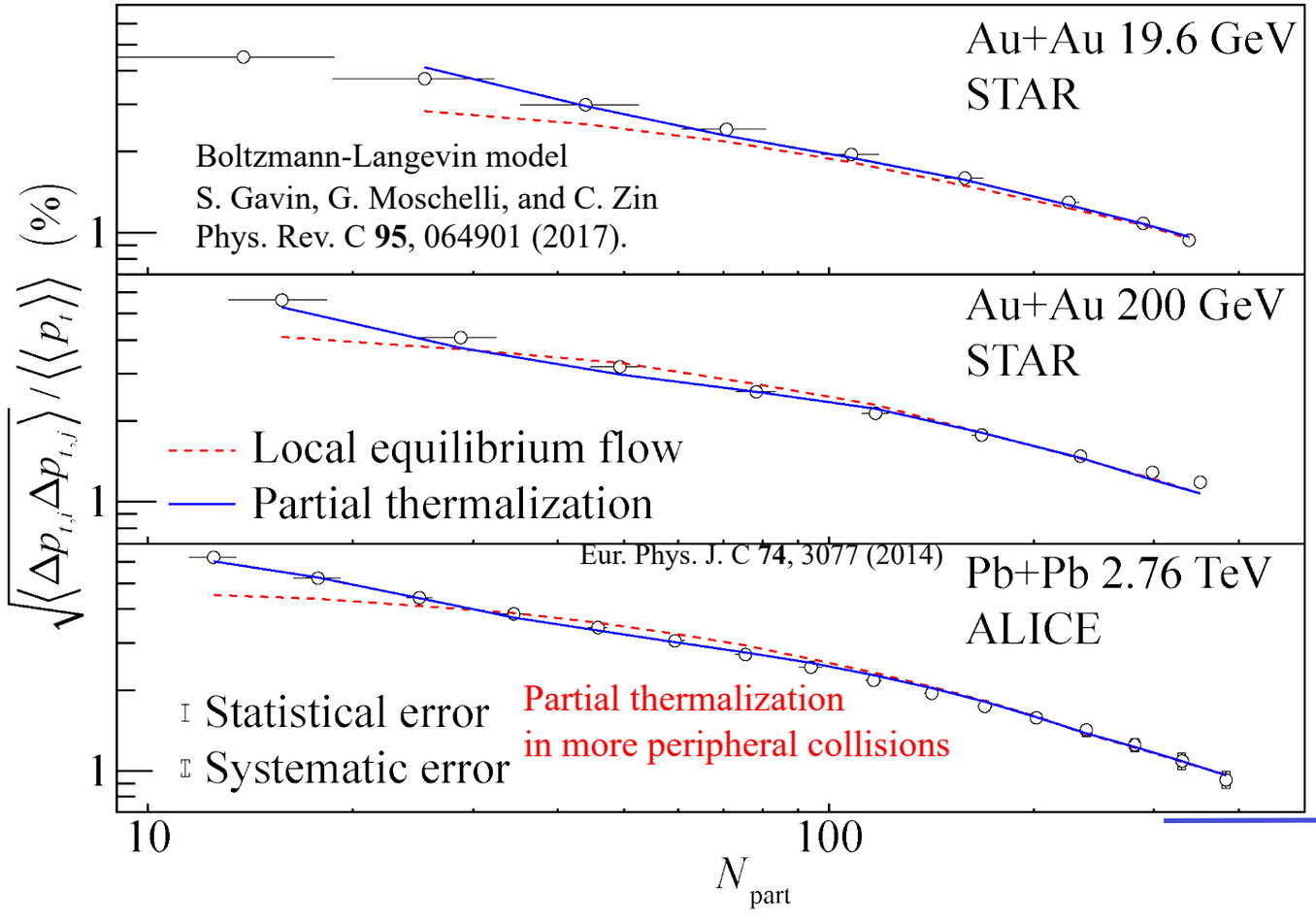
PRC **99** (2019) 44918

Relative dynamical correlations scale as $1/(N_{part})^{1/2}$ for 200 and 2.76 TeV data

- particle production from uncorrelated sources

Power-law scaling breaks for 7.7 GeV data





Evidence for only partial thermalization in peripheral events

Theory calculations needed for lower √s

No non-monotonic behavior observed as function of beam energy

Constraining initial conditions

PLB 790 (2019) 81

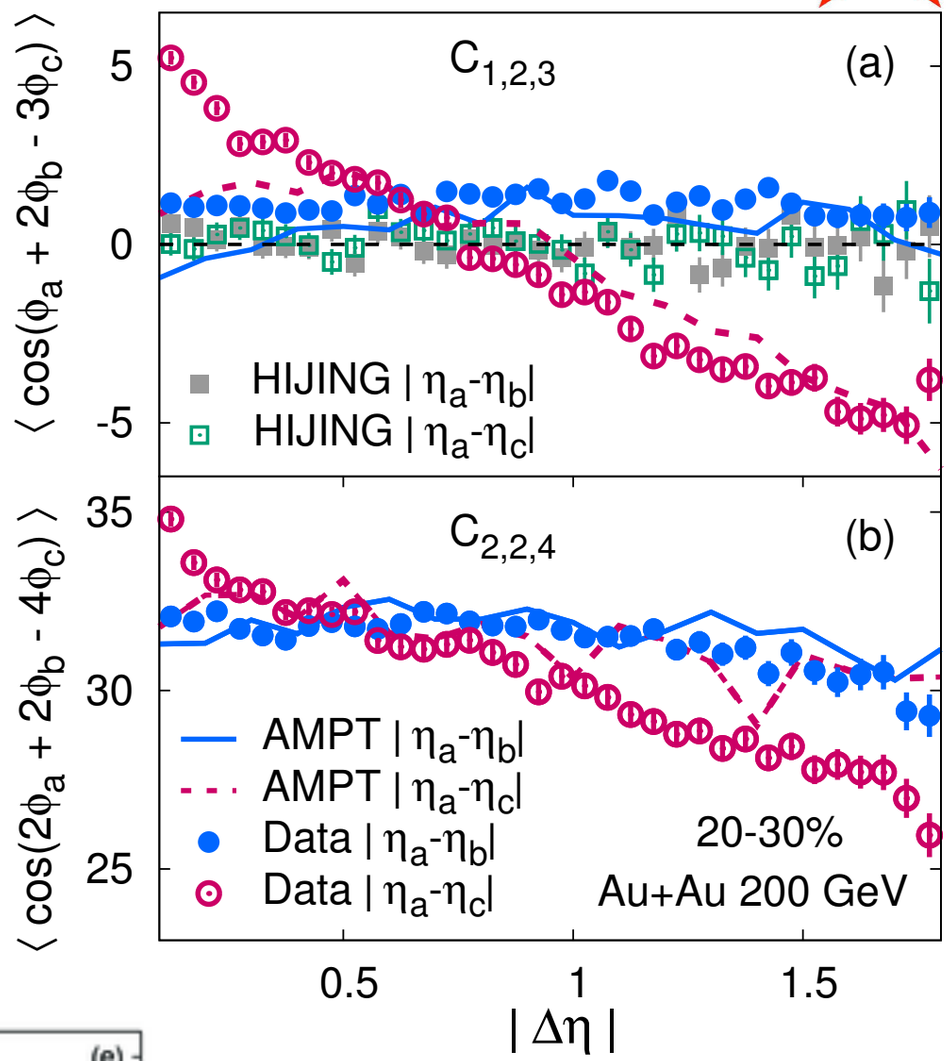
3-particle mixed-harmonic correlations

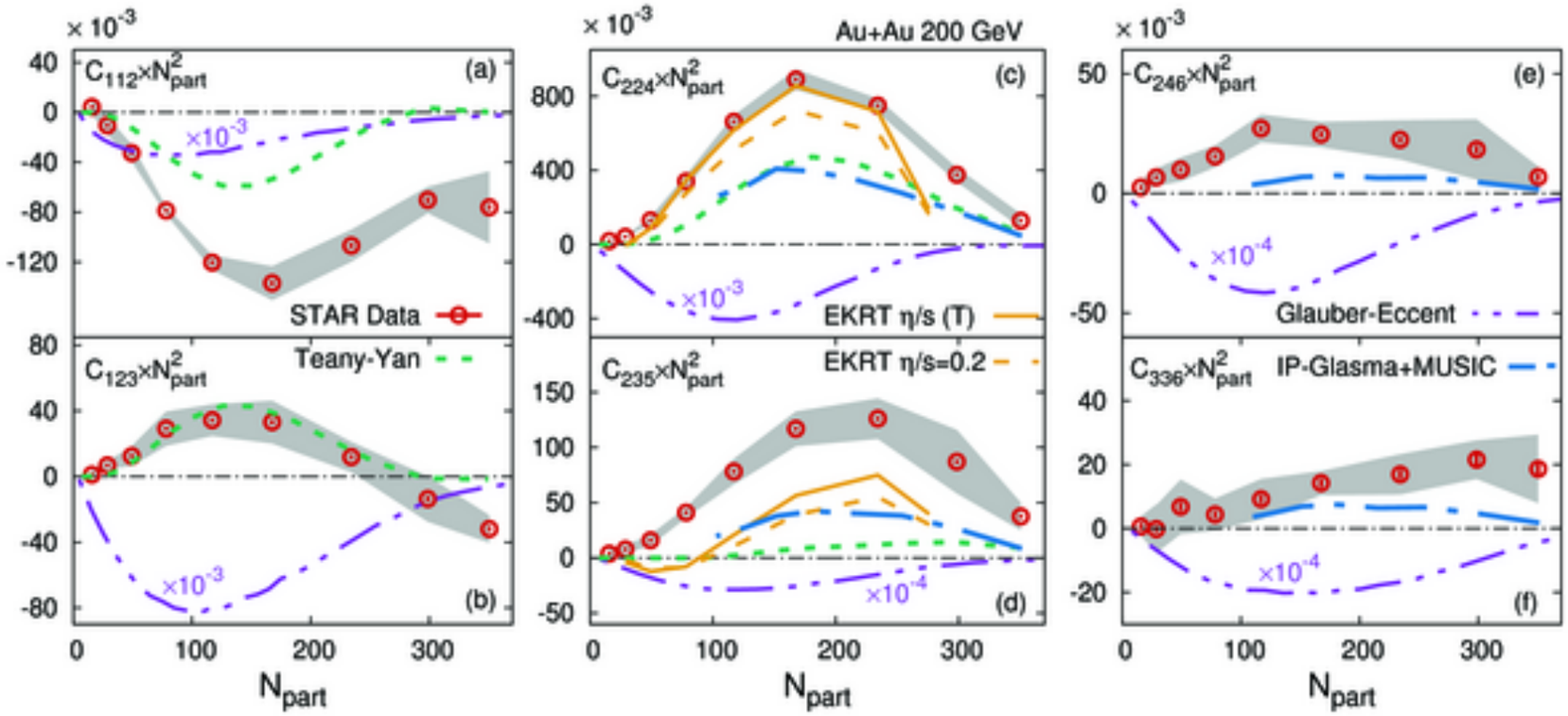
$C_{m,n,m+1} = \langle \cos(m\varphi_a + n\varphi_b - (m+n)\varphi_c) \rangle$

$m, n = 1-3$

Inform on 3-D structure of initial collision zone and its fluctuations

Δη dependence - longitudinal invariance broken?





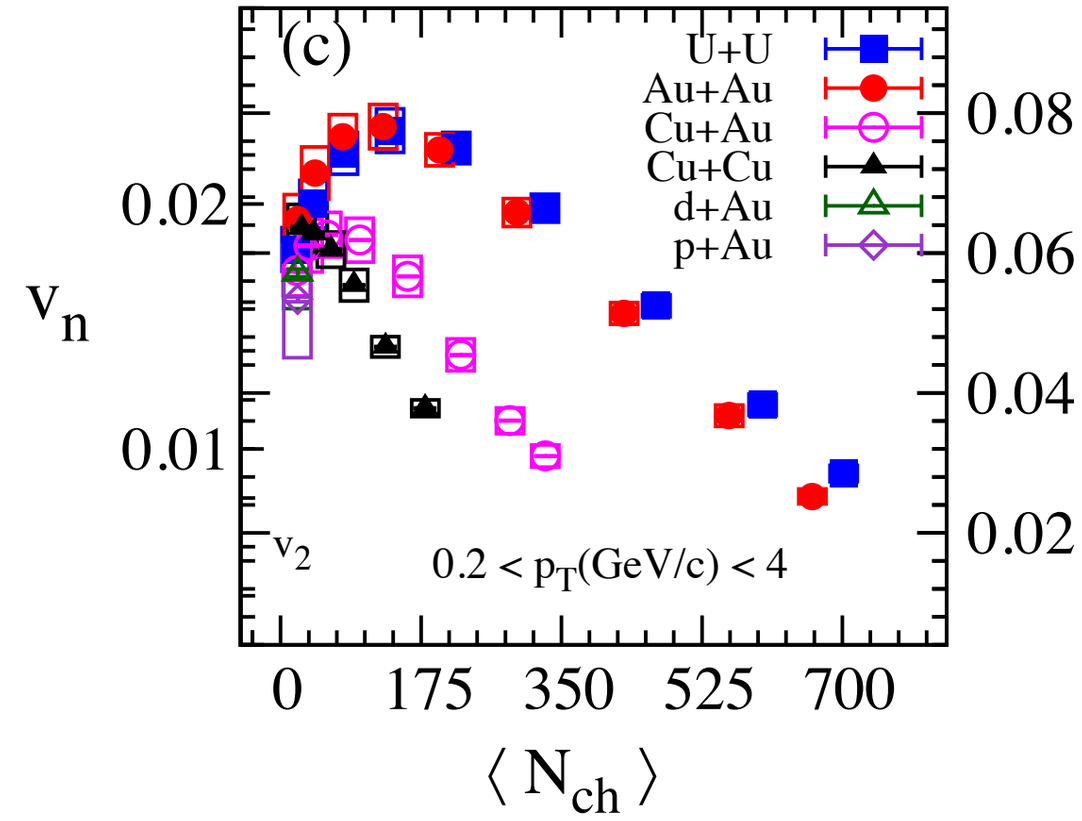
Boost-invariant hydrodynamic models constrained by global data

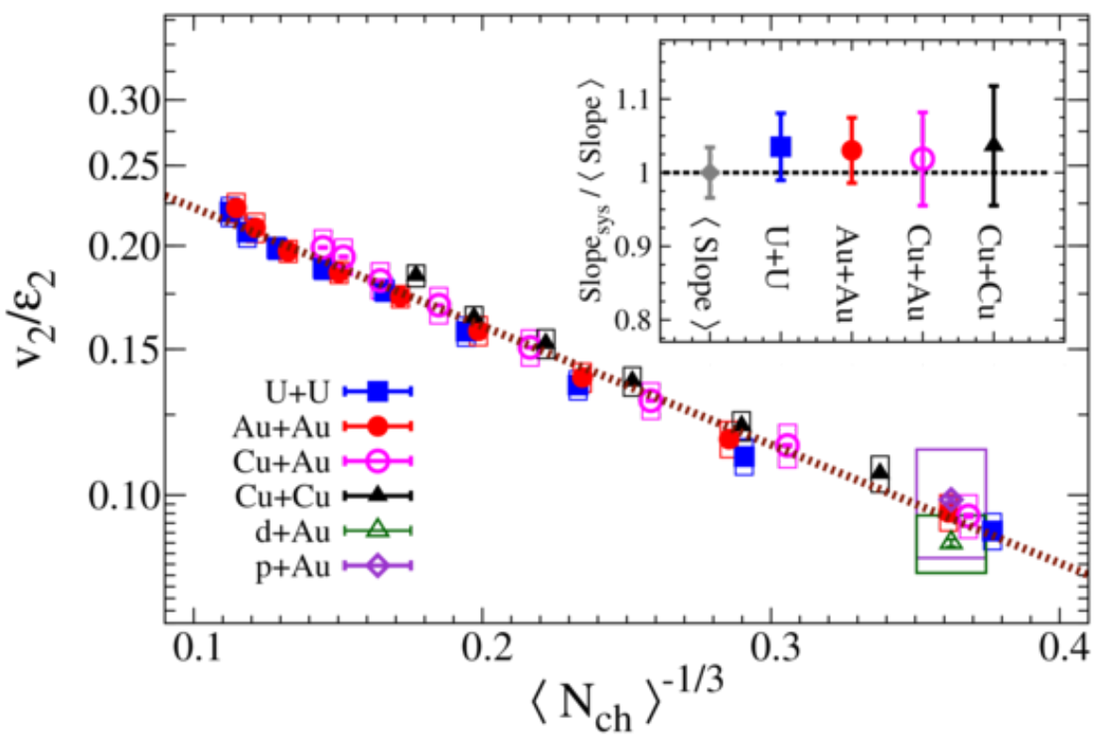
None good match to all data

Constrain T-dependence of transport coefficients

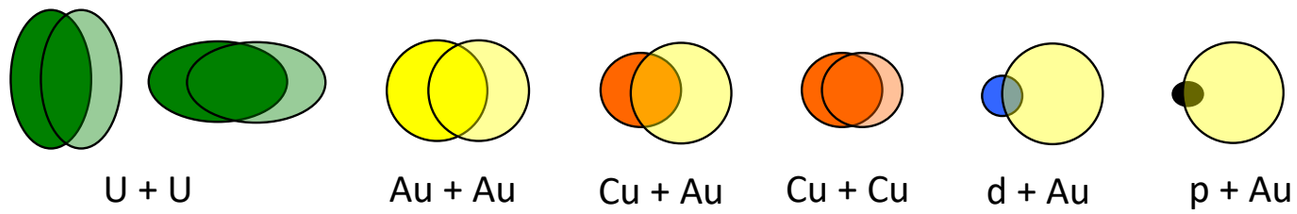
Constraining system size dependence

PRL 122 172301 (2019): First Run-15 publication





Azimuthal harmonics in large & small systems



v_2 system dependent

- for fixed N_{ch} strong dependence of ε_2 on system

$\ln(v_2/\varepsilon_2)$ scales with $N_{ch}^{-1/3}$ independent of system

Different species —> Differing initial state effects and transport coefficients

Constraining hadron production models

PRC **100** (2019) 14902

Correlated production of two different conserved charges, crucial tests for hadronic models

