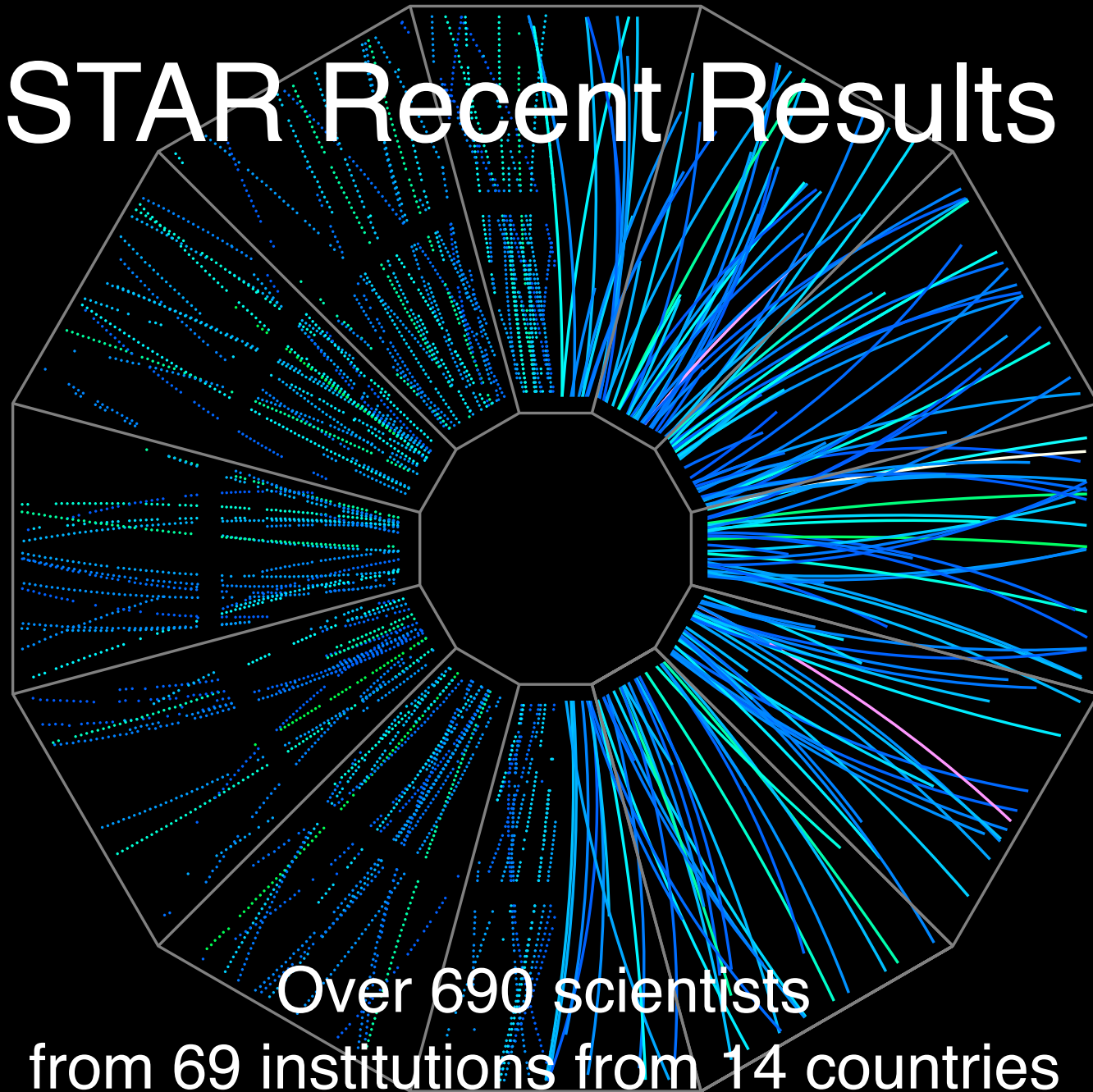




STAR Recent Results



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

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 Berhampur (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 &

BNL Science and Technology Award:

Elke-Caroline Aschenauer (BNL)

DNP 2019 Thesis Award:

Isaac Upsal (OSU)

2019 DoE Certificate of Appreciation (iTPC):

Flemming Videbaek

2017-19 RHIC/AGS Thesis Awards:

Daniel Brandenburg (Rice), Zilong Chan (Texas A&M), Ting Lin (Indiana), Jan Rusnak (CTI), Prashanth Shanmuganathan (Kent State), Isaac Upsal (OSU)

2018-19 RHIC/AGS Merit Awards:

Jim Drachenberg (ACU), Alex Jentsch (BNL), Xiaofeng Luo (), Takafumi Niida (WSU), Isaac Upsal (BNL), Shuai Yang (BNL), Jie Zhao (Purdue), Wangmei Zha (USTC)



2017 Secretary of Energy Achievement Award:

STAR-BNL Group

2017 Top 100 Science Stories - Discover

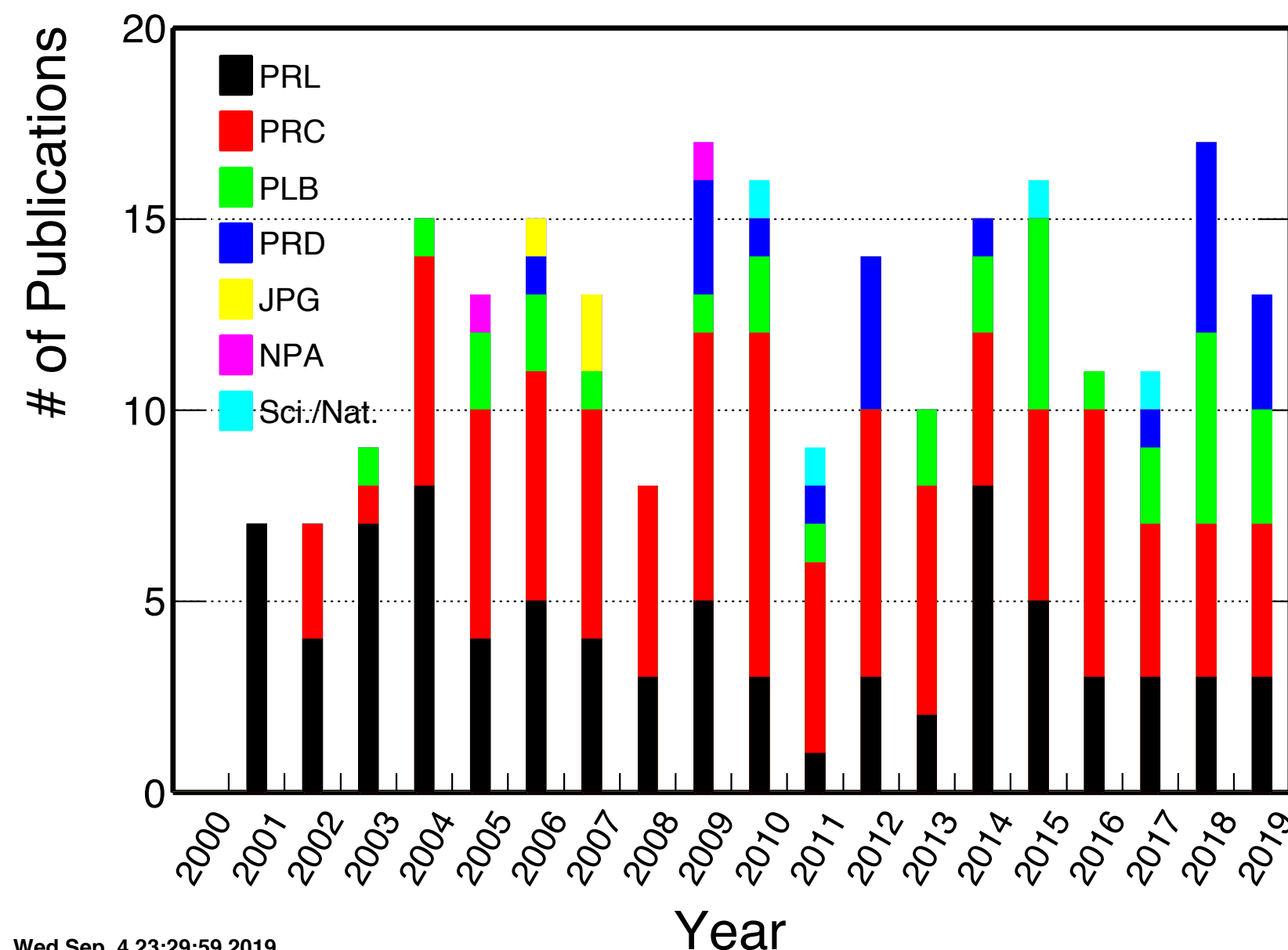
Magazine:

QGPs vorticity

DoE Science Highlights:

pion and (di)jet A_{LL} , $W A_L$, D^0 flow, Λ polarization

Publication record



Continued strong publication and presentation record across all Physics Working groups