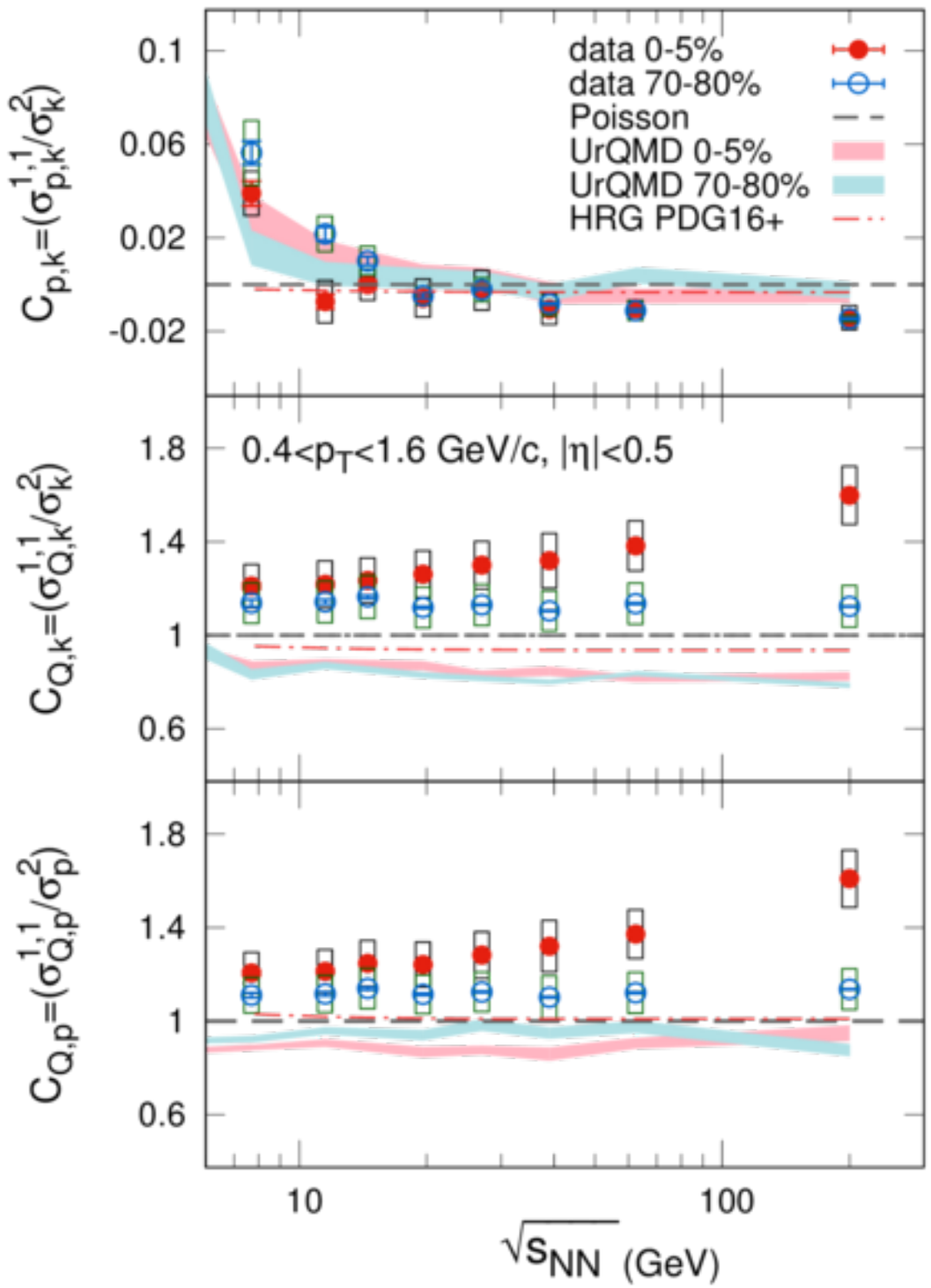
Baryon-strangeness correlations

$C_{p,k,}$ = off-diagonal cumulants/diagonal cumulants (Remove trivial volume dependence)

HRG considerations
Λ(1520)→p+K
increases net-proton, decreases net-kaon
—> anti-correlation
—> negative $C_{p,k}$ at lower energies

Data - negative at high beam energies
- positive at low beam energies

UrQMD and HRG:
- positive, or consistent with 0, for all beam energies



Production from QGP and hadronic phases not well modeled

Nucleon freeze-out volume

PRC **99** (2019) 64905

Broad minimum: implications for change in equation of state?

Light nuclei: final state coalescence

Invariant yield nuclei ∝ invariant yield nucleons

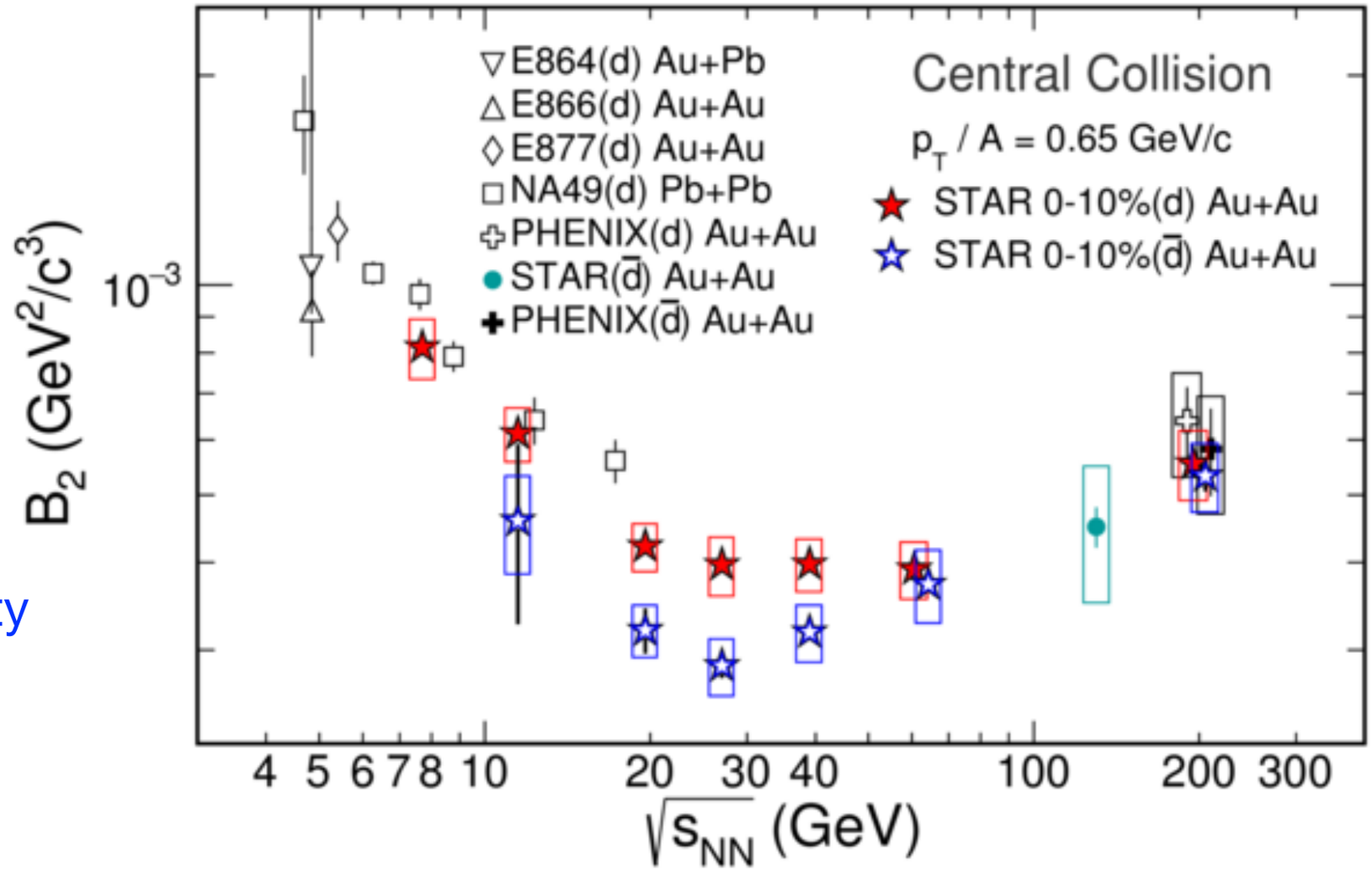
$$E_A \frac{d^3N_A}{d^3p_A} \approx B_A \left(E_p \frac{d^3N_p}{d^3p_p} \right)^A$$

B_A

Reflects probability of nucleon coalescence

Related to local nucleon density

$$B_2 \propto V_{eff}$$



$20 < \sqrt{s_{NN}} < 40$ GeV :

B_2 : anti-deuterons < deuterons

Correlation volume : anti-deuterons > deuterons

Evidence for bound proton-Ω states

PLB 790 (2019) 490

Ratio of peripheral/central collisions:

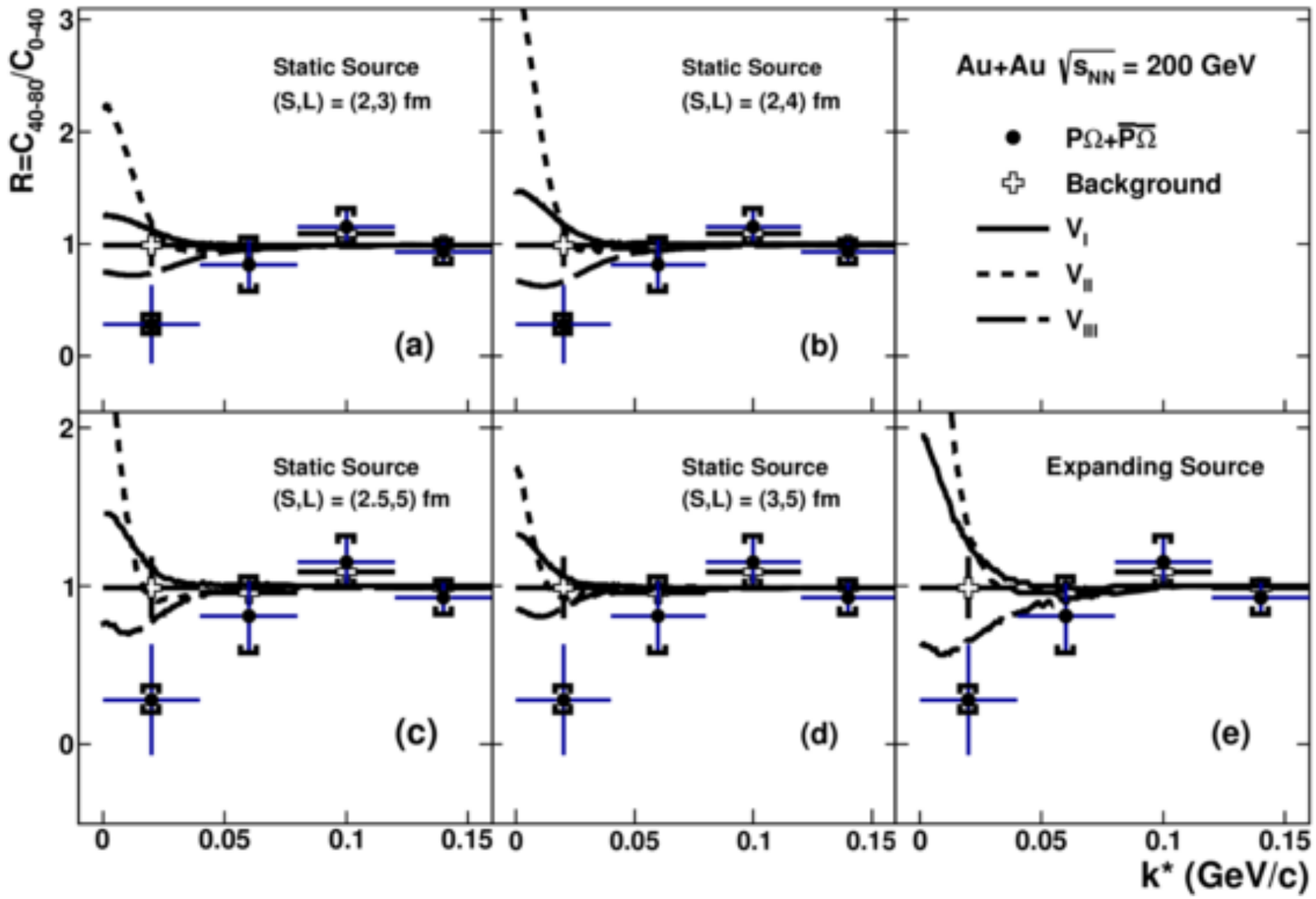
Sensitive to presence of a nucleon-Ω bound state

Less sensitive to Coulomb interaction

k* < 40 MeV/c:

Data < 1
Background = 1

Best agreement with expanding source and interaction potential V_{III}



Spin-2 pΩ potentials	V_I	V_{II}	V_{III}
$\mathbf{E_b}$ (MeV)	-	6.3	26.9
$\mathbf{a_0}$ (fm)	-1.12	5.79	1.29
$\mathbf{r_{eff}}$ (fm)	1.16	0.96	0.65

Slight favoring for bound system with a binding energy of ~27 MeV

Publications coming soon

Submitted papers:

Beam-energy dependence of identified two-particle angular correlations in Au+Au collisions

Charge-dependent pair correlations relative to a third particle in p+Au and d+Au collisions at RHIC

Observation of D^0 directed flow in 200 GeV Au+Au collisions at RHIC

Measurement of jet correlation devoid of flow background in Au+Au collisions at 200 GeV

Bulk properties of the system formed in Au+Au collisions at $\sqrt{s_{NN}}$ =14.5 GeV using the STAR detector at RHIC

Strange hadron production in Au+Au collisions at $\sqrt{s_{NN}}$ =7.7, 11.5, 19.6, 27 and 39 GeV

Precise measurement of mass difference and binding energy B_Λ of hypertriton and anti-hypertriton

Measurements of dielectron production in Au+Au collisions at $\sqrt{s_{NN}}$ =27, 39 and 62.4 GeV from the STAR experiment

Papers aiming for submission by QM:

CME studies in p+A

Probing EM field with di-leptons

First FXT results

Net-proton fluctuations

Inclusive jet R_{AA}

Λ_C production

Underlying event in pp

Splitting functions in pp

Isobar CME analyses

Ru+Ru 10% larger B-field but otherwise similar conditions as for Zr+Zr

3.1B events each for Isobar

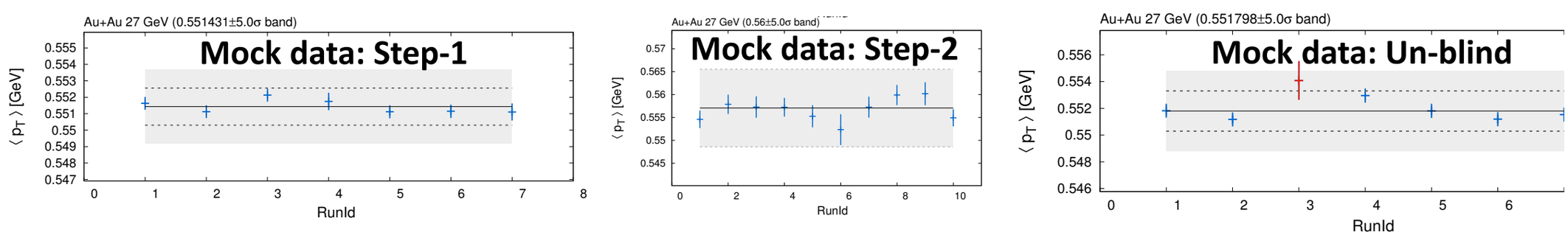
GPC already formed to allow rapid publication of final results

Blind Analysis Plan and Status

Analysis Blinding Committee recommendation: https://drupal.star.bnl.gov/STAR/starnotes/private/ps

- *A draft of the recommendation is written for submission to the arXiv*

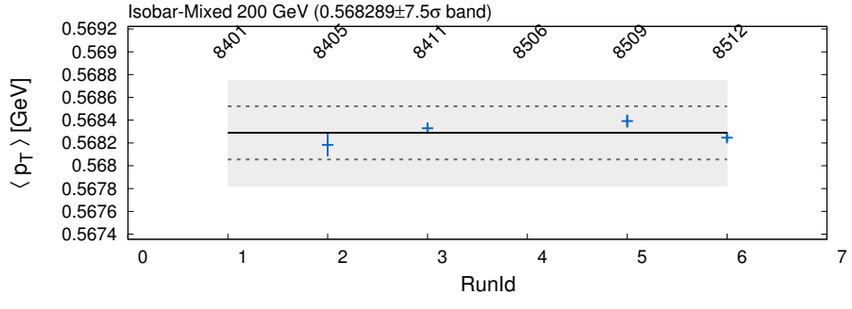
Initial steps: "Mock data challenge" *Sanity-check of feasibility and implementation*



- *Au+Au 27 GeV data produced and analyzed in same way as blind isobar analysis*

Step-1: Provided output files composed of events from a ***mix*** of the isobar species

- *Production and analysis Q/A underway*

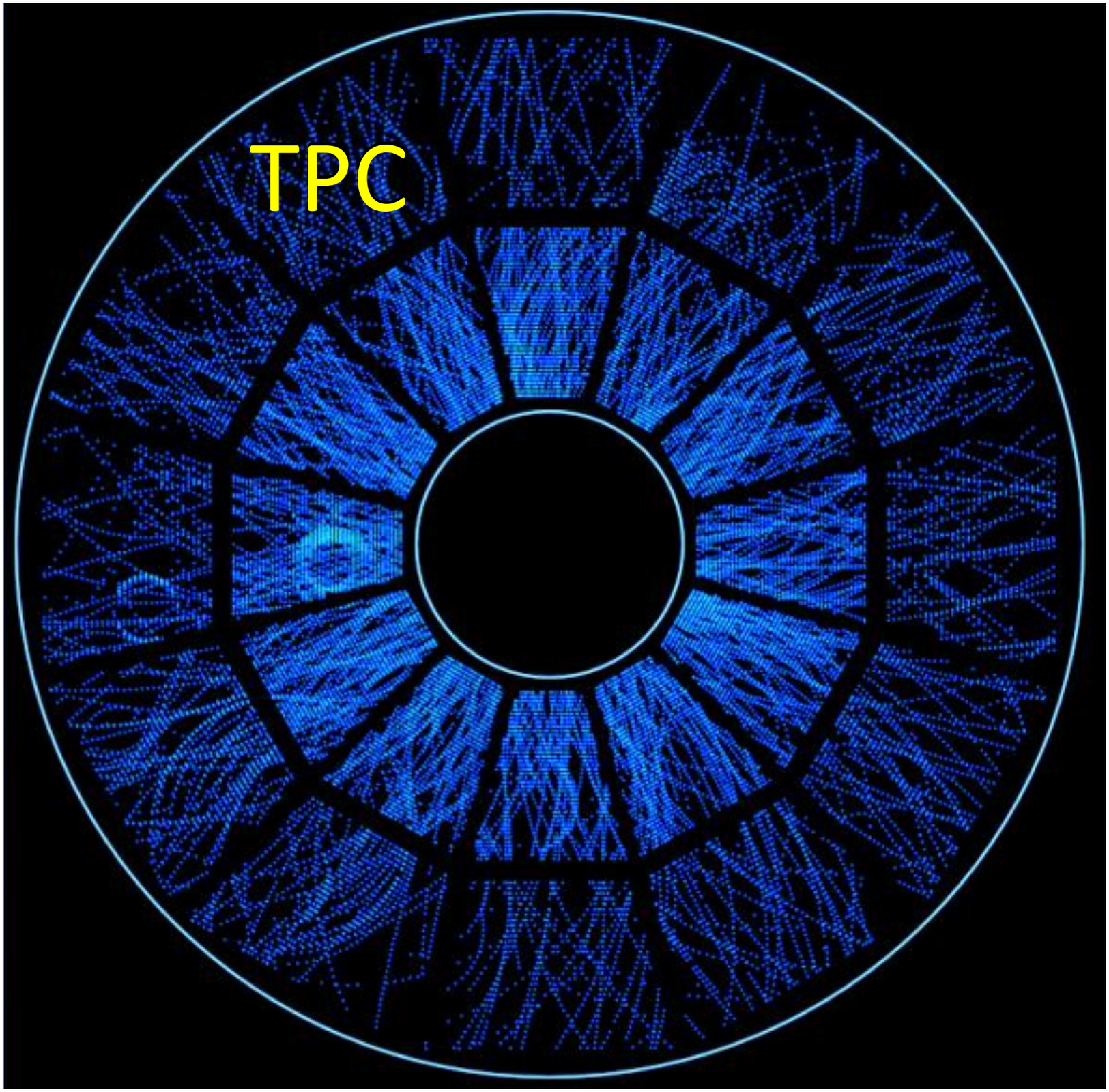


Step-2: Provide files that obscure true runnumber but do ***not*** mix events across different runs

- Only allow run-by-run corrections and code alteration directly resulting from these corrections

Full un-blinding

Run-19
BES-II
begins



Run 19 - Overall went very well

Took

19.6 - 580 M “good” minbias

14.6 - 324 M “good” minbias

200 - 138 M “good” minbias

9.2 - 1.0 M “good” minbias

7.7 - 2.9 M “good” minbias

FXT:

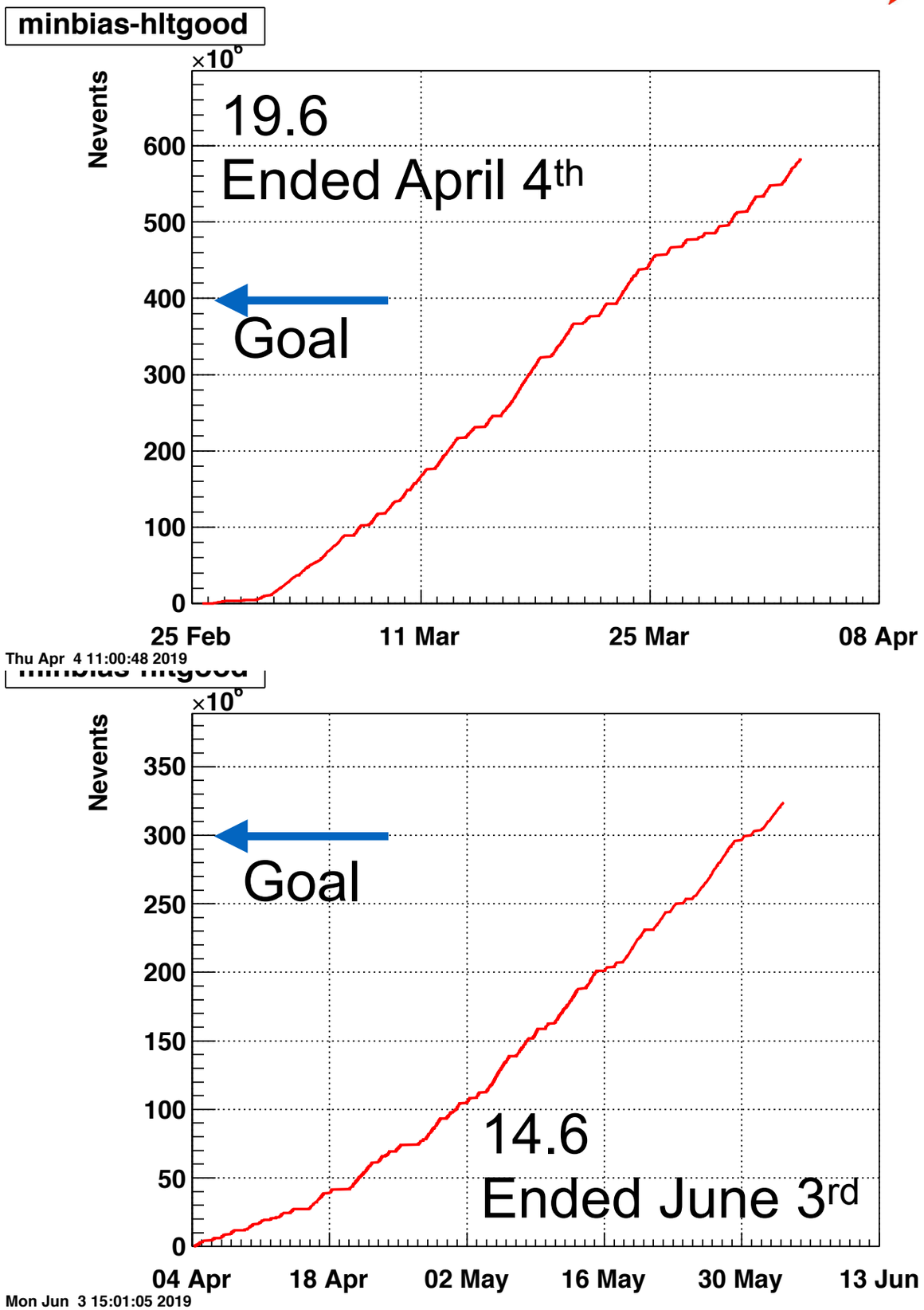
31.2 - 51 M “good” minbias

7.3 - 42 M “good” minbias

4.59 - 201 M “good” minbias

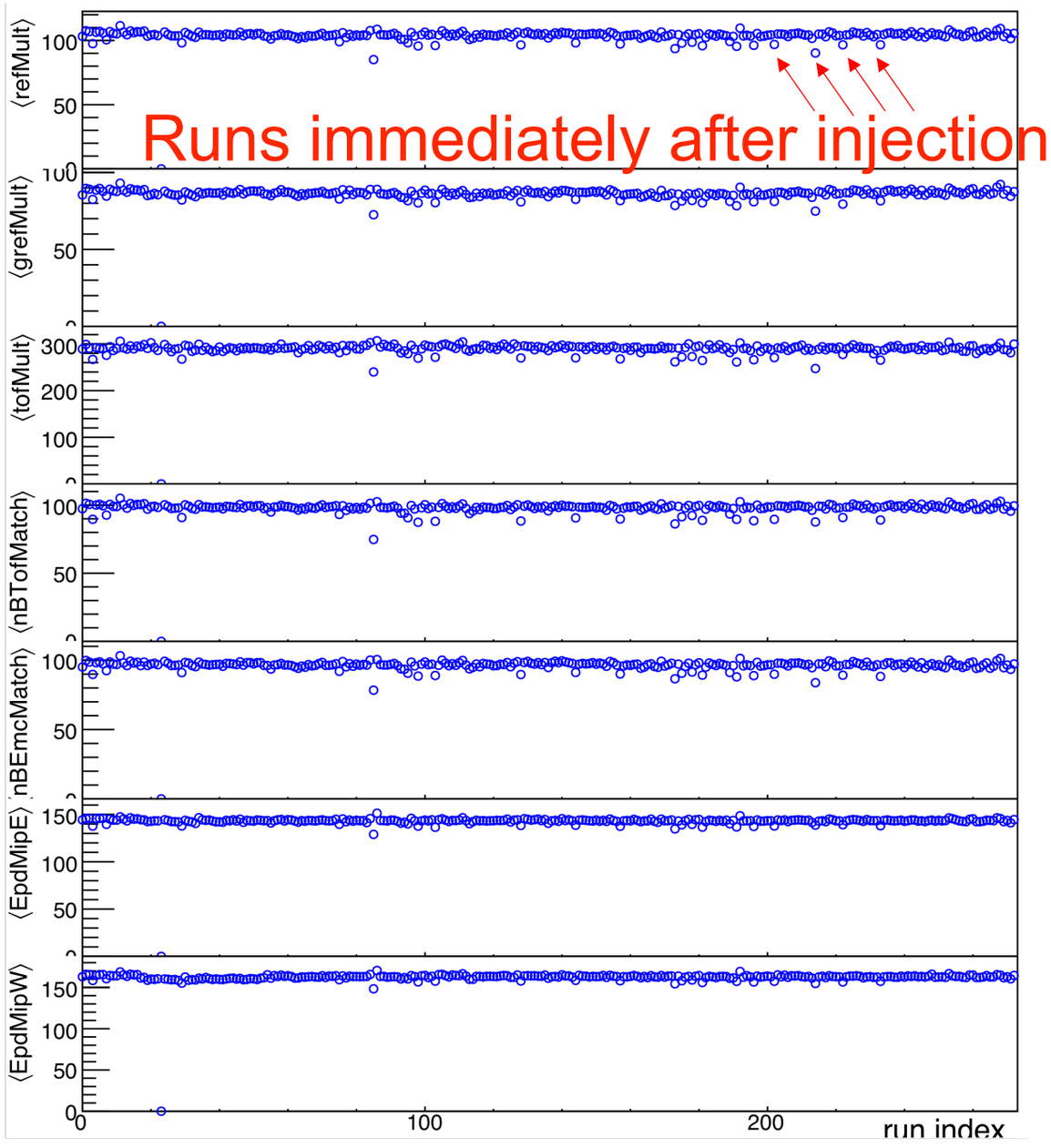
3.85 - 3.7 M “good” minbias

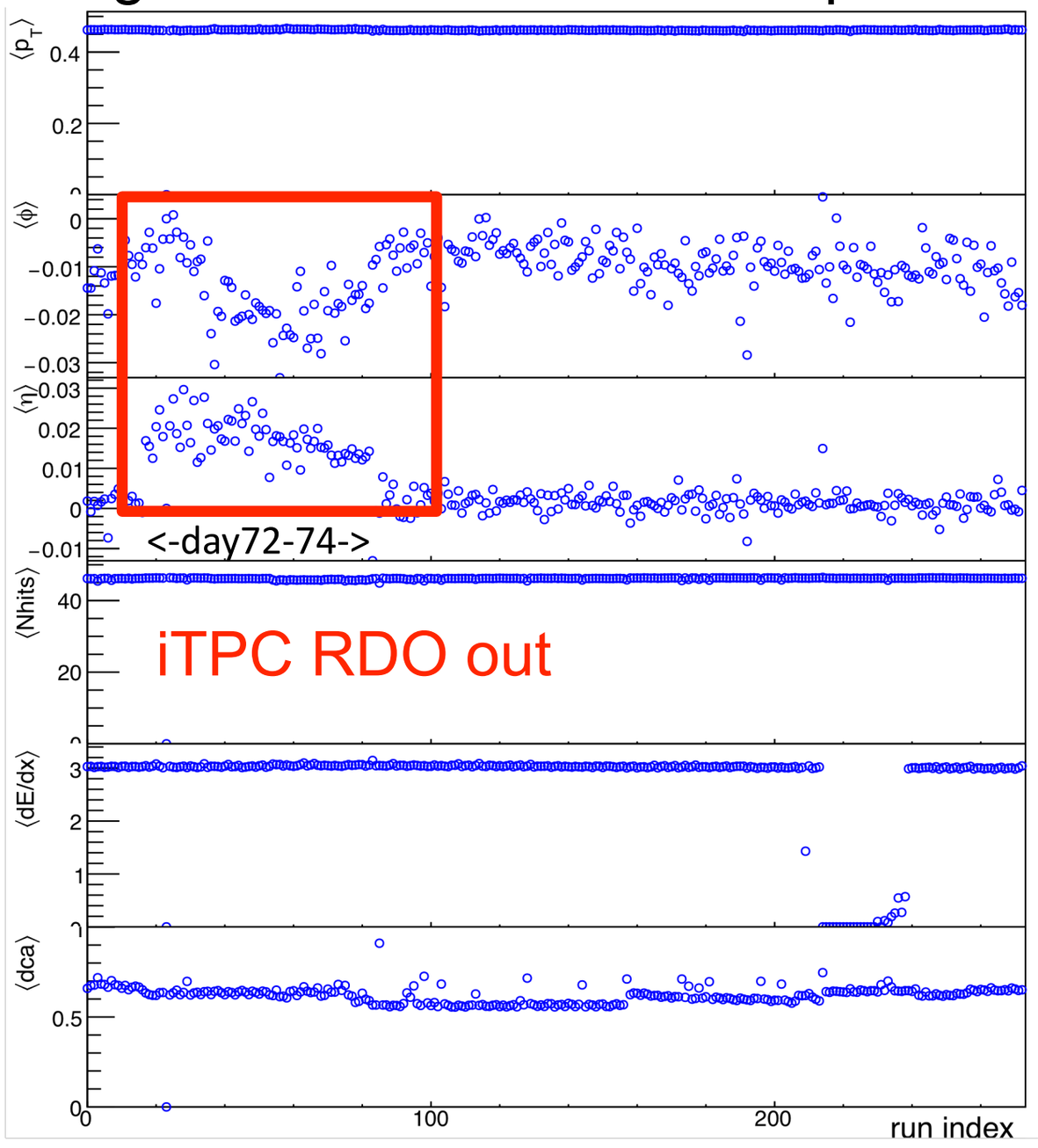
(+300M in Run-18)



Continuous data QA

Data QA occurs: On shift while data being taken, via fast offline reconstruction QA shift, HLT monitoring and weekly meeting of detector and PWG experts