19+1 talks + 45 posters
- Quark Matter

24 talks + 5 posters (CEU)
- DNP conference

Wed Sep 4 23:29:59 2019

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

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**

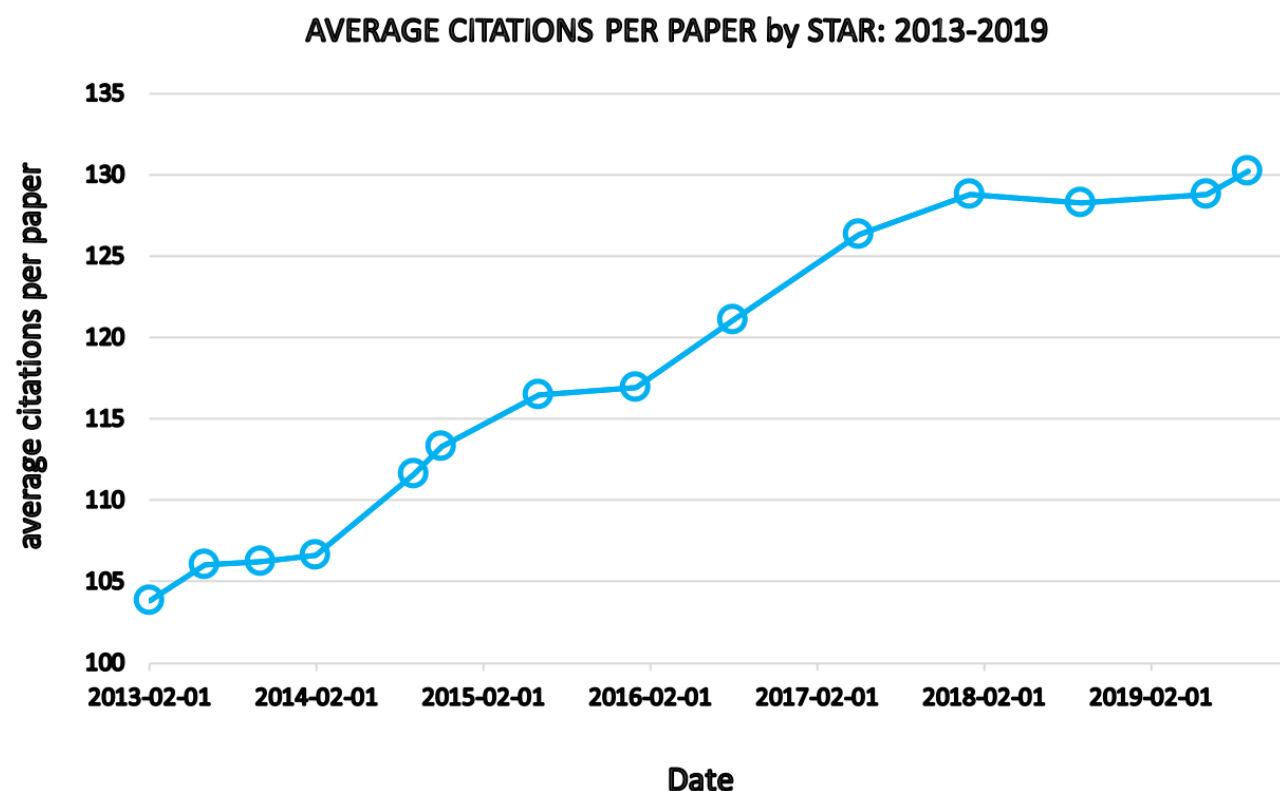
2018: 11 + 19

2017: 11 + 14

2016: 11 + 11

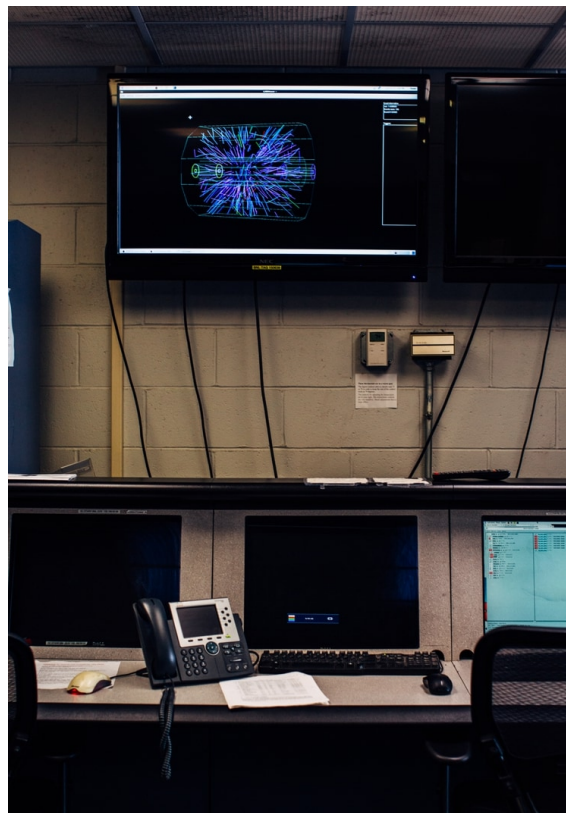
* Don't count STAR NIM article

** "Beam energy dependence of moments of the net-charge multiplicity distributions in Au+Au collisions at RHIC"
PRL 113 (2014) 092301



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**

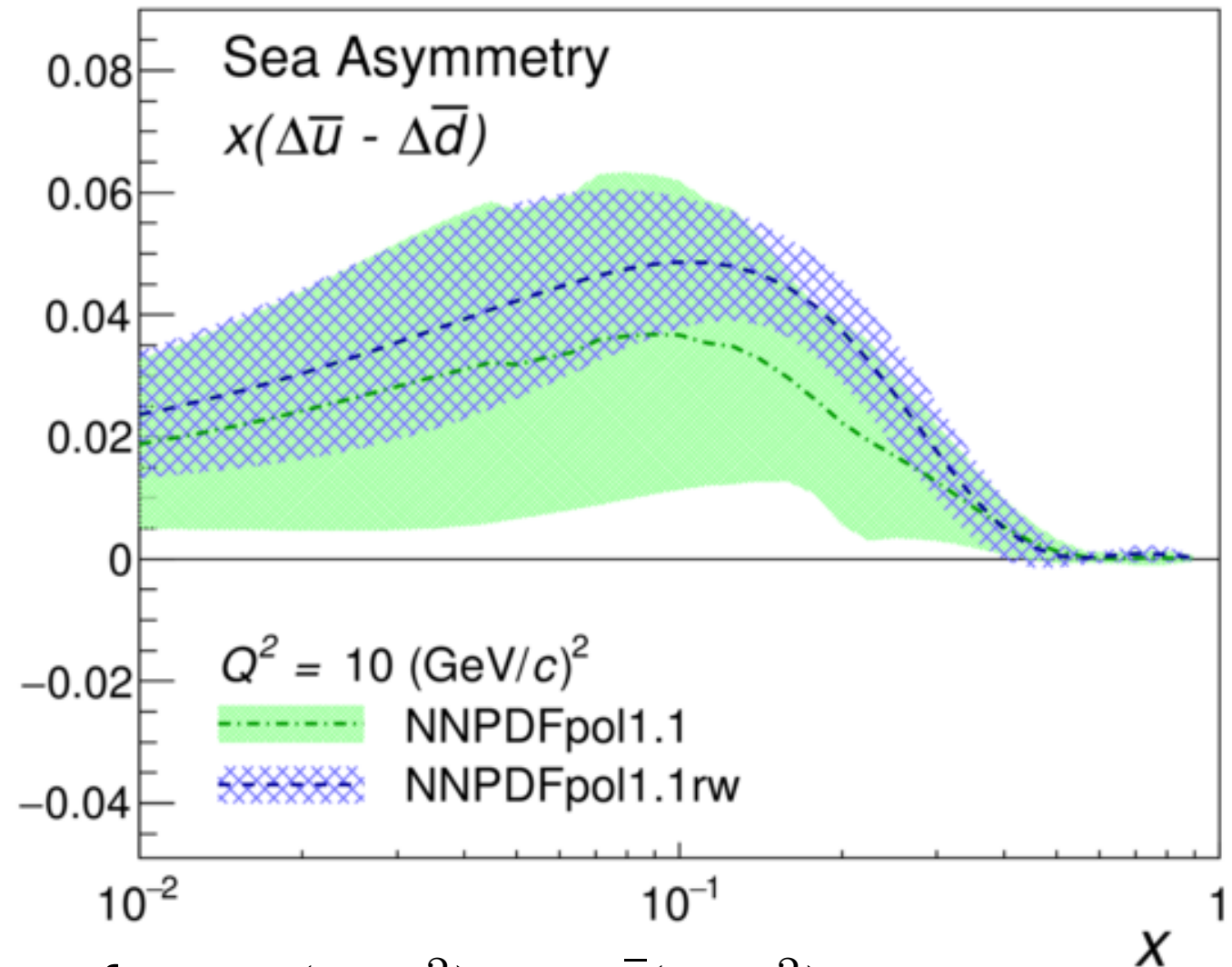
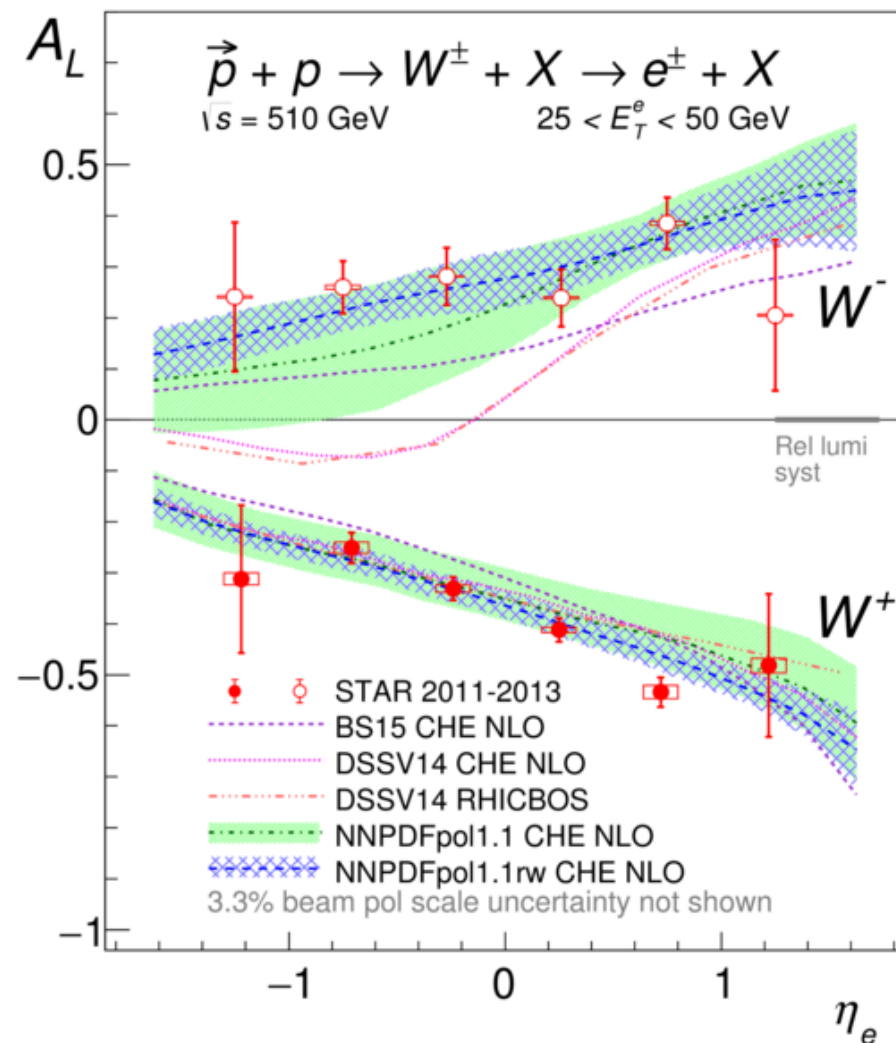
Behold the Relativistic Heavy Ion Collider.”

Sea quark contribution to proton's spin



PRD 99 (2019) 051102: Run-13

$W^\pm$ 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 $Q^2 = 10 \text{ (GeV/c)}^2$