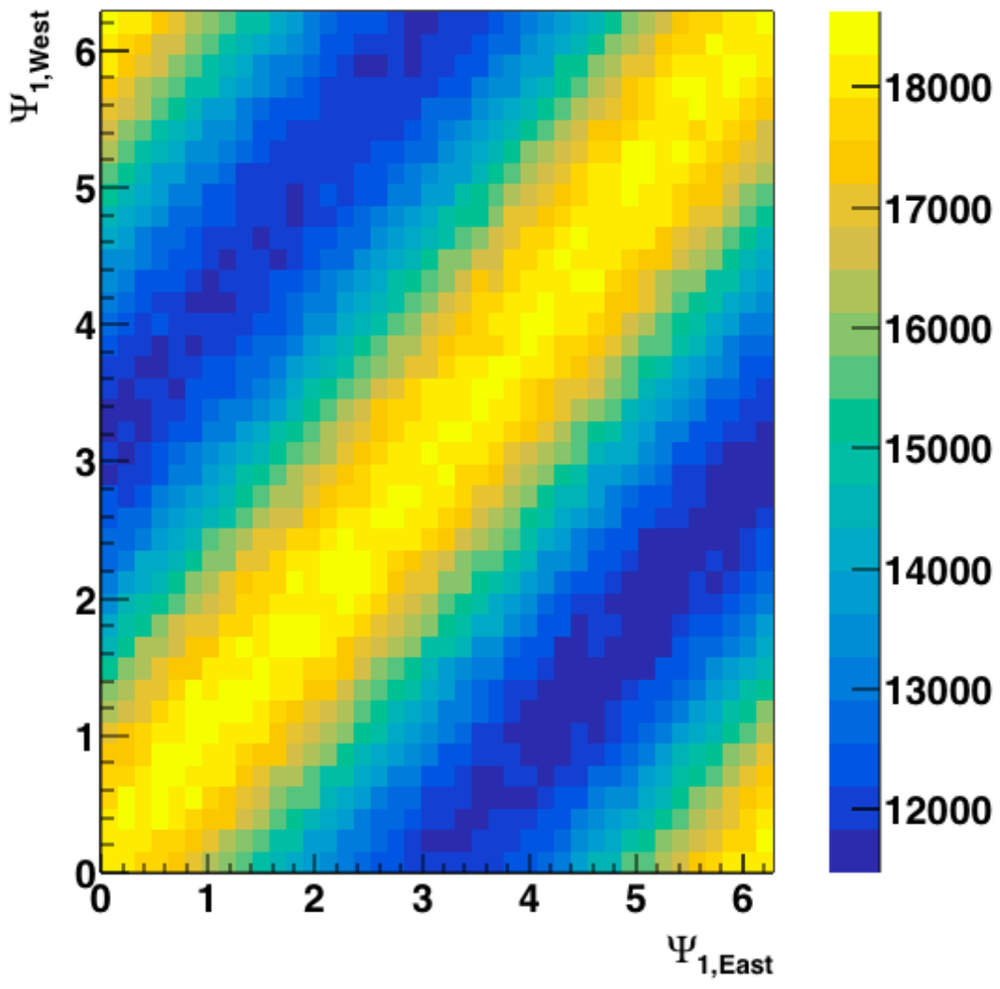
Issues rapidly identified, fast feedback to C-AD and/or shift crew

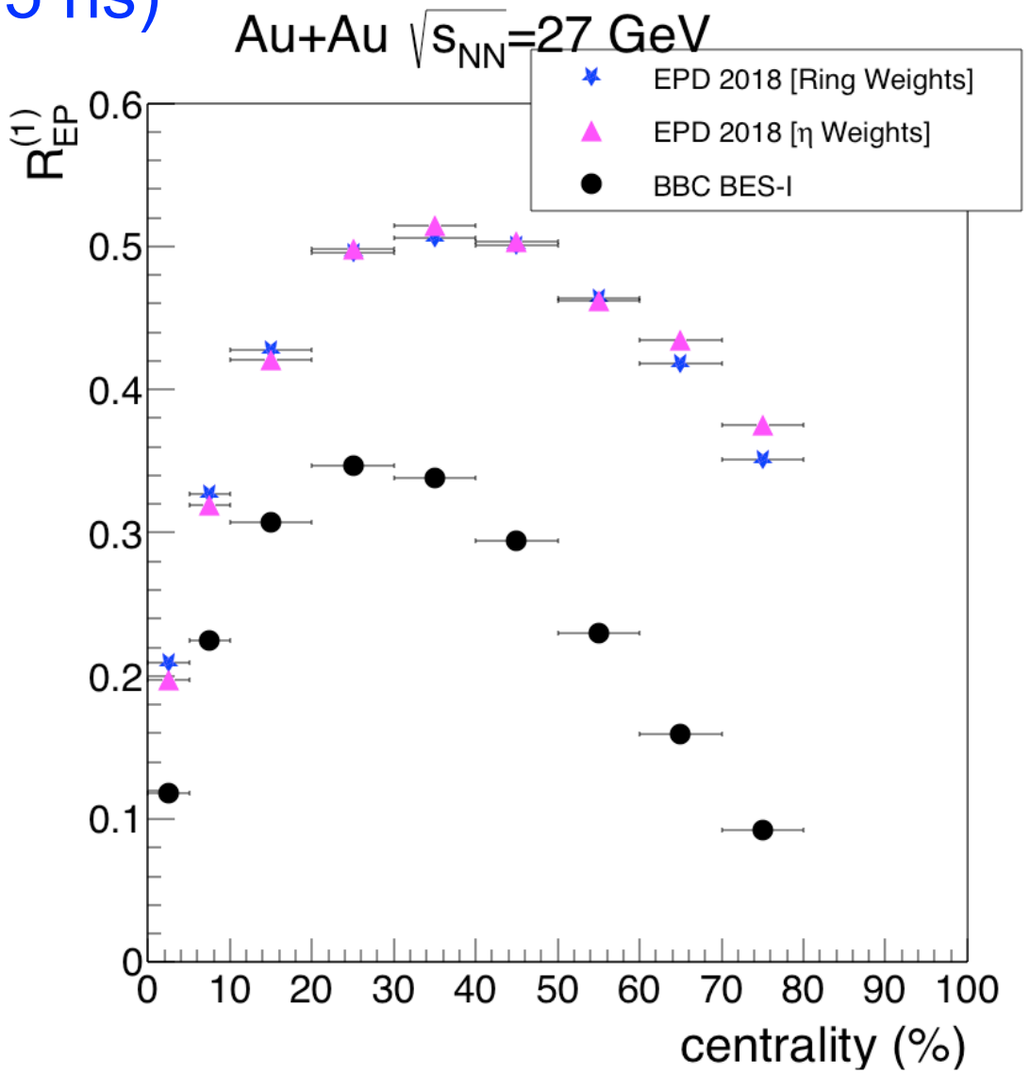
2 plots from a weekly QA meeting

EPD: Enhanced event plane resolution

All tiles operational for Run-18 and Run-19 : 2.1 < |η| < 5.1

Run-19: Main trigger detector
Greater acceptance than VPD or ZDC
Better timing resolution than BBC (0.75 ns)





Event plane (and centrality) outside of iTPC acceptance

EPD data in 3 QM physics talks

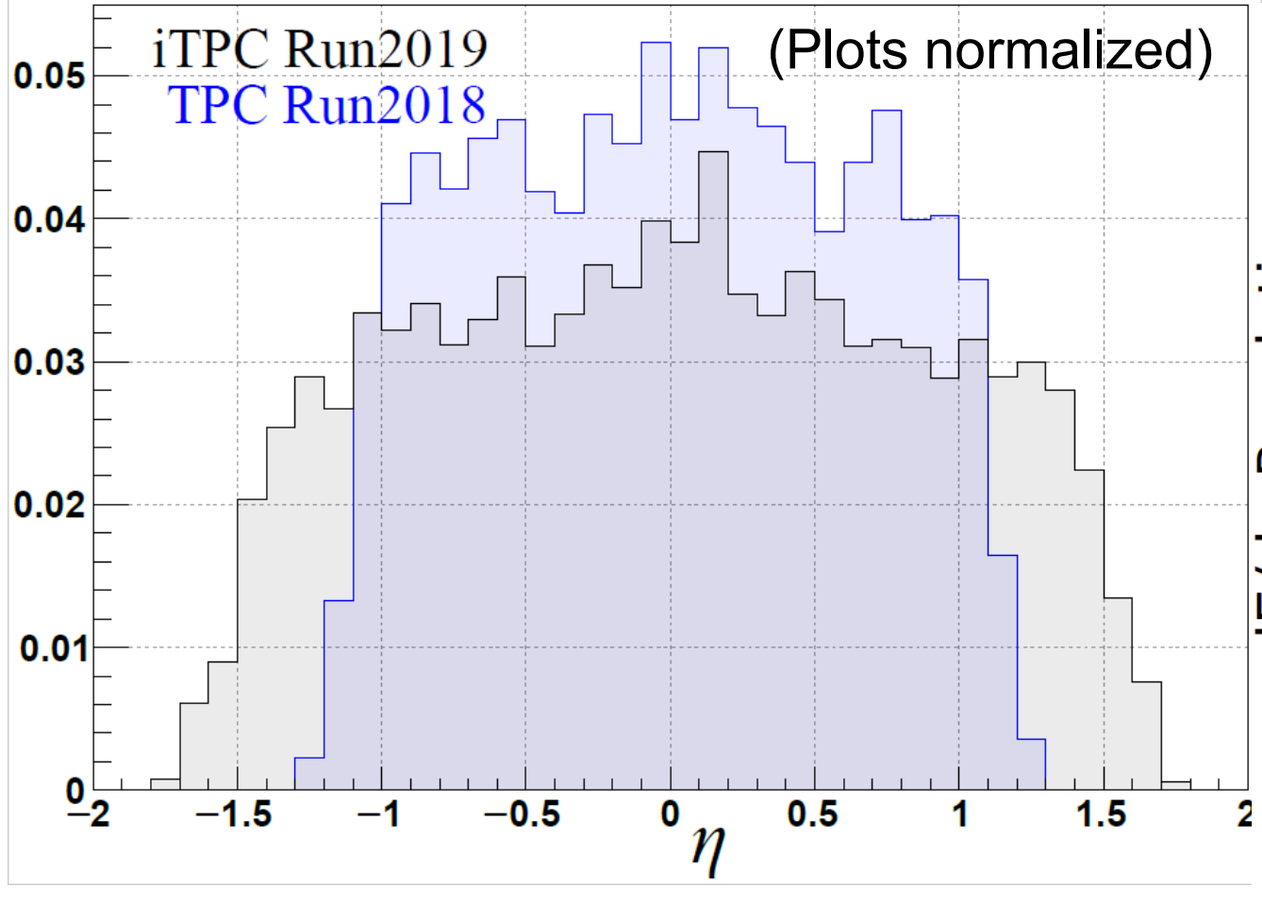
iTPC: Enhanced acceptance

Successfully integrated into data-taking since day 1 of Run-19

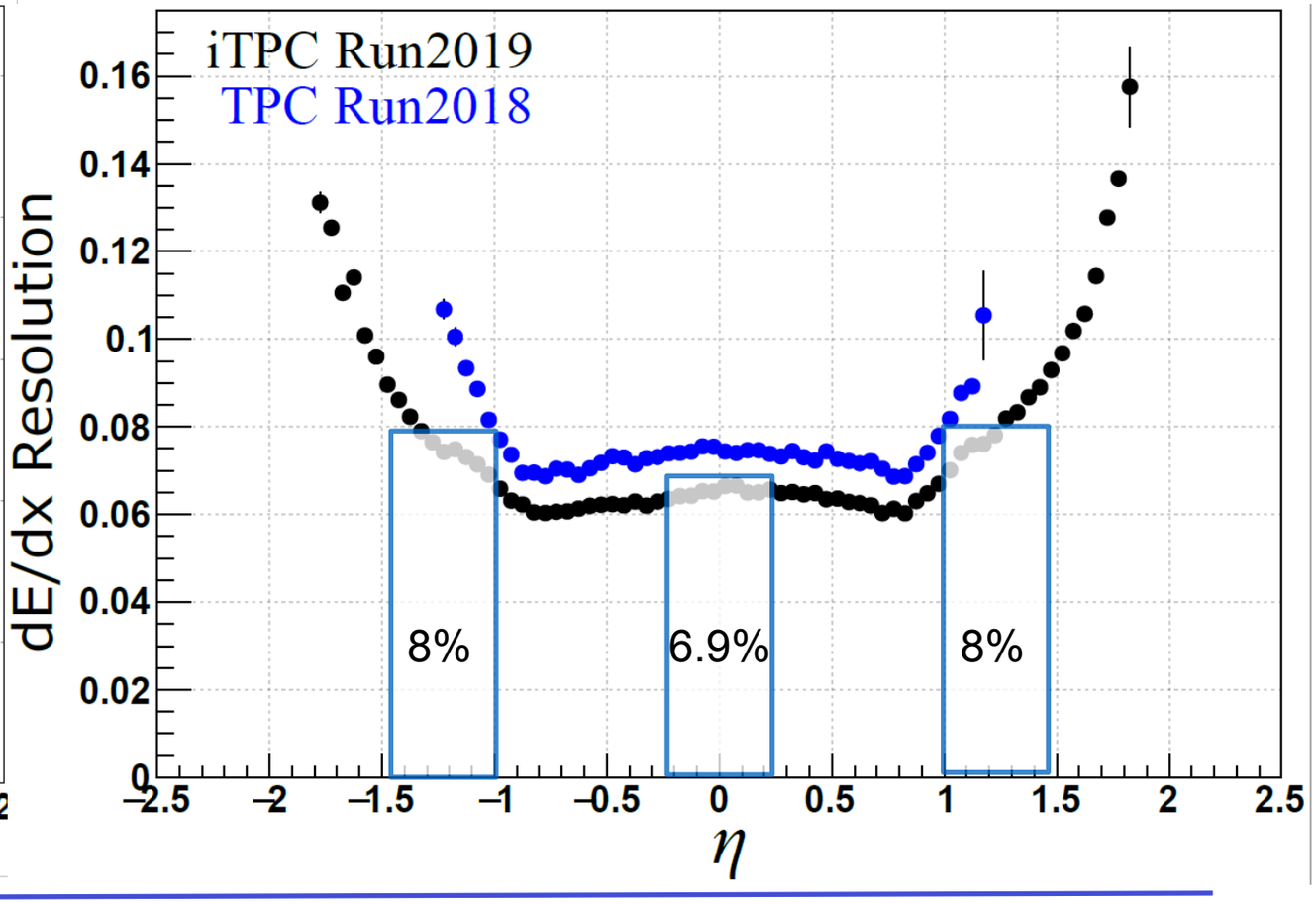
Passed DoE close-out review
All KPP and UPPs met or passed

Demonstrated improvement:

Increased pseudorapidity coverage



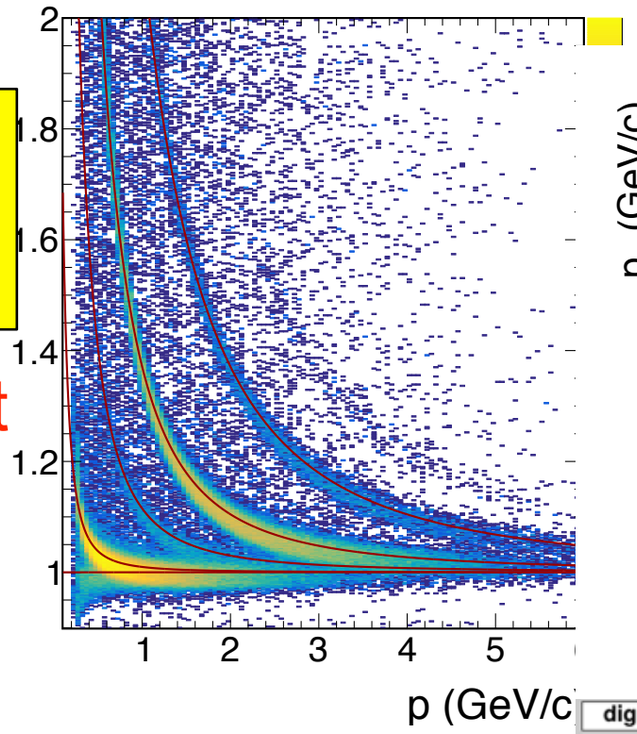
Improved dE/dx resolution

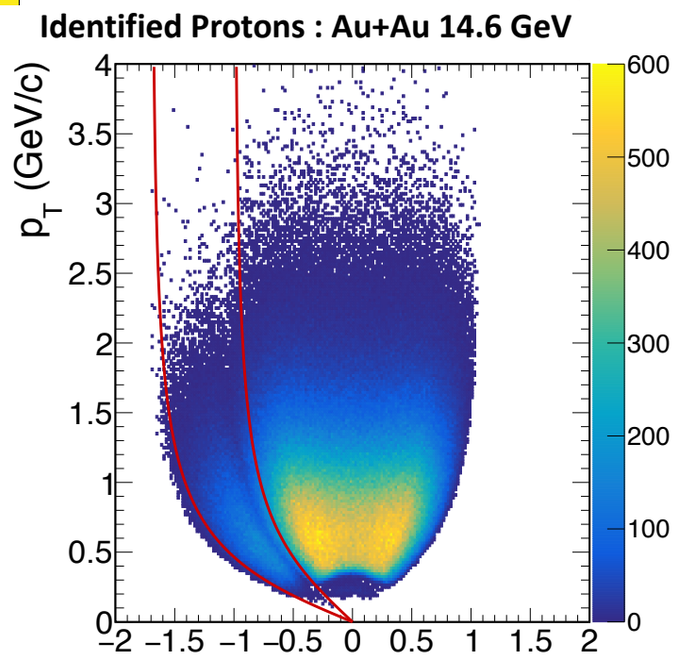


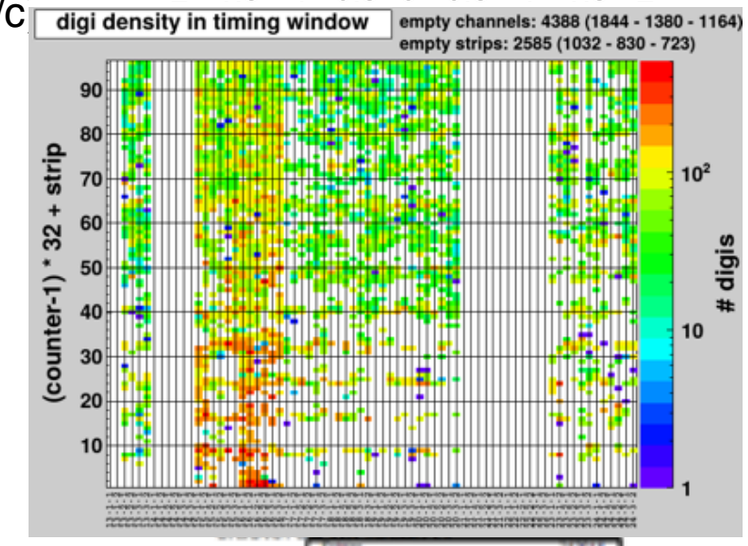
eTOF: Enhanced PID

Experience from Run-18 commissioning
- Real operating conditions
- Integration into STAR/collider mode