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

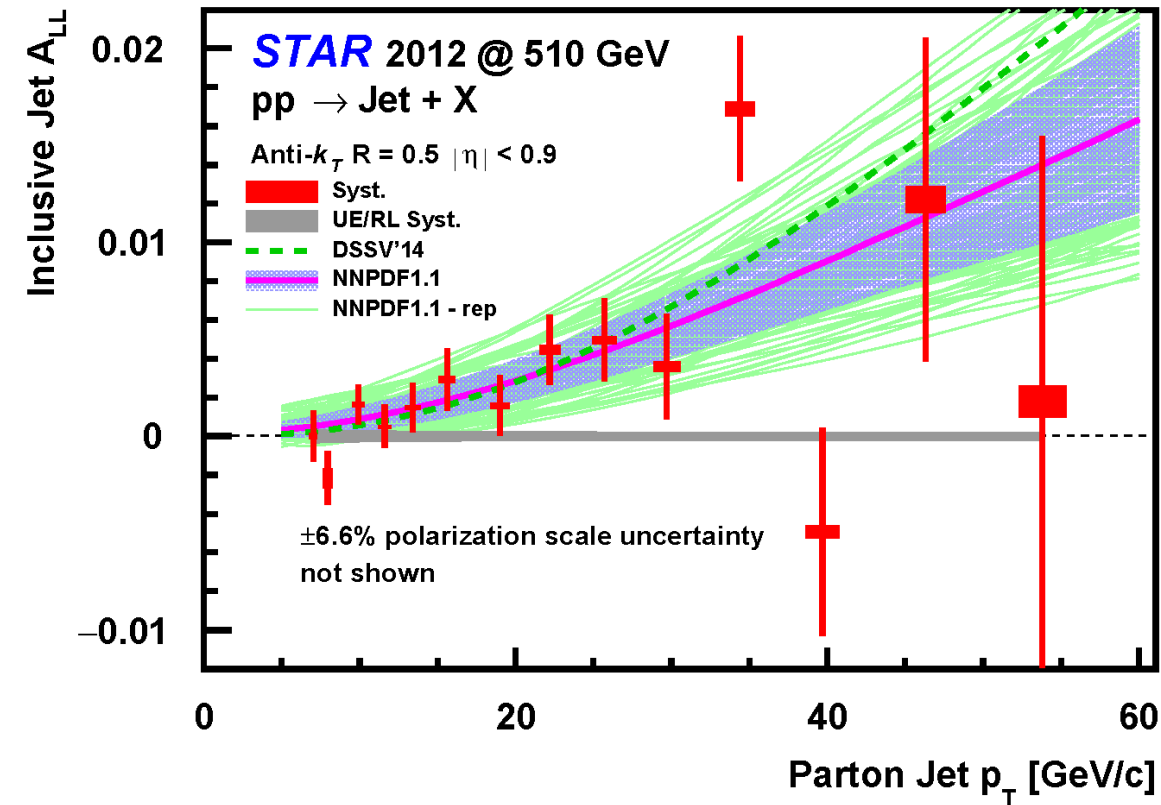
Gluon contribution to proton's spin



PRD 100 (2019) 052005: Run-12

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

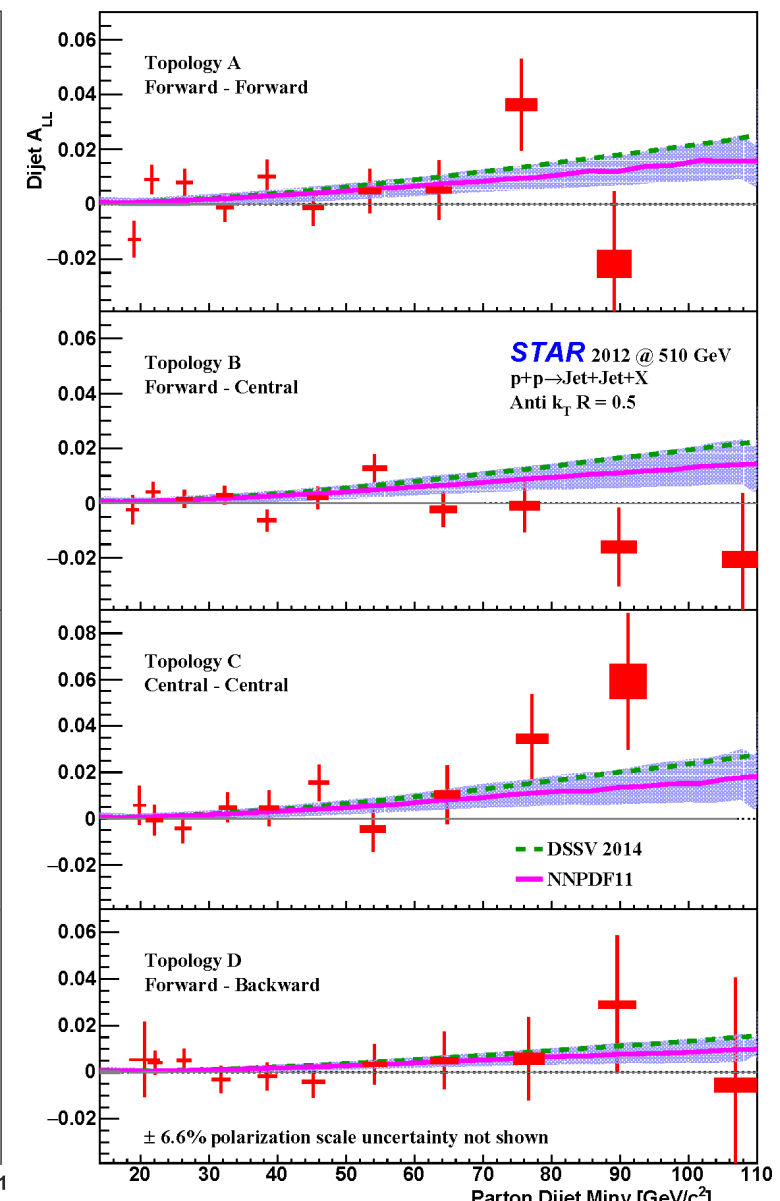
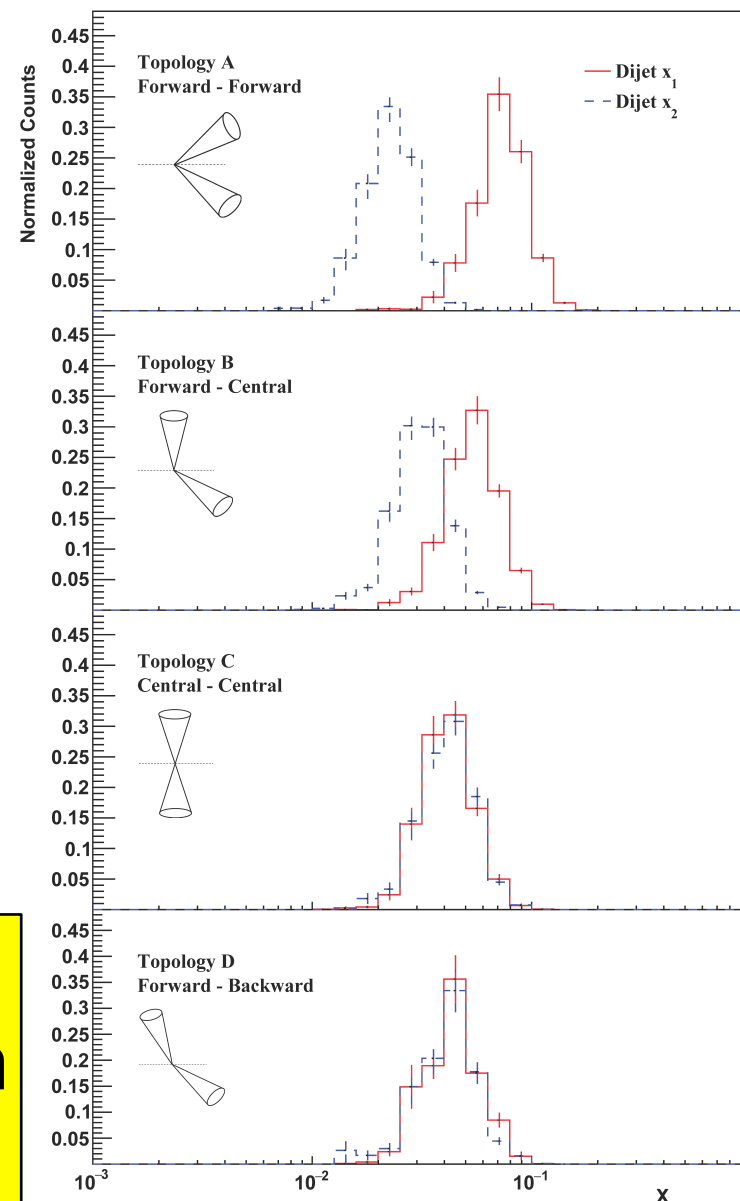
Inclusive jets: **key new constraints on magnitude of gluon polarization**



Dijets: different topologies access different x regions

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

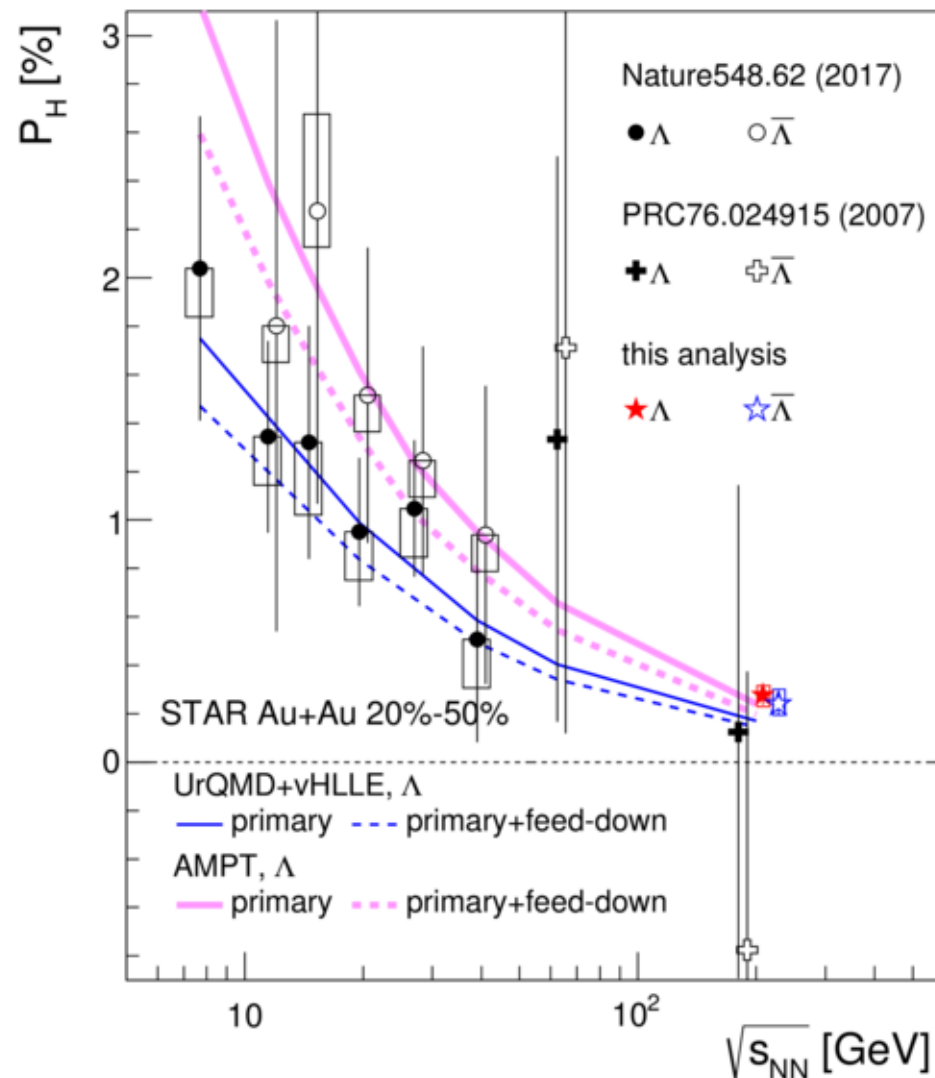
Region $x < 0.05$ previously largely unconstrained by data in global analyses of polarized PDFs



Λ polarization in beam direction



PRC 98 (2018) 014910: Run-10, Run-11, and Run-14



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

5-7 σ significance -
comparable to 7.7-39 GeV combined result
Strong centrality dependence