Joint FAIR Phase-0 CBM / STAR project







Run-19

Initially: Channels 100% working

Good timing resolution (80ps)

Clear PID bands

Extended coverage

System started to lose performance

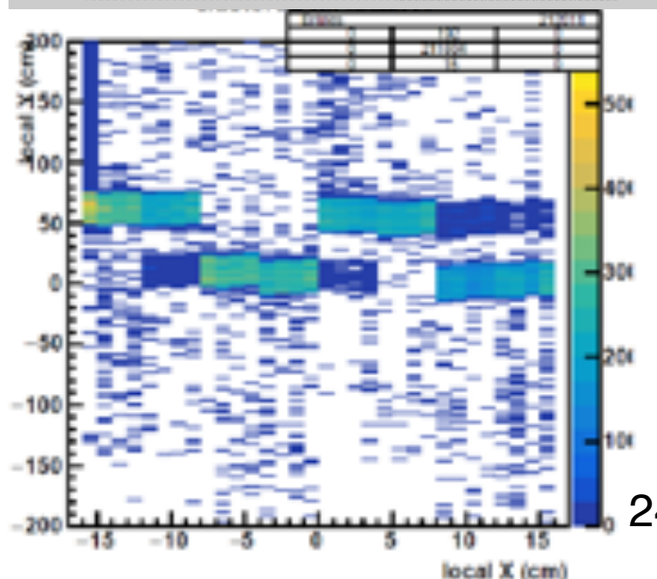
Loss of ~50% of readout channels (PADI) - beam related events

Enhancing stability of long term operation:

Occurrence and handling of noisy channels - Gas mixture changed and improved channel masking

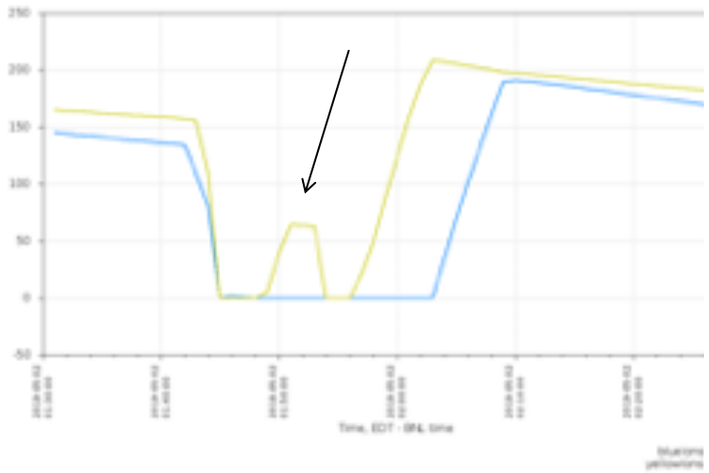
Intermittent failure of GBTx boards configuring - Improvements of eTOF/DAQ code

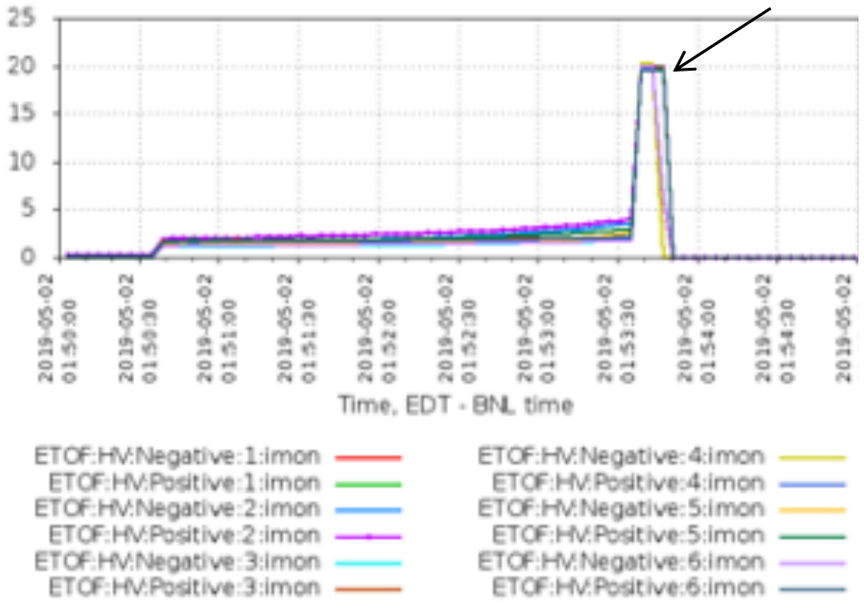
Clock jumps in data occur - Improvement to clock distribution, offline handing of eTOF timing

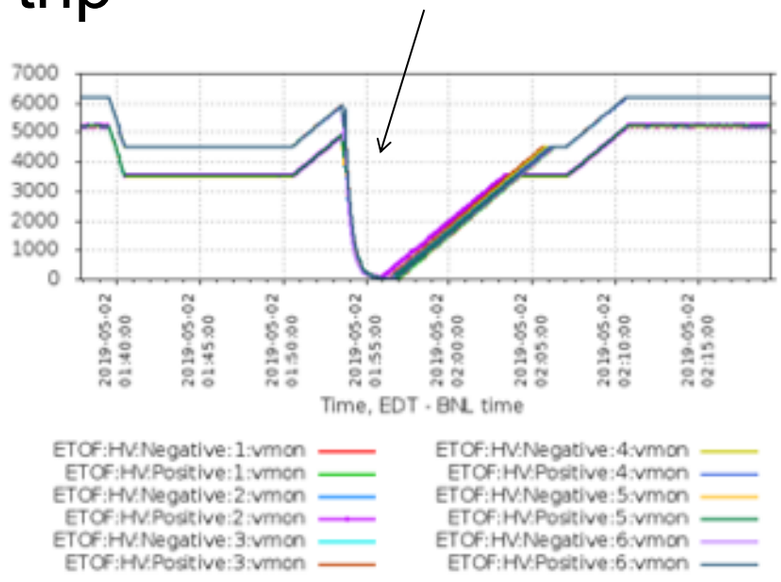


eTOF: Beam loss induced damage

Loss of yellow beam causes instantaneous high current in readout electrode and power supply in turn caused HV trip







Hypothesis: beam loss events → high flux of particles → induced high current in very short time in readout electrodes → damaged PADI input stage

More damaged channels on USTC counters than Tsinghua counters

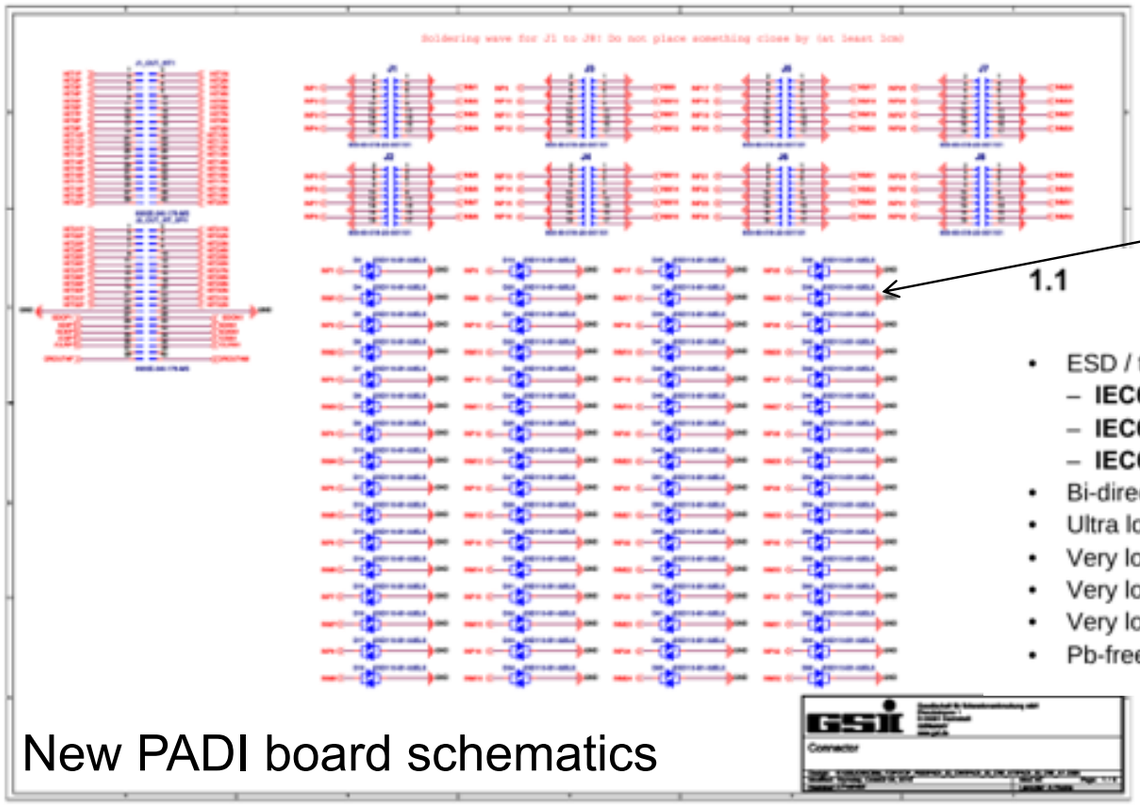
- due to larger E-field energy (~30% more at operating voltage)

- Threshold behavior in channel destruction

  - Distinct pattern of damaged channels is visible on USTC counters
  - Not all beam loss events caused damage

eTOF: Avoiding future damage

- Replace all PADI preamplifier boards
  - New preamplifier boards have protection diode (ESD 113-B1)
  - Prototype boards exist and are being tested



New PADI board schematics

Protection Device

TVS (Transient Voltage Suppressor)

ESD113-B1 Series

1.1 **Features**

- ESD / transient protection of high speed data lines according to:
  - **IEC61000-4-2 (ESD): ±20 kV (air / contact)**
  - **IEC61000-4-4 (EFT): ±2.5 kV / ±50 A (5/50 ns)**
  - **IEC61000-4-5 (surge): ±3 A (8/20 µs)**
- Bi-directional, working voltage up to: V_{RWM} = ±3.6 V
- Ultra low capacitance C_L = 0.20 pF (typical) at f = 1 GHz
- Very low clamping voltage: V_{CL} = 14 V (typical) at I_{TLP} = 16 A
- Very low reverse current. I_R < 1 nA (typical)
- Very low dynamic resistance: R_{DYN} = 0.45 Ω (typical)
- Pb-free and halogen-free package (RoHS compliant)

Mitigation plans underway
STAR Readiness Review yesterday
Full eTOF ready for Run-20

- Change gas mixture to include 1% SF6
- Ramp to full voltage only after both beams are stable
- Lower standby voltage

Summary

9+4+8 papers published/accepted/submitted so far in 2019

including 3 PRL

Published or preliminary results from most datasets in circulation

19 talks at QM, 24 talks+5 CEU posters at DNP

BES-II underway!

iTPC and EPD in all data taken - more details in Zhangbu's talk

Forward program planned for FY2022+

Funding identified for upgrades, construction underway - more details in Zhangbu's talk

Continue to be highly productive, many papers in the works, many ideas for future analyses

BACK UP

Do we need something on net-proton and RUn-17?

Just put in back-up,
Don’t mention?

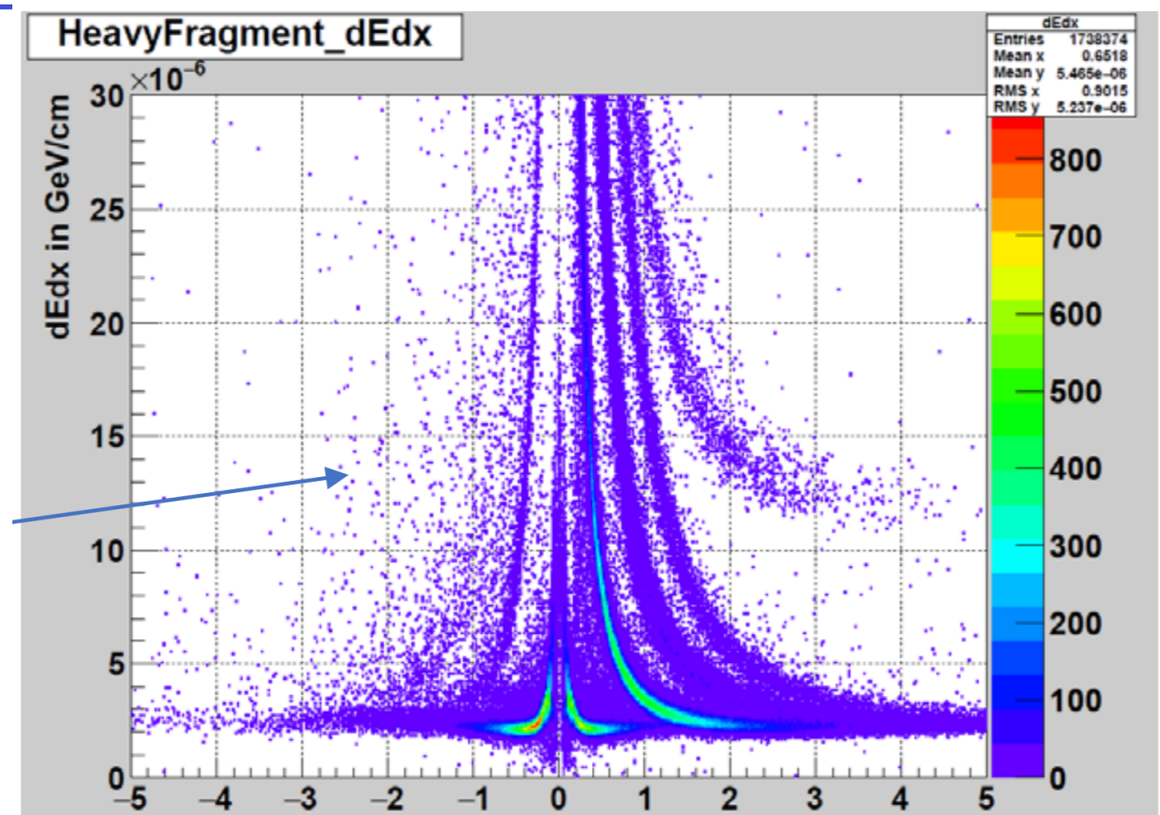
Au+Au $\sqrt{s_{NN}}$ = 3.9 GeV: FXT test