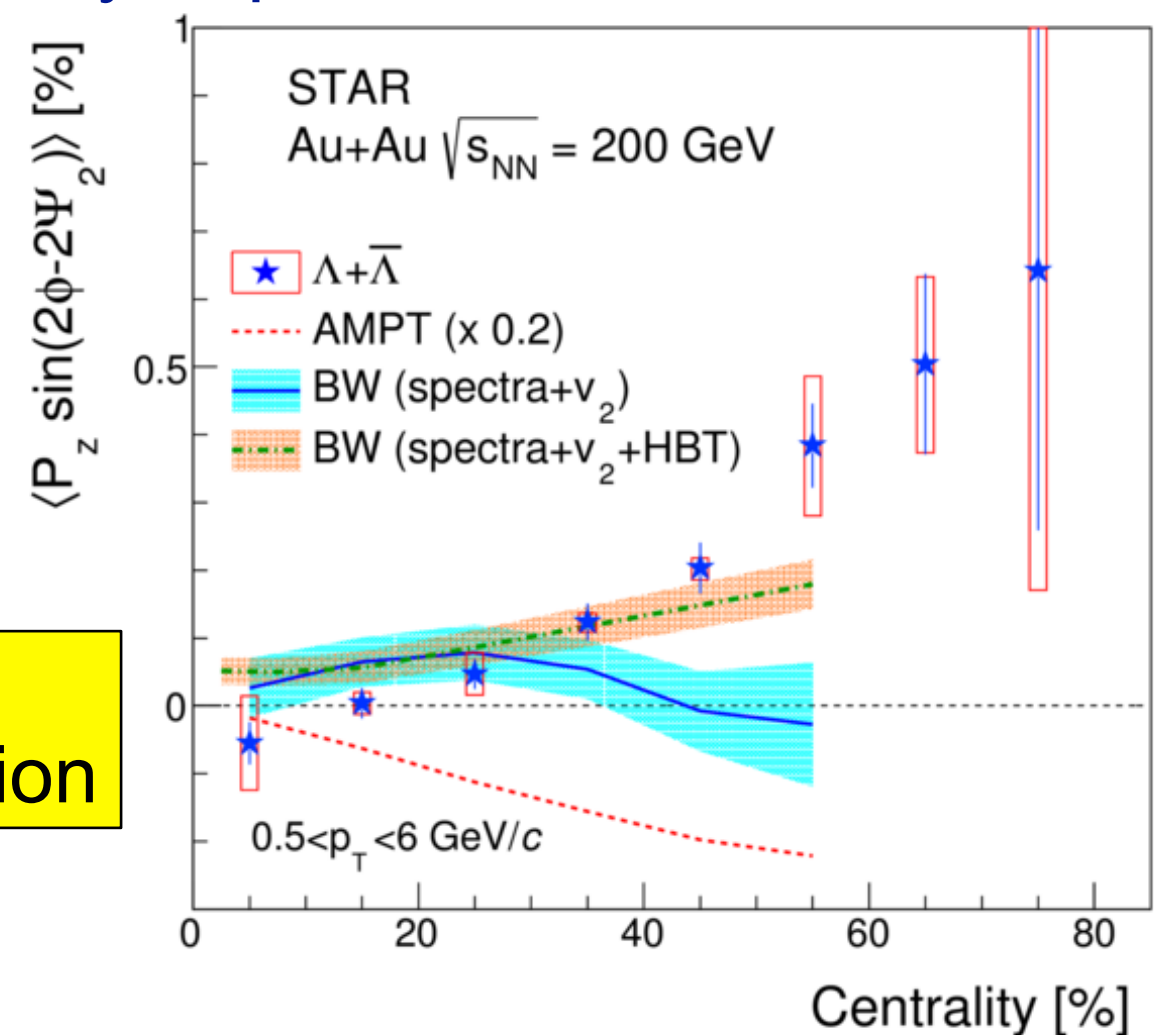
arXiv: 1905.11917 accepted PRL: Run-14

First observation of local quadrupole structure of polarization along beam direction

Opposite trend to AMPT predictions

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

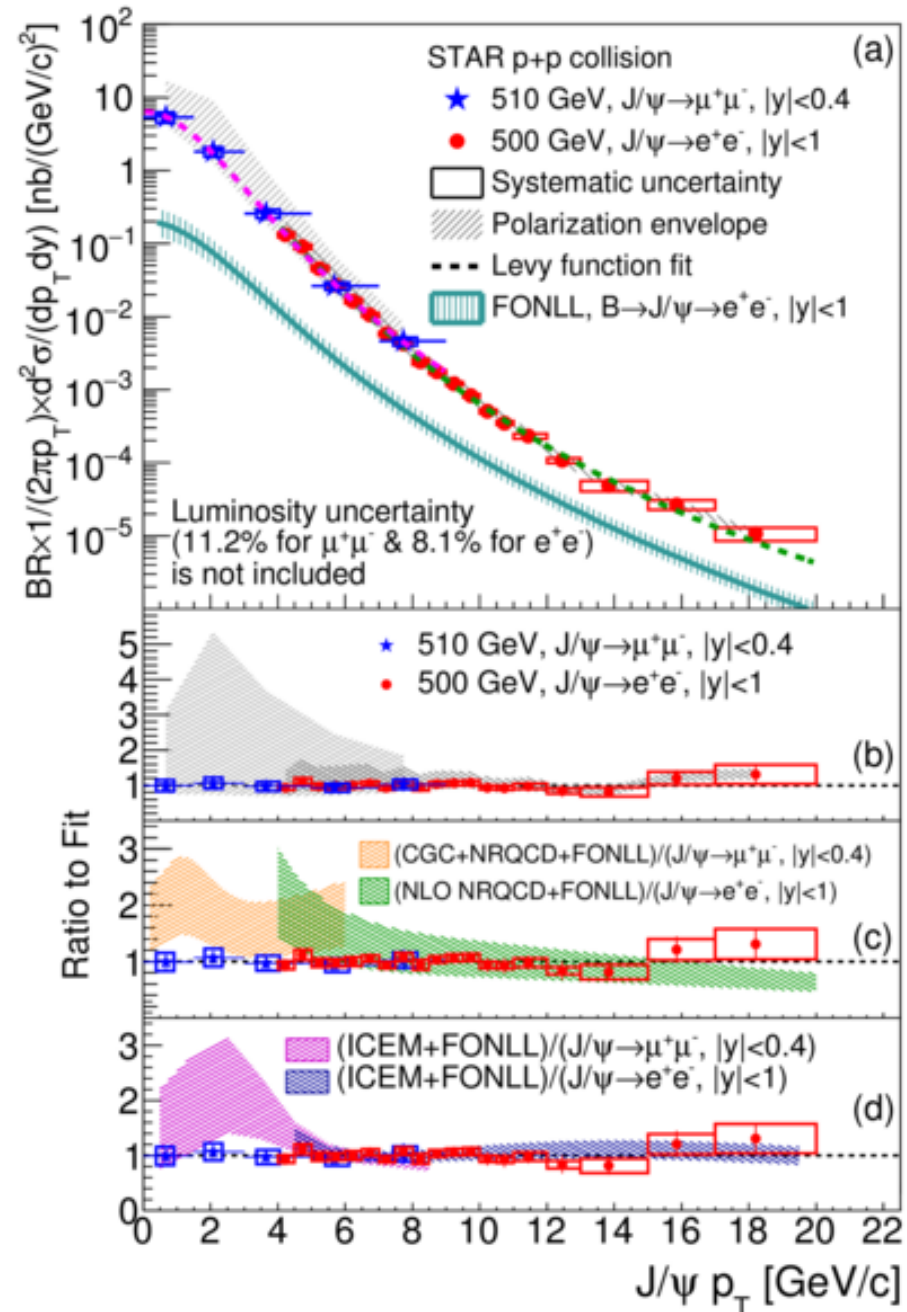
No significant p_T dependence



J/ψ production in pp and $Au-Au$



arXiv:1905.06075, accepted PRD: Run-11 and Run-13



First MTD publications

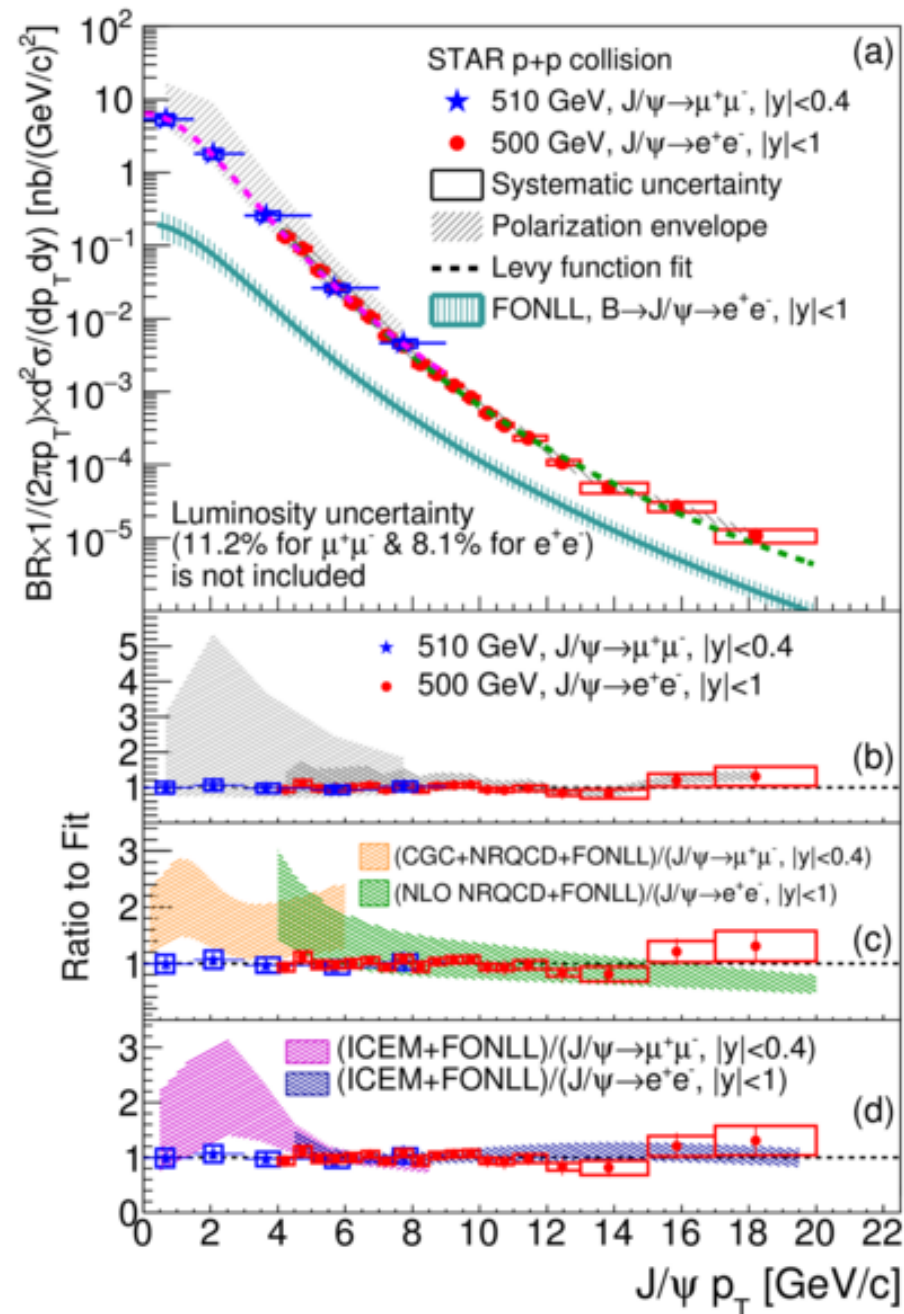
pp differential cross-section reasonably reproduced by theory