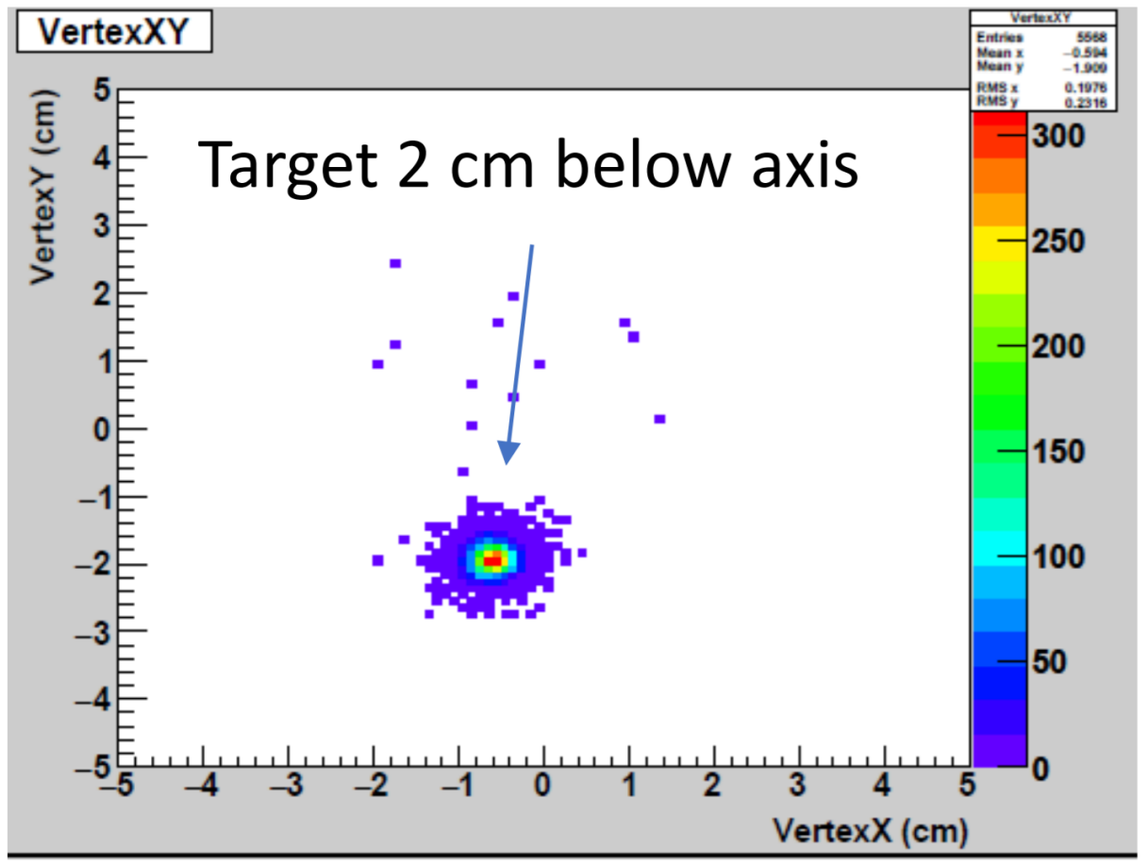
Quick test during LEReC operations

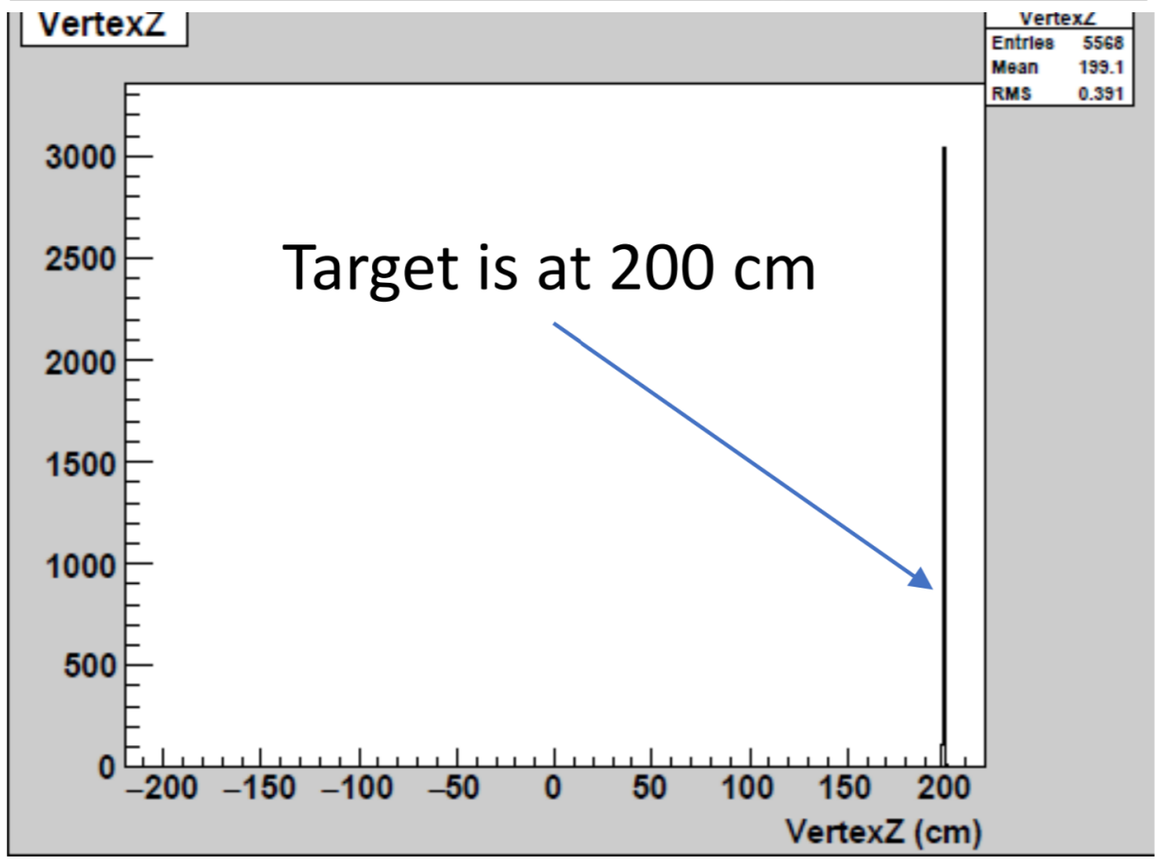
Data taking for 1 hr
recorded ~4M good events
Trigger effic. 90%

Clear PID, including heavy fragments

Confident can trigger and collect data requested







Event statistics requirements: Collider

Table 7: Event statistics (in millions) needed in the collider part of the BES-II program for various observables. This table updates estimates originally documented in STAR Note 598.

Collision Energy (GeV)	7.7	9.1	11.5	14.5	19.6
μ_B (MeV) in 0-5% central collisions	420	370	315	260	205
Observables					
R_{CP} up to $p_T = 5$ GeV/c	-	-	160	125	92
Elliptic Flow (ϕ mesons)	80	120	160	160	320
Chiral Magnetic Effect	50	50	50	50	50
Directed Flow (protons)	20	30	35	45	50
Azimuthal Femtoscopy (protons)	35	40	50	65	80
Net-Proton Kurtosis	70	85	100	170	340
Dileptons	100	160	230	300	400
$>5\sigma$ Magnetic Field Significance	50	80	110	150	200
Required Number of Events	100	160	230	300	400

Typically factor 20 more than for BES-I

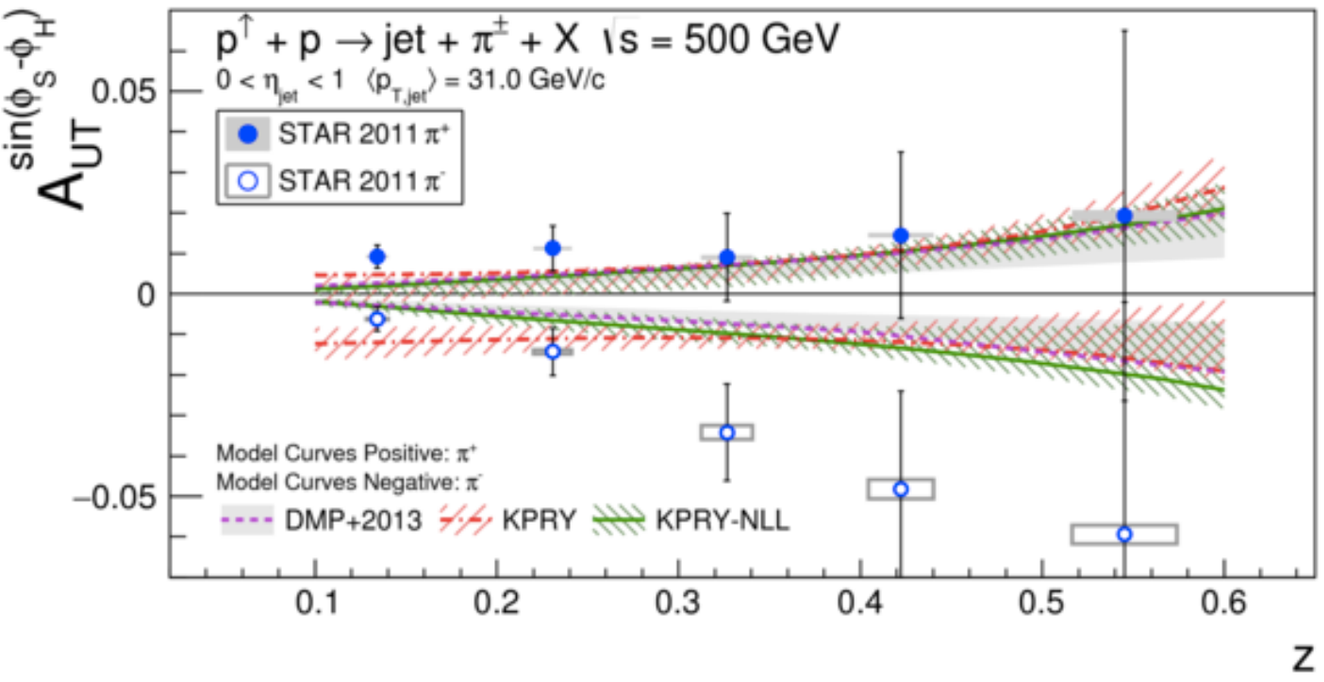
dileptons drive the event request

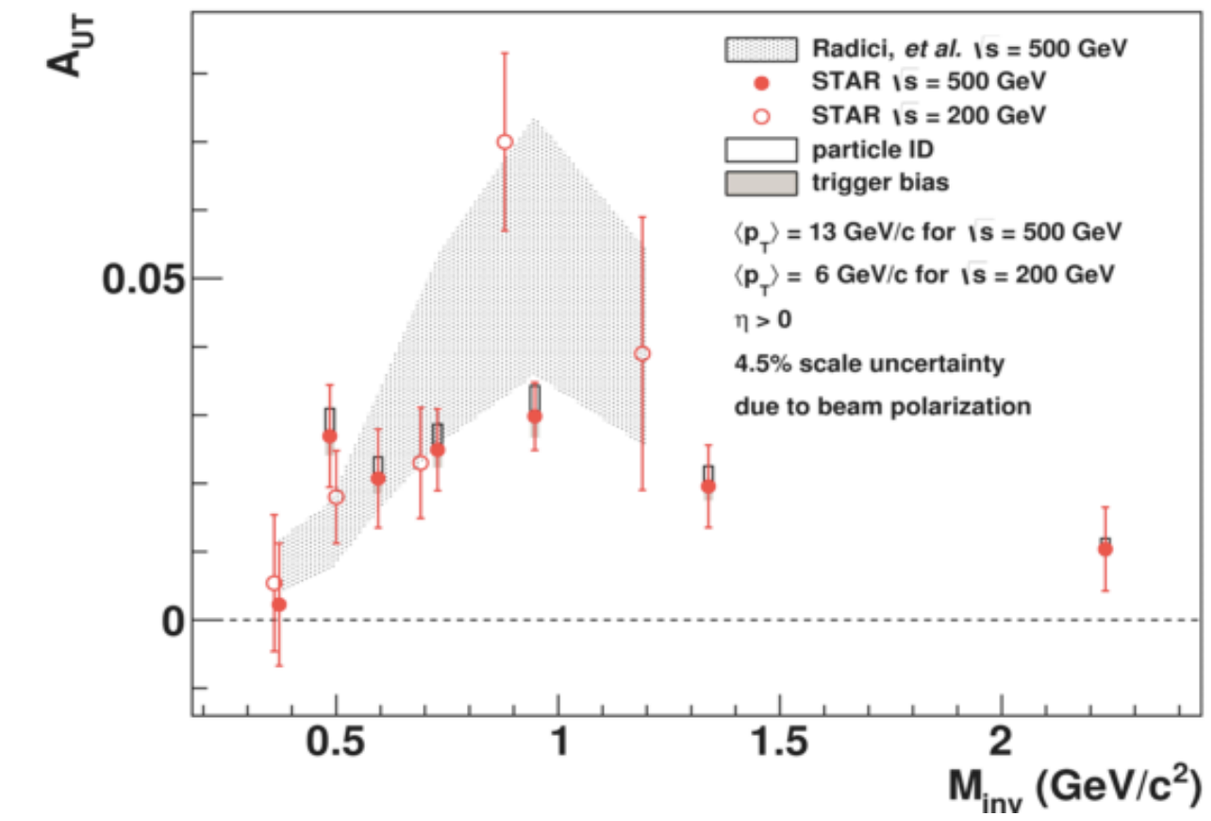
Event statistics requirements: FXT

Table 8: Event statistics (in millions) needed in the fixed-target part of the BES-II program for various observables.

$\sqrt{s_{NN}}$ (GeV)	3.0	3.2	3.5	3.9	4.5	5.2	6.2	7.7
Single Beam Energy (GeV)	3.85	4.55	5.75	7.3	9.8	13.5	19.5	31.2
μ_{B} (MeV)	721	699	666	633	589	541	487	420
Rapidity y_{CM}	1.06	1.13	1.25	1.37	1.52	1.68	1.87	2.10
Observables								
Elliptic Flow (kaons)	300	150	80	40	20	40	60	80
Chiral Magnetic Effect	70	60	50	50	50	70	80	100
Directed Flow (protons)	20	30	35	45	50	60	70	90
Femtoscopy (tilt angle)	60	50	40	50	65	70	80	100
Net-Proton Kurtosis	36	50	75	125	200	400	950	NA
Multi-strange baryons	300	100	60	40	25	30	50	100
Hypertritons	200	100	80	50	50	60	70	100
Requested Number of Events	300	100	100	100	100	100	100	100

Transverse spin measurements





W and Z A_N and Drell-Yan from Run 17
510 GeV - data being analyzed

PRD **97** (2018) 032004
First observation of non-zero Collins Effect in pp collisions and first limit on linearly polarized gluons in polarized proton

Models-based entirely on SIDIS
- π^+ reasonable description of despite being 1-2 order magnitude higher Q^2
- π^- new constraints - d-quark transversity not well determined previously

TMD evolution effects appear small

Suggests factorization and universality of Collins function

PLB **780** (2018) 332
Interference fragmentation functions at 200 and 500 GeV

First inclusion of RHIC data in transversity determination at high Q^2

(Radici and Bacchetta PRL 120, 192001 (2018))