J/ψ production in pp and $Au-Au$



arXiv:1905.06075, accepted PRD: Run-11 and Run-13

PLB 797 (2019) 134917: Run-14



pp differential cross-section reasonably reproduced by theory

Suppression increases with centrality

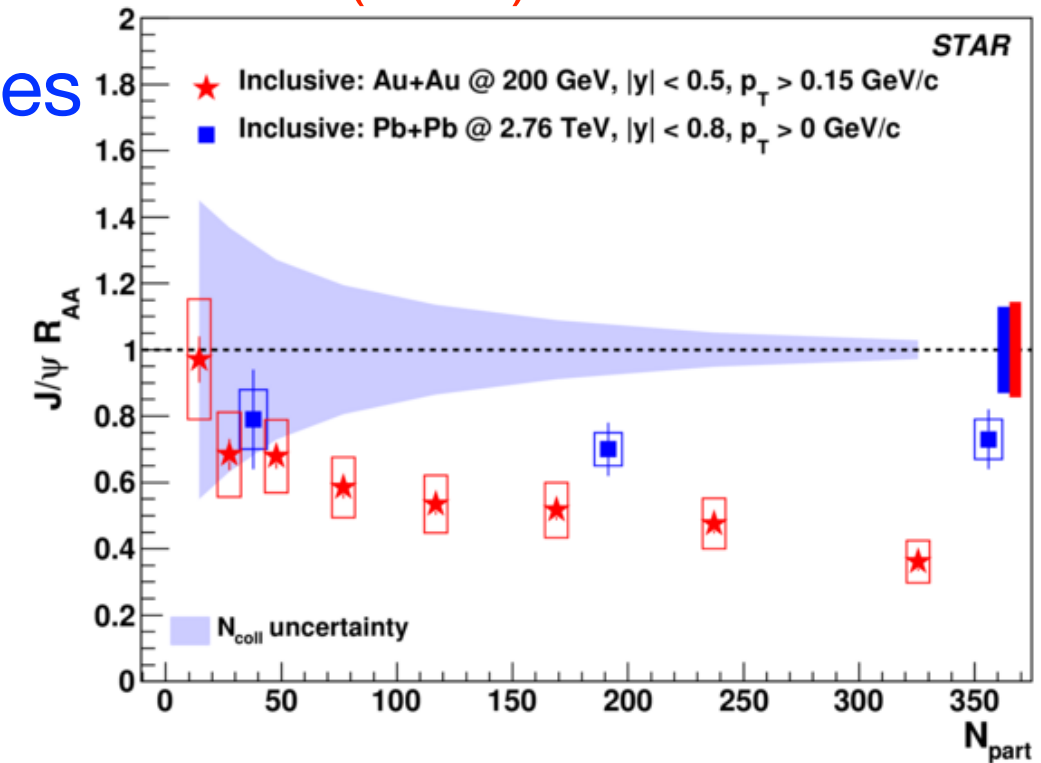
Consistent with:

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

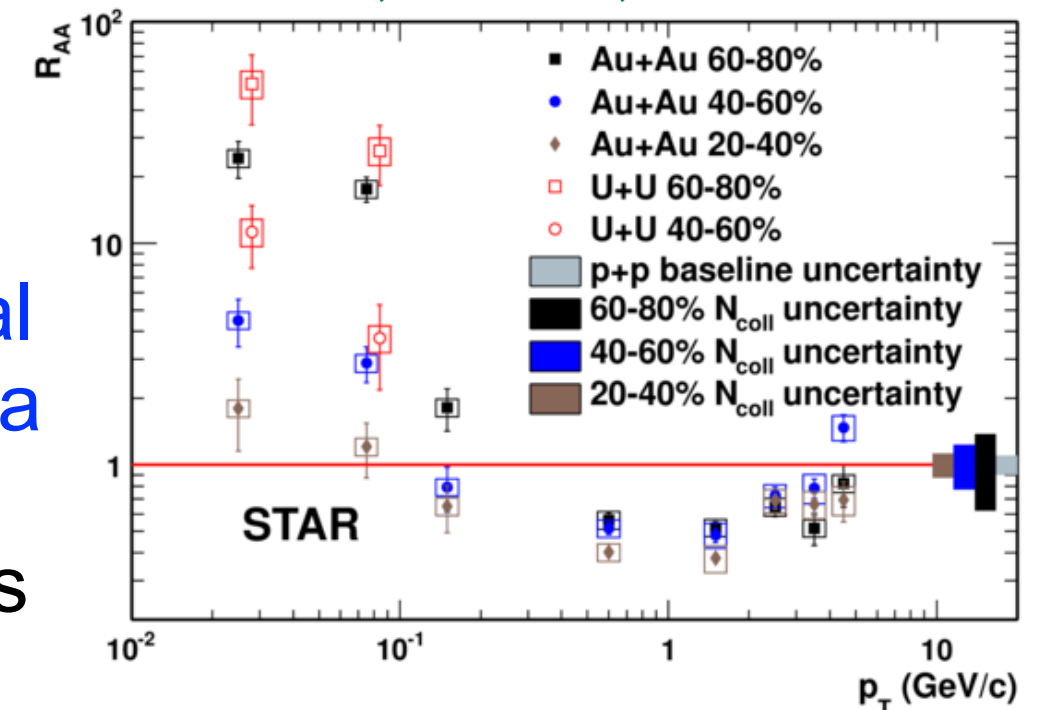
First MTD publications

Significant low p_T excess in peripheral $Au-Au$ and $U-U$ data

- Coherent photo-nucleus interactions



arXiv:1904.11658, accepted PRL: Run-10, Run-11, and Run-12



Charm-medium interactions

PRC 99 (2019) 034908: Run-14

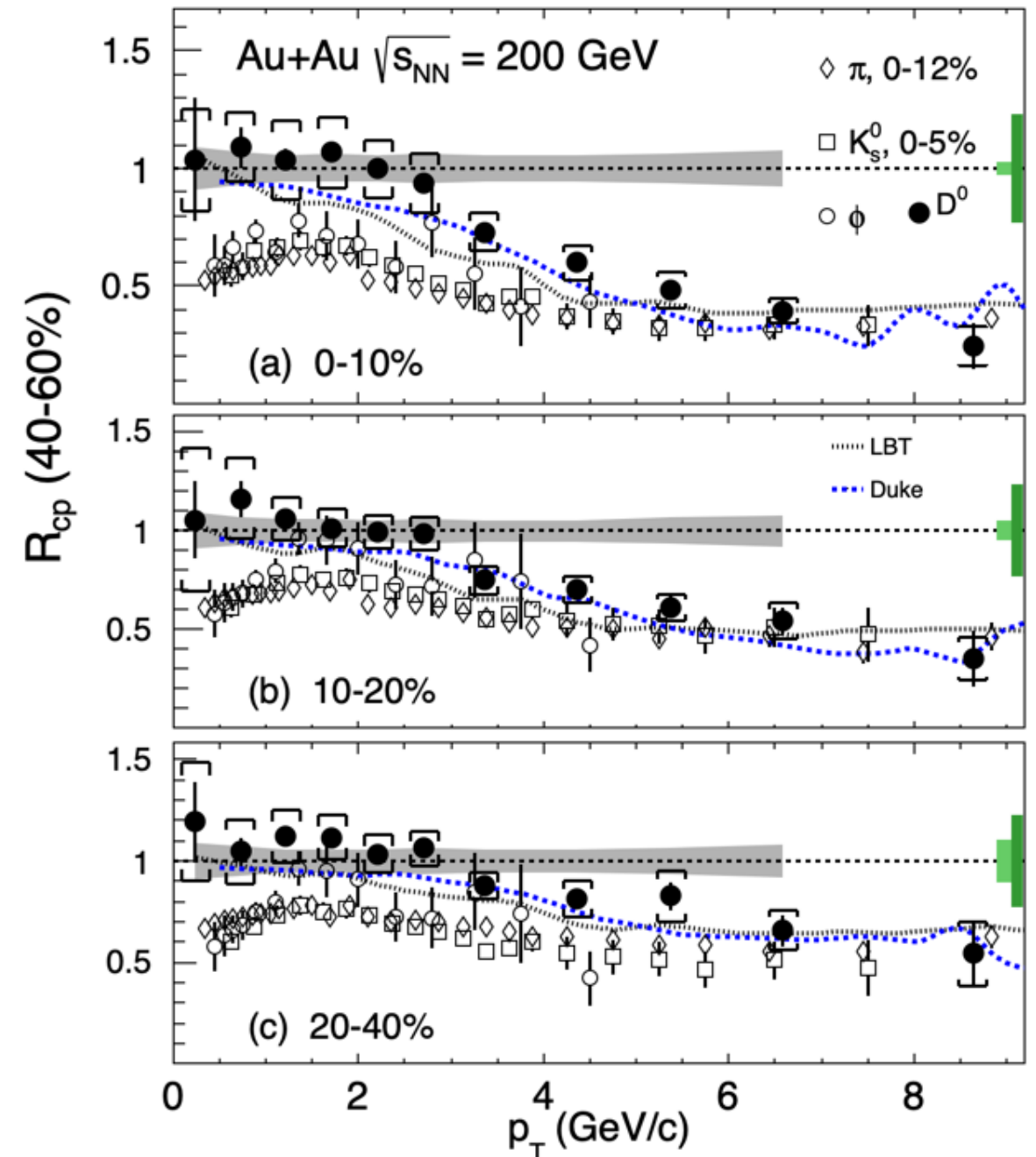
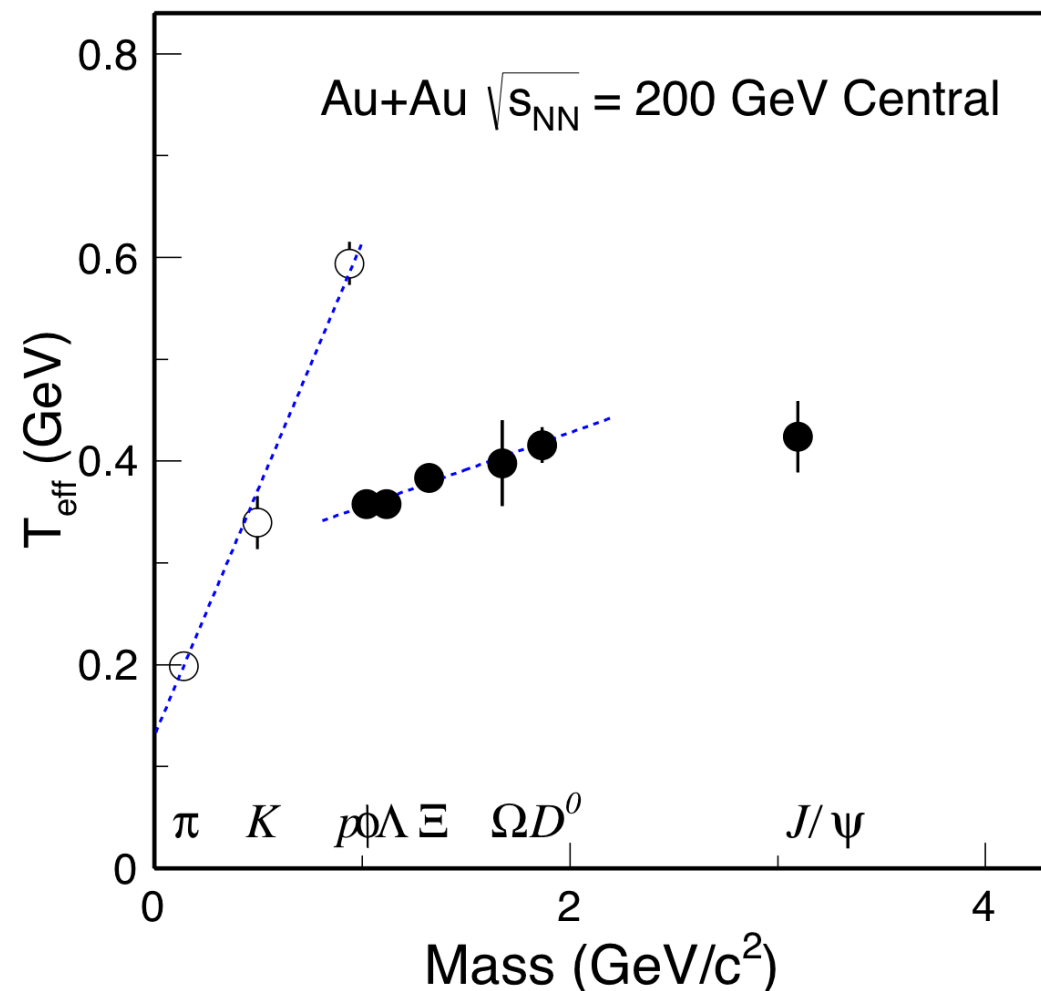
HFT data :

Greatly enhanced precision at low p_T

R_{CP} :

Comparable to light hadrons for $p_T > 5 \text{ GeV}/c$

- charm quarks lose significant energy traversing QGP



D^0 less radial collectivity than π , K , p
Similar kinetic freeze-out as ϕ and Ξ

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

Partial thermalization of source

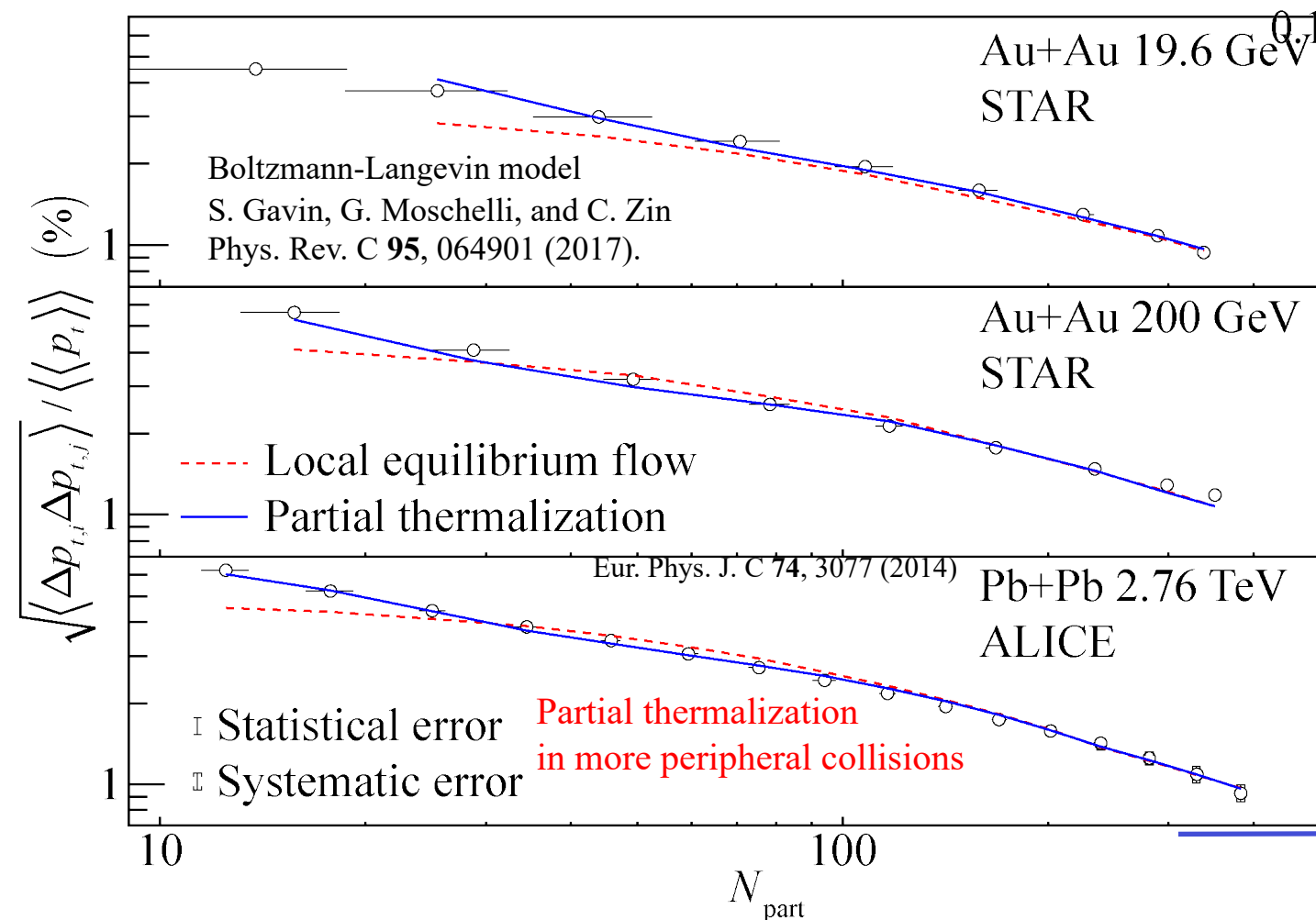
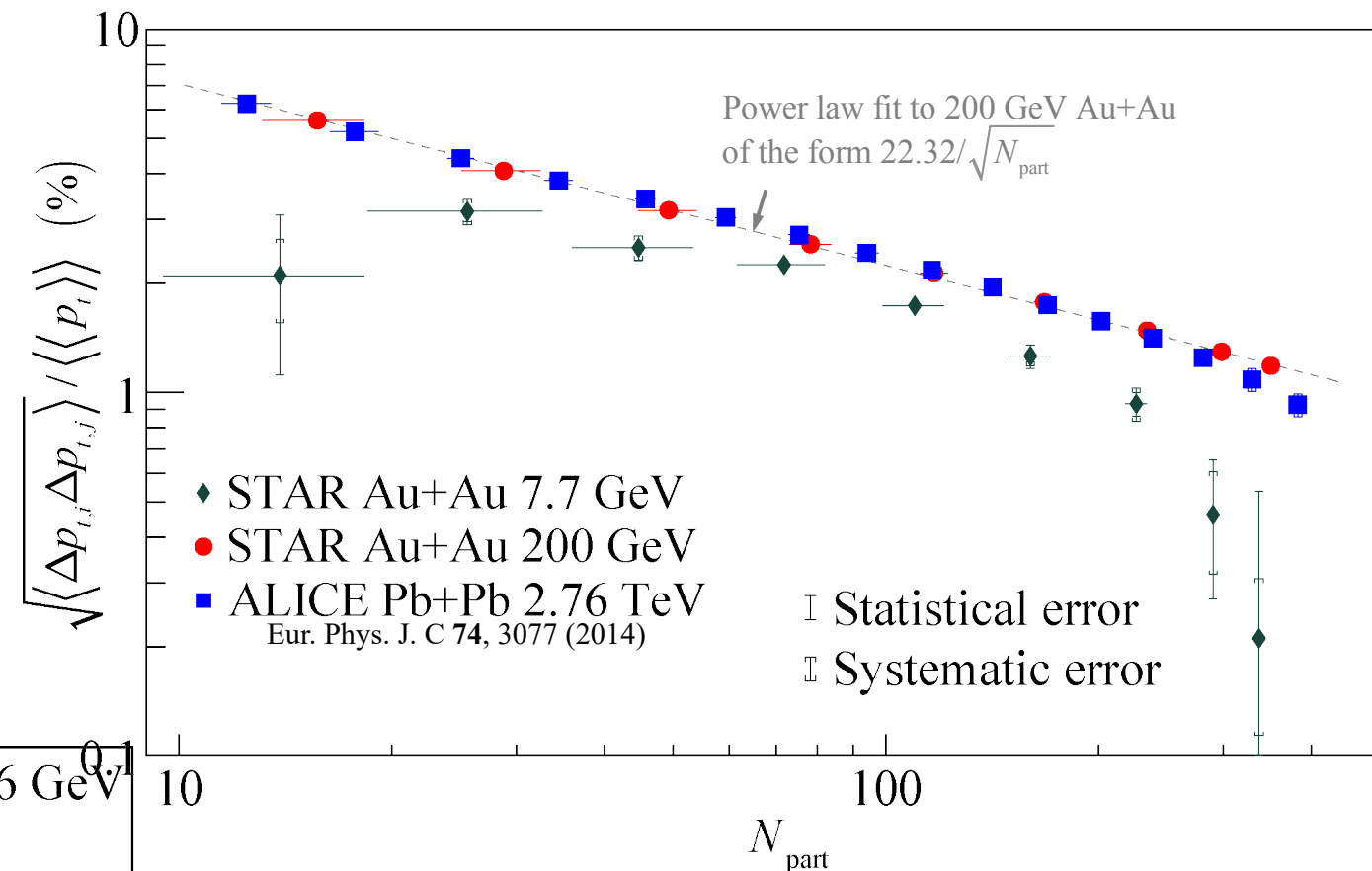


PRC 99 (2019) 44918: Run-10, Run-11, and Run-14

Relative dynamical correlations scale as $1/(N_{\text{part}})^{1/2}$ at 200 GeV and 2.76 TeV