STAR data significantly reduces uncertainties

Proton spin: gluon helicity contribution

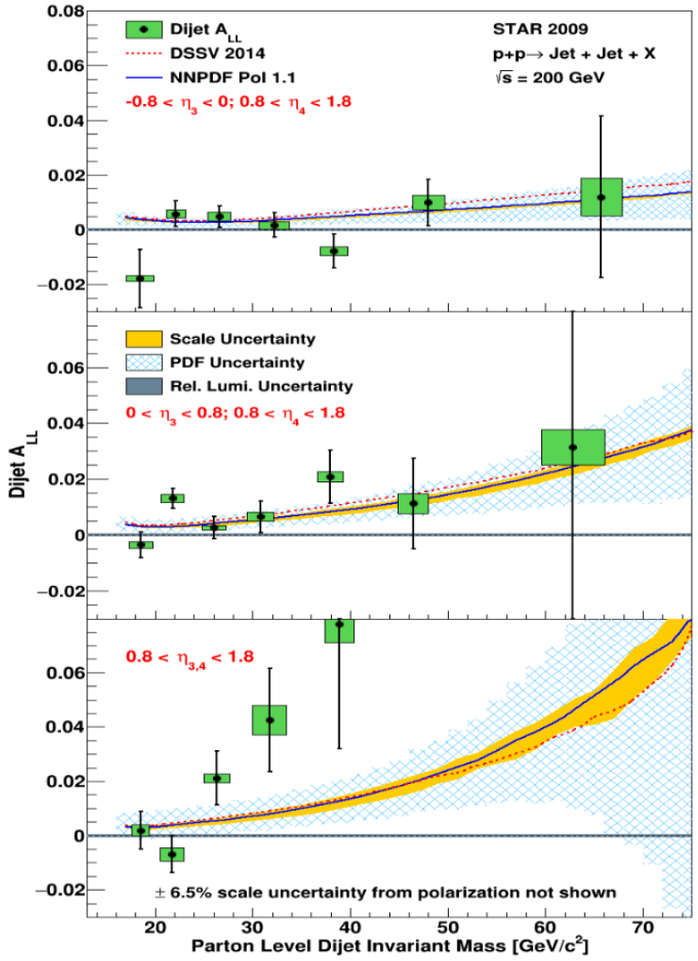
~0.2 for x>0.05: Unconstrained at low-x

First extension of gluon polarization measurements beyond mid-rapidity

PRD **98** (2018) 032011

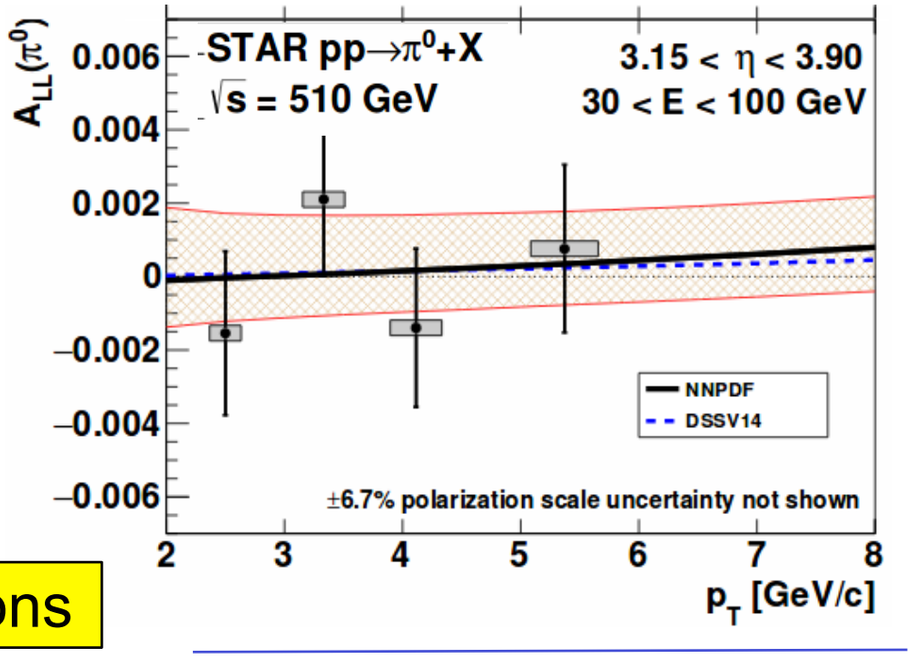
Pushing forward access down to x=0.01

First forward dijet A_{LL} with 3 different topologies



PRD **98** (2018) 032013

Moving to higher √s access down to x=0.001



Good agreement with theory

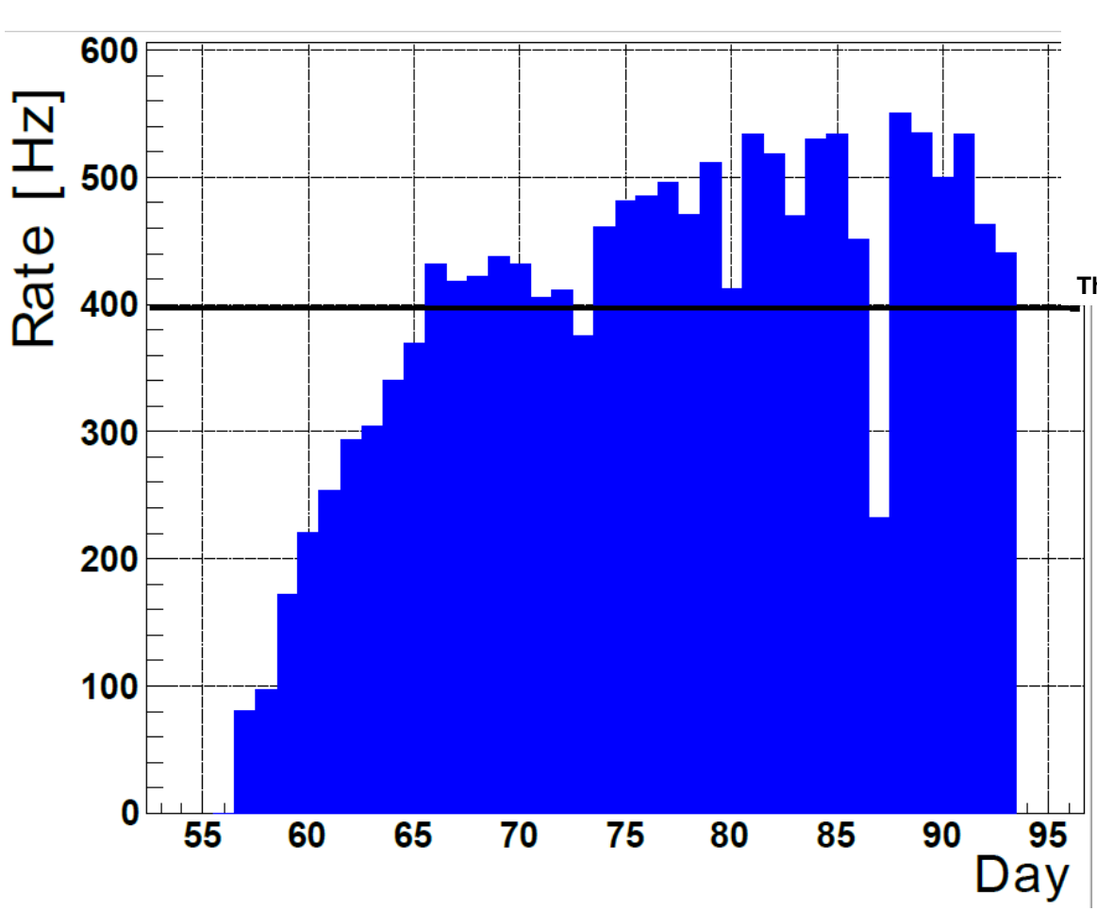
Constrains unexplored low-x region - abundant soft gluons

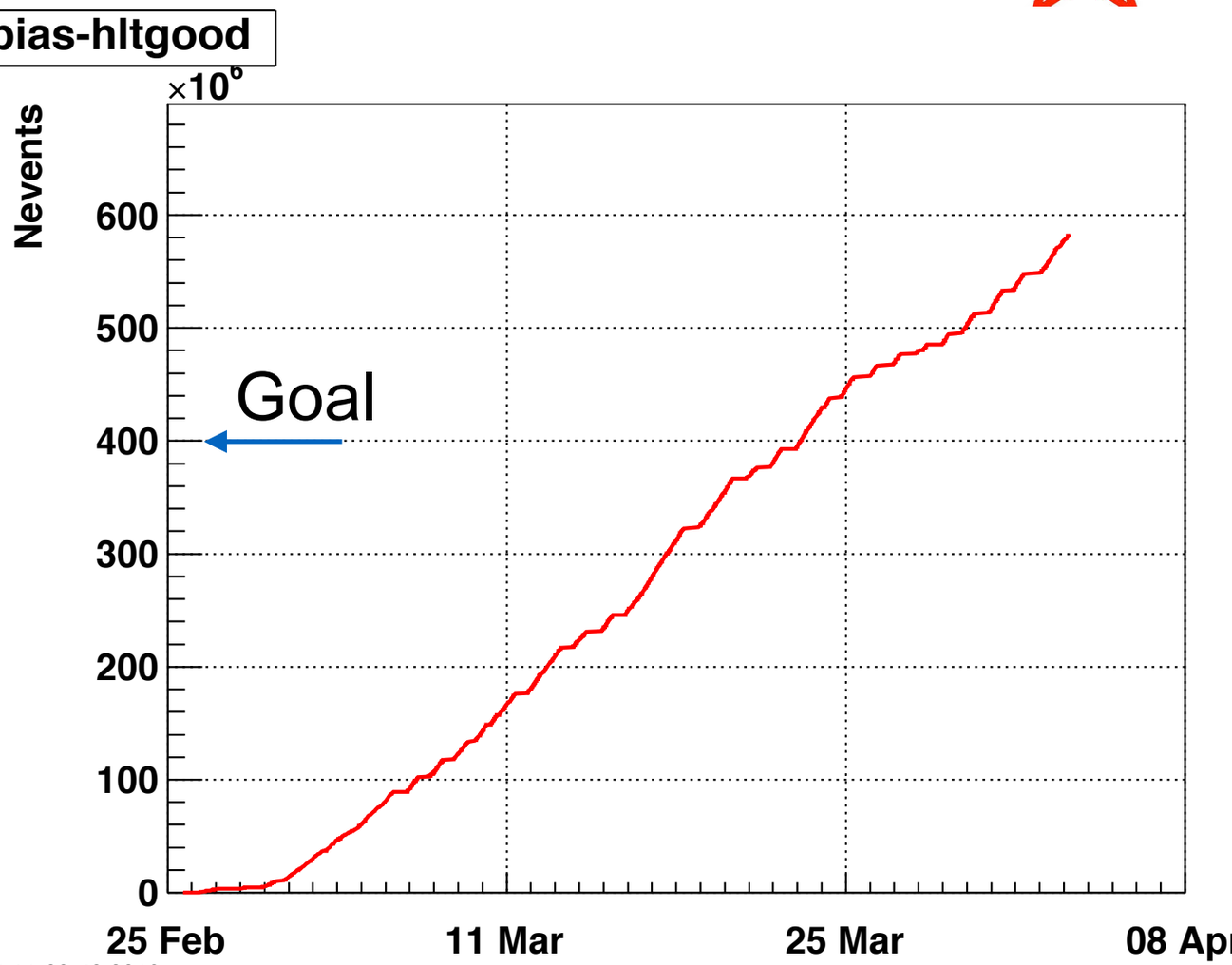
Au+Au $\sqrt{s_{NN}}$ = 19.6 GeV

Efficient data-taking and high quality stable beams

~60 min fills,
turn around ~20mins

Good event fraction 40-55%





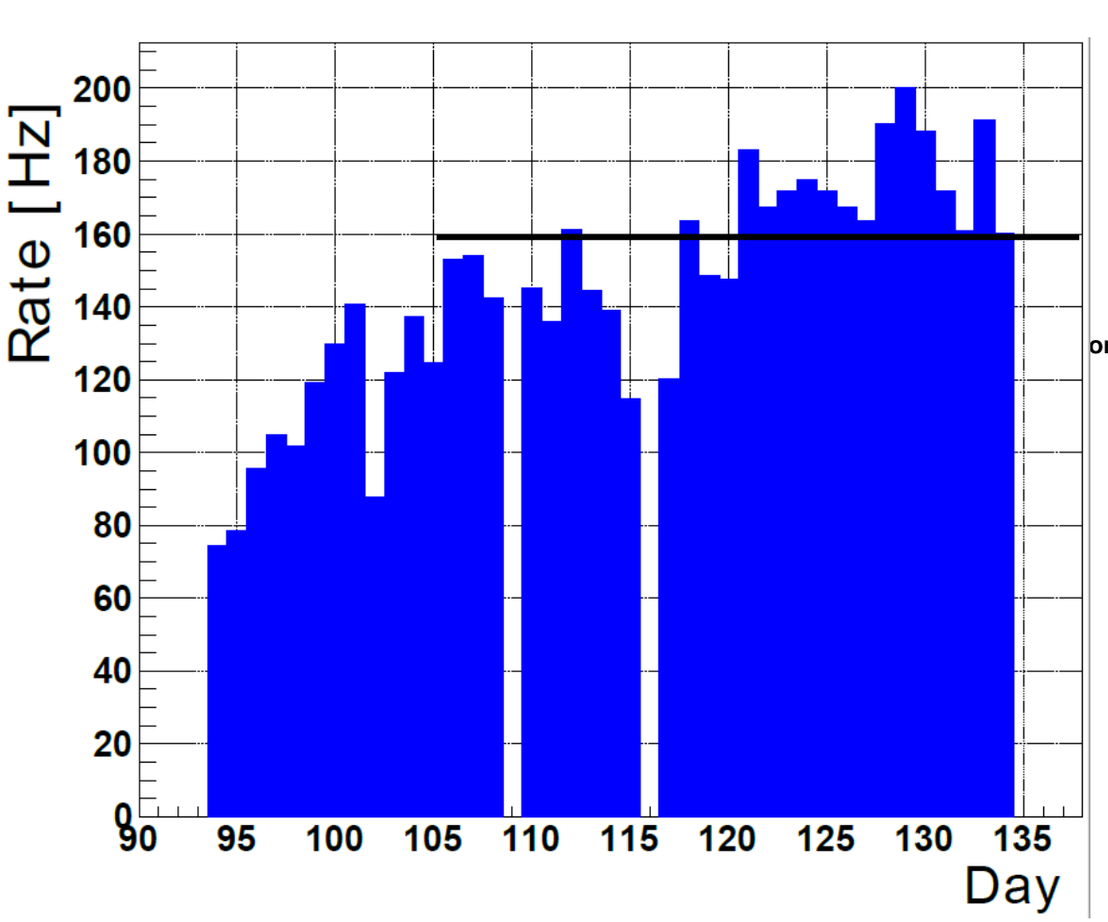
Concluded on April 4th
580 M minbias "good" events collected

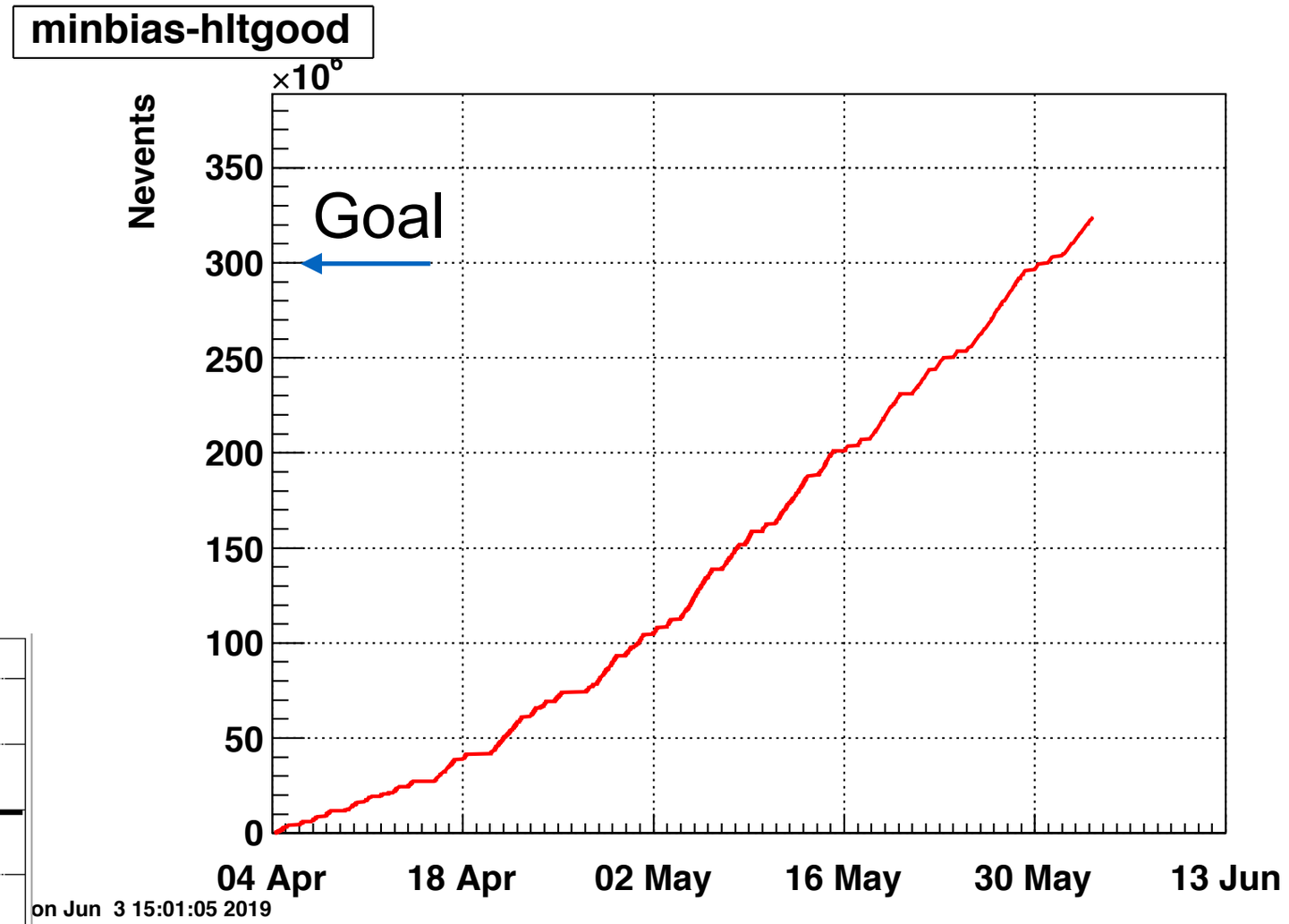
Au+Au $\sqrt{s_{NN}}$ = 14.6 GeV

Ever-increasing collision rate as C-AD enhanced beam

~45 min fills,
turn around ~20mins

Good event fraction 35-40%





Concluded on June 3rd
324 M minbias "good" events collected

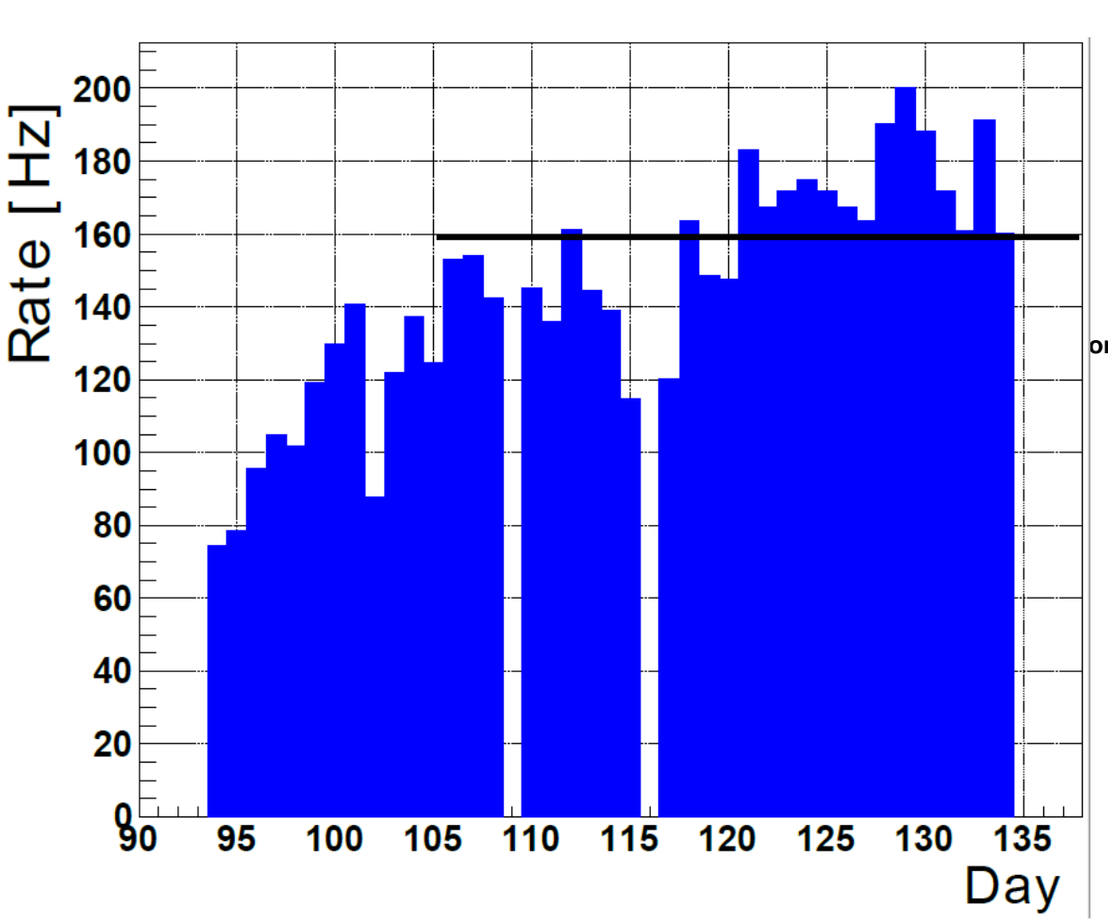
[1]In 2014, collisions were run at a collider energy of 14.546 GeV, which was rounded to 14.5 GeV. This year, we are running at a slightly different energy, 14.618 GeV, which is rounded to 14.6 GeV.