- particle production from uncorrelated sources

Scaling breaks for 7.7 GeV data



Evidence for only partial thermalization in peripheral events

Theory calculations needed for lower $\sqrt{s_{\text{NN}}}$

No non-monotonic behavior observed as function of $\sqrt{s_{\text{NN}}}$

Constraining initial conditions



PLB 790 (2019) 81: Run-11

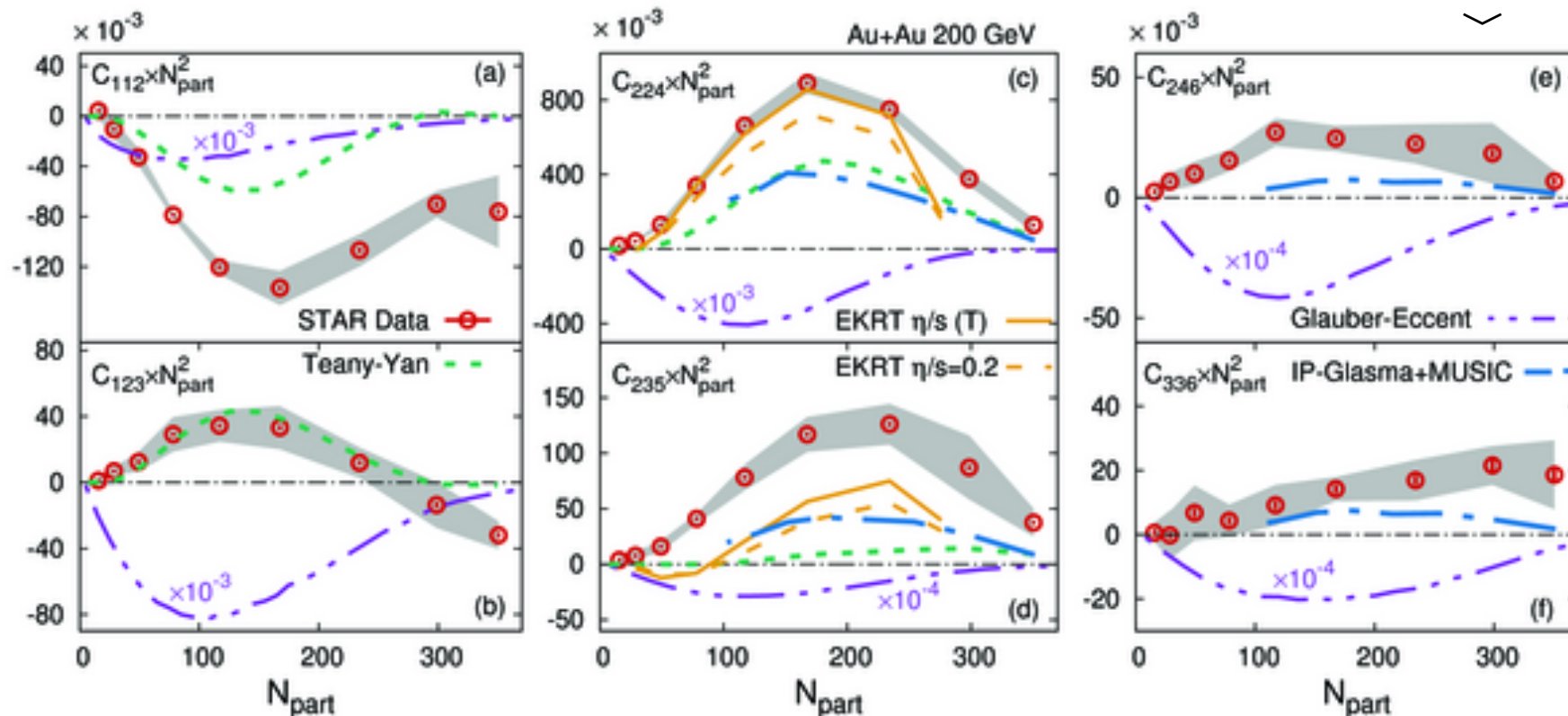
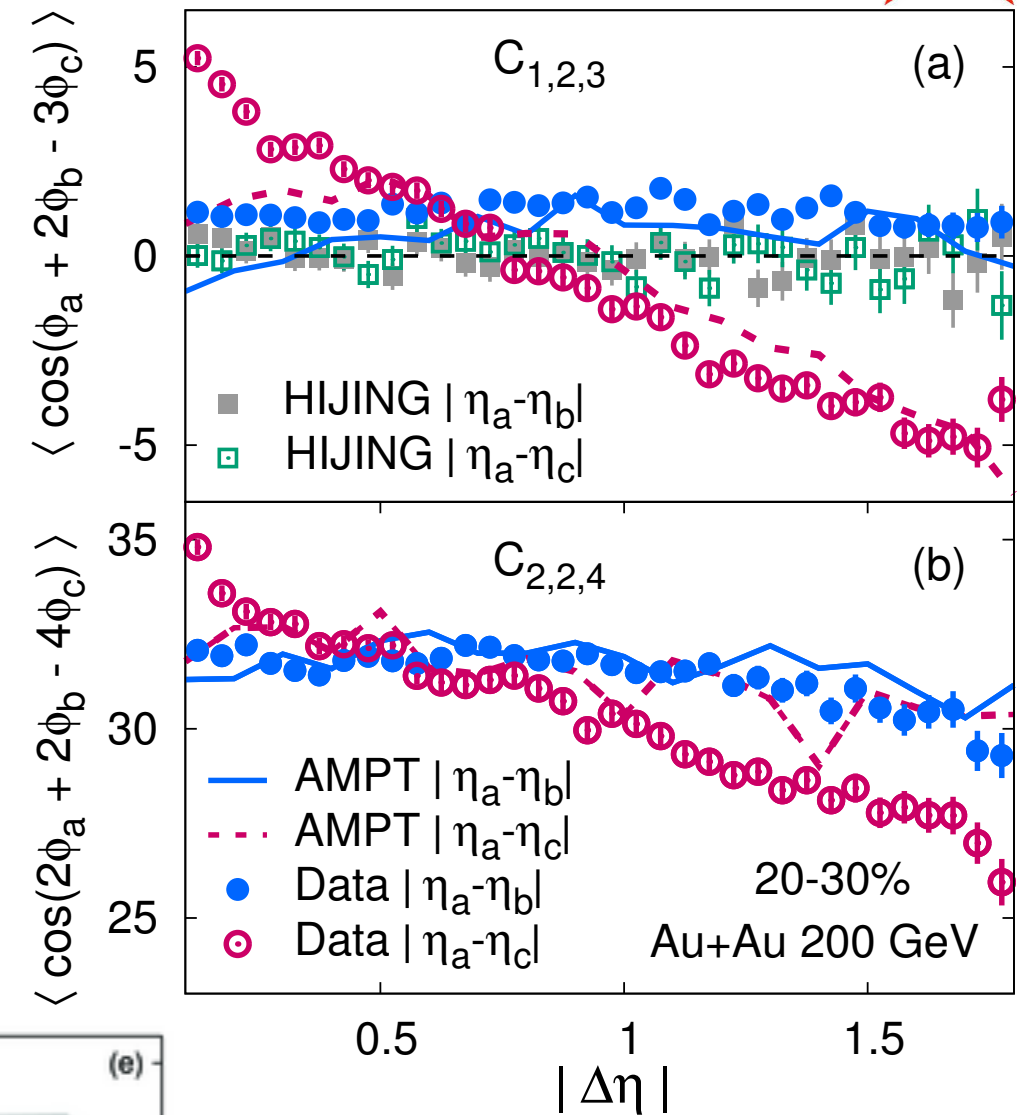
3-particle mixed-harmonic correlations

$$C_{m,n,m+1} = \langle \cos(m\phi_a + n\phi_b - (m+n)\phi_c) \rangle$$

$$m, n = 1-3$$

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

$\Delta\eta$ dependence - longitudinal invariance broken?



Boost-invariant hydro models (constrained by global data)