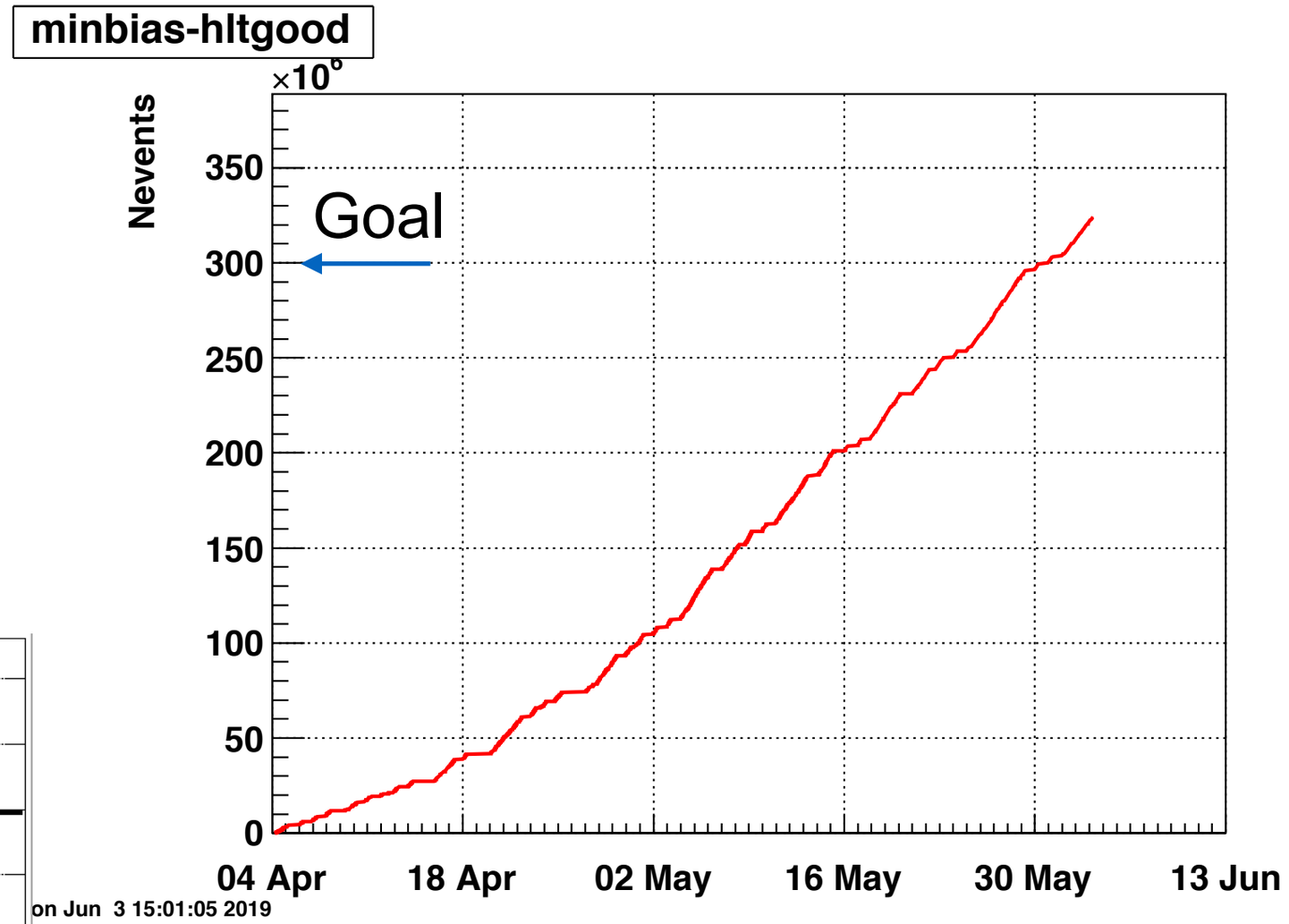
Au+Au $\sqrt{s_{NN}}$ = 14.6 GeV

Ever-increasing collision rate as C-AD enhanced beam

~45 min fills,
turn around ~20mins

Good event fraction 35-40%





Concluded on June 3rd
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[1]In 2014, collisions were run at a collider energy of 14.546 GeV, which was rounded to 14.5 GeV. This year, we are running at a slightly different energy, 14.618 GeV, which is rounded to 14.6 GeV.

Papers Published in 2019

- Polarization of Lambda hyperons along the beam direction in Au+Au collisions at 200 GeV
  - **Phys. Rev. Lett. (accepted)** Submit: 5/28/2019; Accept: 8/27/2019
- Collision Energy Dependence of Second-order Off-diagonal and Diagonal Cumulants of Net-charge, Net-proton and Net-kaon Multiplicity Distributions in Au+Au Collisions
  - **Phys. Rev. C 100 (2019) 014902** Submit: 3/13/2019; Publish: 7/8/2019
- Azimuthal Harmonics in Small and Large Collision Systems at RHIC Top Energies
  - **Phys. Rev. Lett. 122 (2019) 172301** Submit: 1/23/2019; Publish: 4/30/2019
- Collision Energy Dependence of p_T Correlations in Au+Au Collisions at RHIC
  - **Phys. Rev. C 99 (2019) 044918** Submit: 1/3/2019; Publish: 4/26/2019
- Constraining the initial conditions and temperature dependent transport with three-particle correlations in Au+Au collisions
  - **Phys. Lett. B 790 (2019) 81** Submit: 1/23/2017; Publish: 3/10/2019
- The proton-Omega correlation function in Au+Au collisions at sqrt(s_{NN})=200 GeV
  - **Phys. Lett. B 790 (2019) 490** Submit: 8/7/2018; Publish: 3/10/2019
- Beam Energy Dependence of (anti)deuteron Production in Au+Au Collisions at RHIC
  - **Phys. Rev. C 99 (2019) 064905** Submit: 3/29/2019; Publish: 6/21/2019

6 BulkCorr, 1 LFSUPC

Papers Published in 2019

- Observation of excess of J/psi yield at very low transverse momenta in Au+Au collisions at sqrt(sNN)=200 GeV and U+U collisions at sqrt(sNN)=193 GeV by STAR
  - **Phys. Rev. Lett. (accepted)** Submit: 4/26/2019; Accept: 9/4/2019
- Measurements of inclusive J/psi suppression in Au+Au collisions at sqrt(sNN) = 200 GeV through the dimuon channel at STAR
  - **Phys. Lett. B (accepted)** Submit: 5/31/2019; Accept: 9/3/2019
- Measurements of the differential cross-sections of J/psi production in proton-proton collisions at 510 and 500 GeV with STAR
  - **Phys. Rev. D (accepted)** Submit: 5/15/2019; Accept: 8/26/2019
- Centrality and transverse momentum dependence of D^0 meson production at mid-rapidity in Au+Au collisions at 200 GeV
  - **Phys. Rev. C 99 (2019) 034908** Submit: 12/26/2018; Publish: 3/20/2019
- Longitudinal double-spin asymmetry for inclusive jet and dijet production in pp collisions at sqrt{s}=510 GeV
  - **Phys. Rev. D (accepted)** Submit: 12/12/2018; Accept: 8/8/2019
- Measurement of the longitudinal spin asymmetries for weak boson production in proton-proton collisions at sqrt(s)=510 GeV
  - **Phys. Rev. D 99 (2019) 051102** Submit: 12/12/2018; Publish: 3/14/2019

4 HF, 2 Spin/ColdQCD

Papers in Journal Review

- Beam-energy dependence of identified two-particle angular correlations in Au+Au collisions
  - Submitted to Phys. Rev. C: 6/24/2019
- Charge-dependent pair correlations relative to a third particle in p+Au and d+Au collisions at RHIC
  - Submitted to Phys. Lett. B: 6/8/2019
- Observation of D0 directed flow in 200 GeV Au+Au collisions at RHIC
  - Submitted to Phys. Rev. Lett.: 5/7/2019
- Measurement of jet correlation devoid of flow background in Au+Au collisions at 200 GeV
  - Submitted to Phys. Rev. C: 6/22/2019
- Bulk properties of the system formed in Au+Au collisions at sqrt(sNN) =14.5 GeV using the STAR detector at RHIC
  - Submitted to Phys. Rev. C: 8/9/2019
- Strange hadron production in Au+Au collisions at sqrt(sNN)=7.7, 11.5, 19.6, 27 and 39 GeV
  - Submitted to Phys. Rev. C: 6/9/2019
- Precise measurement of the mass difference and the binding energy B_Lambda of hypertriton and anti-hypertriton
  - Submitted to Nature Physics: 4/24/2019
- Measurements of dielectron production in Au+Au collisions at sqrt(sNN)=27, 39 and 62.4 GeV from the STAR experiment
  - Submitted to Phys. Rev. Lett.: 10/29/2018

2 BulkCorr, 1 HF, 1 JetCorr, 4 LFS/UPC

Papers in Collaboration Review

- Search for the Chiral Magnetic Wave with anisotropic flow of identified particles at RHIC
  - Collaboration review: 2/6/2019
- Charge Separation Measurements in p(d)+Au and Au+Au Collisions; Implications for the Chiral Magnetic Effect
  - Collaboration review: 9/2/2019
- Measurements of Dihadron Correlations Relative to the Event Plane in Au+Au Collisions at sqrt(s) = 200 GeV
  - Collaboration review: 5/2/2019
- Underlying Event Measurements in p+p Collisions at sqrt(s)=200 GeV
  - Collaboration review: 6/8/2019
- Probing Extreme Electromagnetic Fields with the Breit-Wheeler Process
  - Collaboration review: 9/2/2019

2 BulkCorr, 2 JetCorr, 1 LFSUPC

Active GPCs

http://www.star.bnl.gov/protected/common/GPCs/gpc-active.xml

ID	Title of Paper	Date GPC requested	Date GPC Formed	GPC Chairperson	GPC Members	Date to Collaboration	Date Submitted for publication	Principal Authors	Comments
216	Coulomb Effect in Au+Al Collisions at sqrt(sNN) = 3.0, 3.5, and 4.5 GeV	3-Aug-15	2-Dec-15	Mike Lisa	Yuri Fisyak, Bill Christie (English QA), Steve Horvat (Code QA), Daniel Cebra (PA rep), Lokesh Kumar (PWG rep)			Brooke Haag, Christopher Flores, Samantha Brovko, Jim Draper, Juan Romero, Grazyna Odyniec, Richard Witt, Daniel Cebra	
219	Search for Muonic Atoms in Au+Au collisions at sqrt(sNN)=200GeV	17-Nov-15	30-Nov-15	Aihong Tang	Hanna Zbroszczyk, Declan Keane (English QA), John Campbell (Code QA), Kefeng Xin (PA rep), Frank Geurts (PA rep), Bingchu Huang (PWG rep)			Frank Geurts, Zebo Tang, Kefeng Xin, Yifei Zhang, Long Zhou	
225	Measurement of jet correlation devoid of flow background in Au+Au collisions at sqrt(s_NN)=200GeV	16-Mar-16	24-May-16	Subhasis Chattopadhaya	Jiangyong Jia, Spencer Klein (English QA), Li Yi (Code QA), Alex Schmah (PWG rep), Kun Jiang (PA rep)	18-Oct-17	22-Jun-19	Kun Jiang, Fuqiang Wang, Cheng Li	
227	Measurements of e+e- production in Au+Au collisions at sqrt(sNN) = 27, 39, and 62.4 GeV from the STAR experiment	04-May-16	05-July-16	Lanny Ray	Tatyana Galatyuk, Jim Thomas (English QA), David Tlusty (Code QA), Lokesh Kumar (PWG rep), Joey Butterworth (PA rep), Yi Guo (PA rep)	22-May-18	29-Oct-18	Joseph Butterworth, Xin Dong, Frank Geurts, Yi Guo, Bingchu Huang, Patrick Huck, Lijuan Ruan, Zebo Tang, Chi Yang, Yifei Zhang, Jie Zhao	

Total 30 (24) active GPCs — 3 in pipelines — (#) @ April 2019

- 20 (10) pre collaboration review
- 2 (10) in/post collaboration review
- 8 (4) submitted, journal review

13 BulkCorr, 4 HF, 5 JetCorr, 9 LFS/UPC

Published Papers in 2018

- Beam-energy dependence of directed flow of Lambda, Anti-Lambda, K plus, K minus, K0 short and phi in Au+Au collisions
  - **Phys. Rev. Lett. 120 (2018) 062301** Submit: 8/23/2017; Publish: 2/6/2018
- Global Polarization of Lambda Hyperons in Au+Au Collisions at 200 GeV
  - **Phys. Rev. C 98 (2018) 014910** Submit: 5/11/2018; Publish: 7/23/2018
- Systematic Study of Azimuthal Anisotropy in Cu+Au Collisions at 200 GeV
  - **Phys. Rev. C 98 (2018) 014915** Submit: 12/5/2017; Publish: 7/31/2018
- Correlation measurements between flow harmonics in Au+Au collisions at RHIC
  - **Phys. Lett. B 783 (2018) 459** Submit: 3/11/2018; Publish: 8/10/2018
- Beam Energy Dependence of Rapidity-Even Dipolar Flow in Au+Au Collisions
  - **Phys. Lett. B 784 (2018) 26** Submit: 4/23/2018; Publish: 9/10/2018
- Harmonic decomposition of three-particle azimuthal correlations at RHIC
  - **Phys. Rev. C 98 (2018) 034918** Submit: 1/24/2017; Publish: 9/28/2018
- Energy Dependence of Moments of Net-kaon Multiplicity Distributions at RHIC
  - **Phys. Lett. B 785 (2018) 551** Submit: 9/2/2017; Publish: 10/10/2018

7 BulkCorr

Published Papers in 2018

- Azimuthal transverse single-spin asymmetries of inclusive jets and charged pions within jets from polarized-proton collisions at sqrt(s) = 500 GeV
  - **Phys. Rev. D 97 (2018) 032004** Submit: 8/23/2017; Publish: 2/2/2018
- Transverse spin-dependent azimuthal correlations of charged pion pairs measured in p$^\uparrow$+p collisions at $\sqrt{s}$ = 500 GeV
  - **Phys. Lett. B 780 (2018) 332** Submit: 10/27/2017; Publish: 3/10/2018
- Longitudinal Double-Spin Asymmetries for π^0's in the Forward Direction for 510 GeV Polarized pp Collisions
  - **Phys. Rev. D 98 (2018) 032013** Submit: 5/24/2018; Publish: 8/17/2018
- Longitudinal Double-Spin Asymmetries for Dijet Production at Intermediate Pseudorapidity in Polarized p+p Collisions at 200 GeV
  - **Phys. Rev. D 98 (2018) 032011** Submit: 5/29/2018; Publish: 8/17/2018
- Transverse spin transfer to Lambda and anti-Lambda hyperons in polarized proton-proton collisions at sqrt(s)=200 GeV
  - **Phys. Rev. D 98 (2018) 091103** Submit: 8/24/2018; Publish 11/29/2018
- Improved measurement of the longitudinal spin transfer to Lambda and anti-Lambda hyperons in polarized proton-proton collisions at sqrt(s)=200 GeV
  - **Phys. Rev. D 98 (2018) 112009** Submit: 8/23/2018; Publish: 12/20/2018

6 ColdQCD/Spin

Published Papers in 2018

- J/psi production cross section and its dependence on charged-particle multiplicity in p+p collisions at sqrt(s)=200 GeV
  - **Phys. Lett. B 786 (2018) 87** Submit 5/11/2018; Publish 11/10/2018
- Erratum: observation of D^0 meson nuclear modifications in Au+Au collisions at sqrt(sNN)=200 GeV
  - **Phys. Rev. Lett. 121 (2018) 229901** Submit: 9/24/2018; Publish: 11/28/2018

- Beam Energy Dependence of Jet-Quenching Effects in Au+Au Collisions at sqrt(sNN) = 7.7, 11.5, 14.5, 19.6, 27, 39, and 62.4 GeV
  - Phys. Rev. Lett. 121 (2018) 032301 Submit: 7/11/2017; Publish: 7/19/2018

- Measurement of hypertriton lifetime in Au+Au collisions at the Relativistic Heavy-Ion Collider
  - Phys. Rev. C 97 (2018) 054909 Submit: 10/1/2017; Publish: 5/22/2018
- Low p_T e^+e^- pair production in Au+Au collisions at sqrt(s_{NN})=200 GeV and U+U collisions at sqrt(s_{NN})=193 GeV at STAR
  - **Phys. Rev. Lett. 121 (2018) 132301** Submit: 6/6/2018; Publish: 9/25/2018

2 HF, 1 JetCorr, 2 LFS/UPC