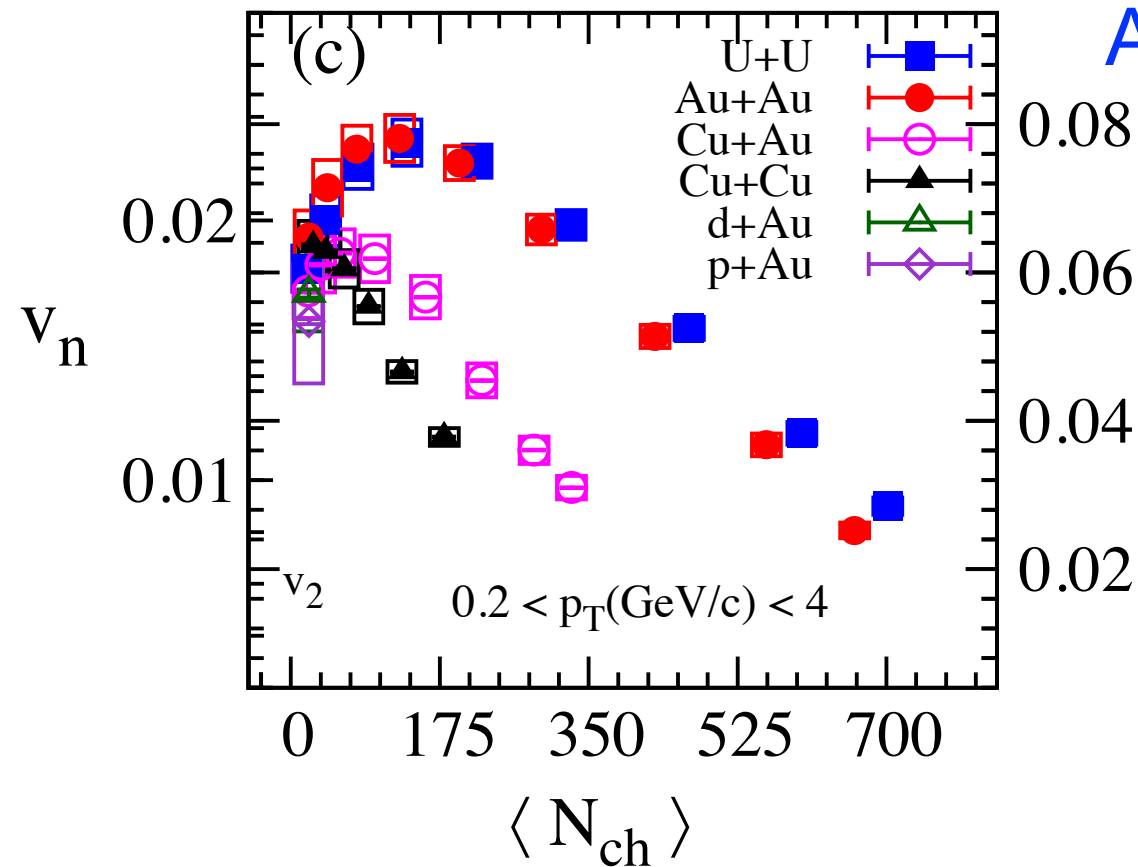
- None match all data

Constrain T-dependence of transport coefficients

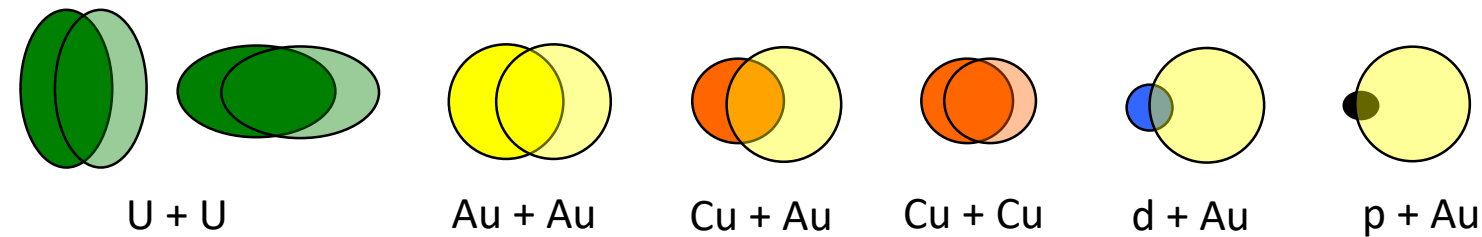
Constraining system size dependence



PRL 122 172301 (2019): Run-5, Run-8, Run-11, Run-12, First Run-15 publication



Azimuthal harmonics: large & small systems

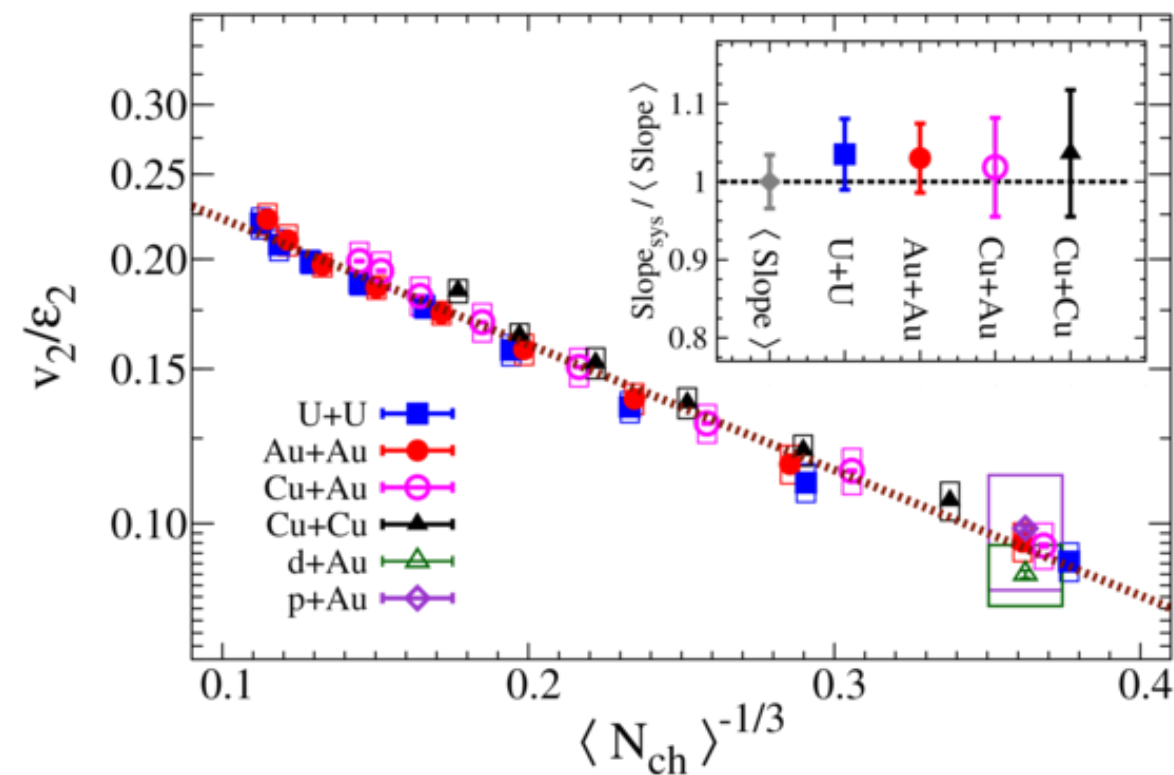


v_2 system dependent

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

$\ln(v_2/\epsilon_2)$ scales with $N_{ch}^{-1/3}$

- independent of system



Combining data different species
—> Insights into initial geometry
fluctuations and role of viscous
hydro. attenuation on v_n

Constraining hadron production models

PRC 100 (2019) 14902: Run-10-Run-14

Correlated production of 2 different conserved charges, crucial tests for hadronic models

Baryon-strangeness correlations

$C_{p,k}$ = off-diagonal cumulants/diagonal cumulants

(Remove trivial volume dependence)

Resonance decay $\Lambda(1520) \rightarrow p + K^-$

increase net-p, decrease net-K

—> anti-correlation

—> negative $C_{p,k}$ at lower energies

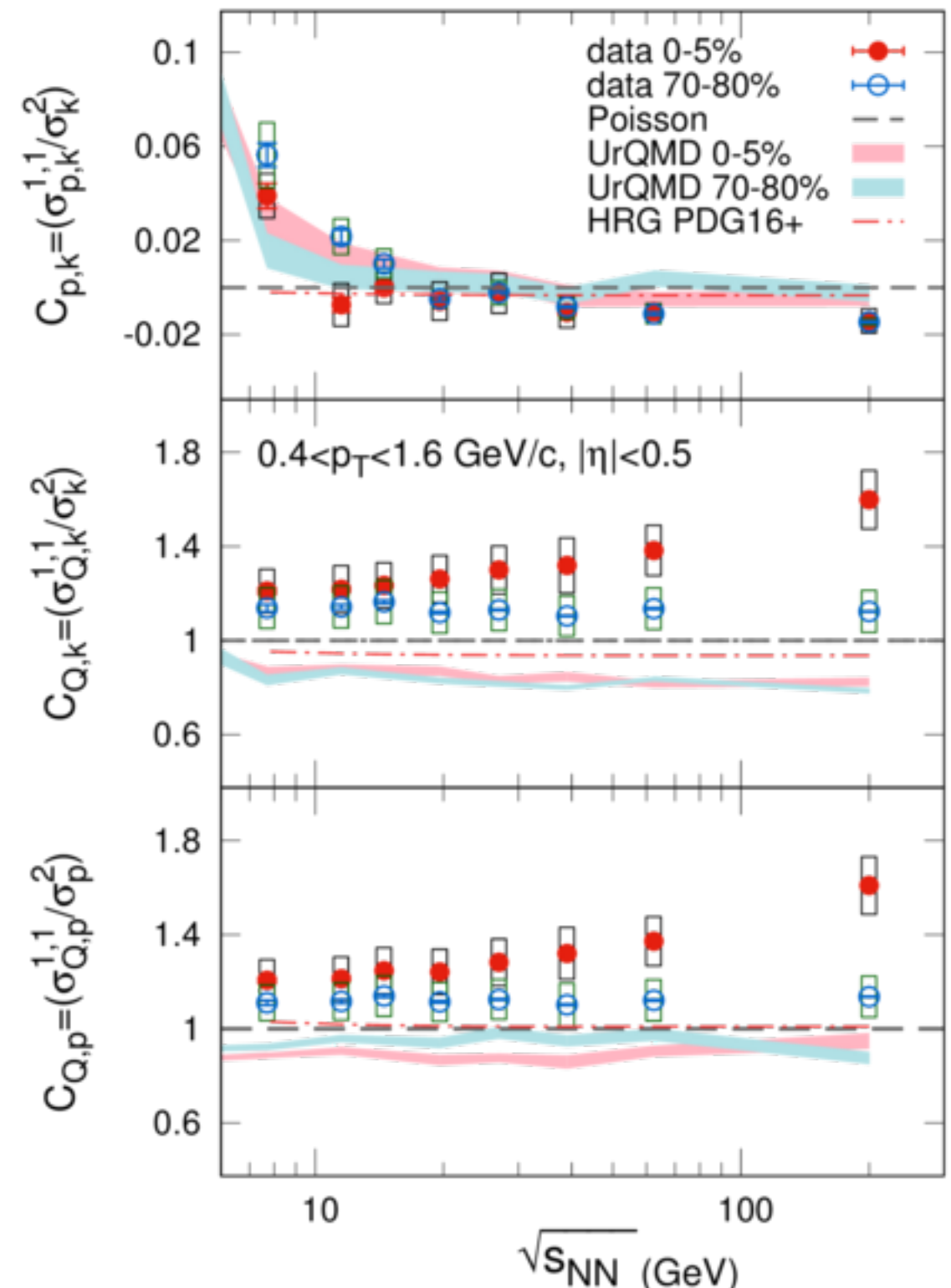
were hadronic medium might dominate

Data - negative at high beam energies

- positive at low beam energies

UrQMD and HRG:

- positive, or consistent with 0



Production from QGP and hadronic phases not well modeled

Nucleon freeze-out volume



PRC 99 (2019) 64905: Run-10, Run-11, and Run-14

Light nuclei: final state coalescence

Invariant yield nuclei $\propto$ invariant yield nucleons

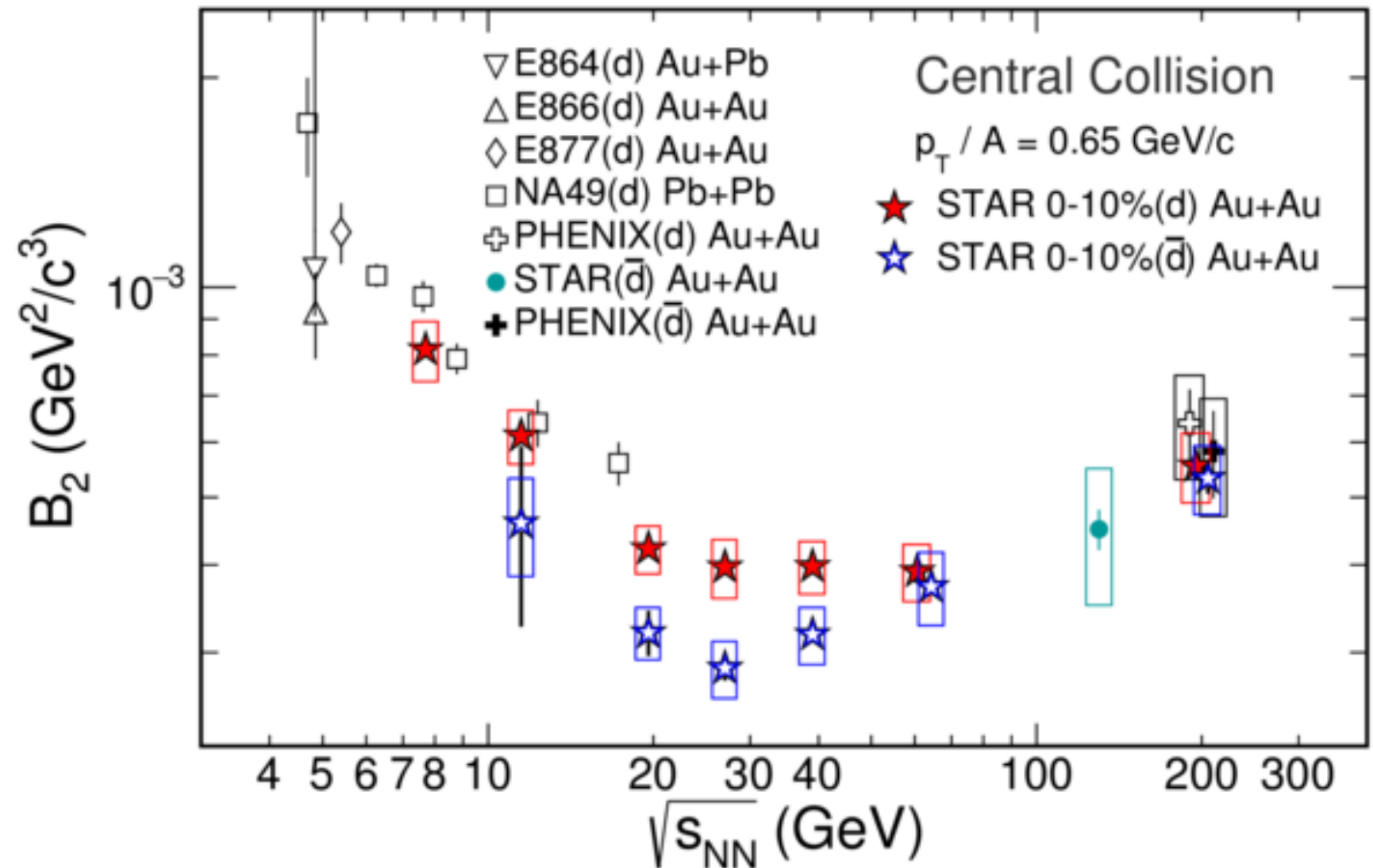
$$E_A \frac{d^3 N_A}{d^3 p_A} \approx B_A \left(E_p \frac{d^3 N_p}{d^3 p_p} \right)^A$$

B_A

Reflects probability of
nucleon coalescence
Related to local nucleon
density

$$B_2 \propto 1/V_{eff}$$

Broad minimum:
implications for
change in equation
of state?



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

B_2 : antideuteron < deuteron

Correlation volume : antideuteron > deuteron

Bound proton- Ω states



PLB 790 (2019) 490: Run-11 and Run-14

Ratio peripheral/central collisions:

Sensitive to presence of nucleon- Ω bound state

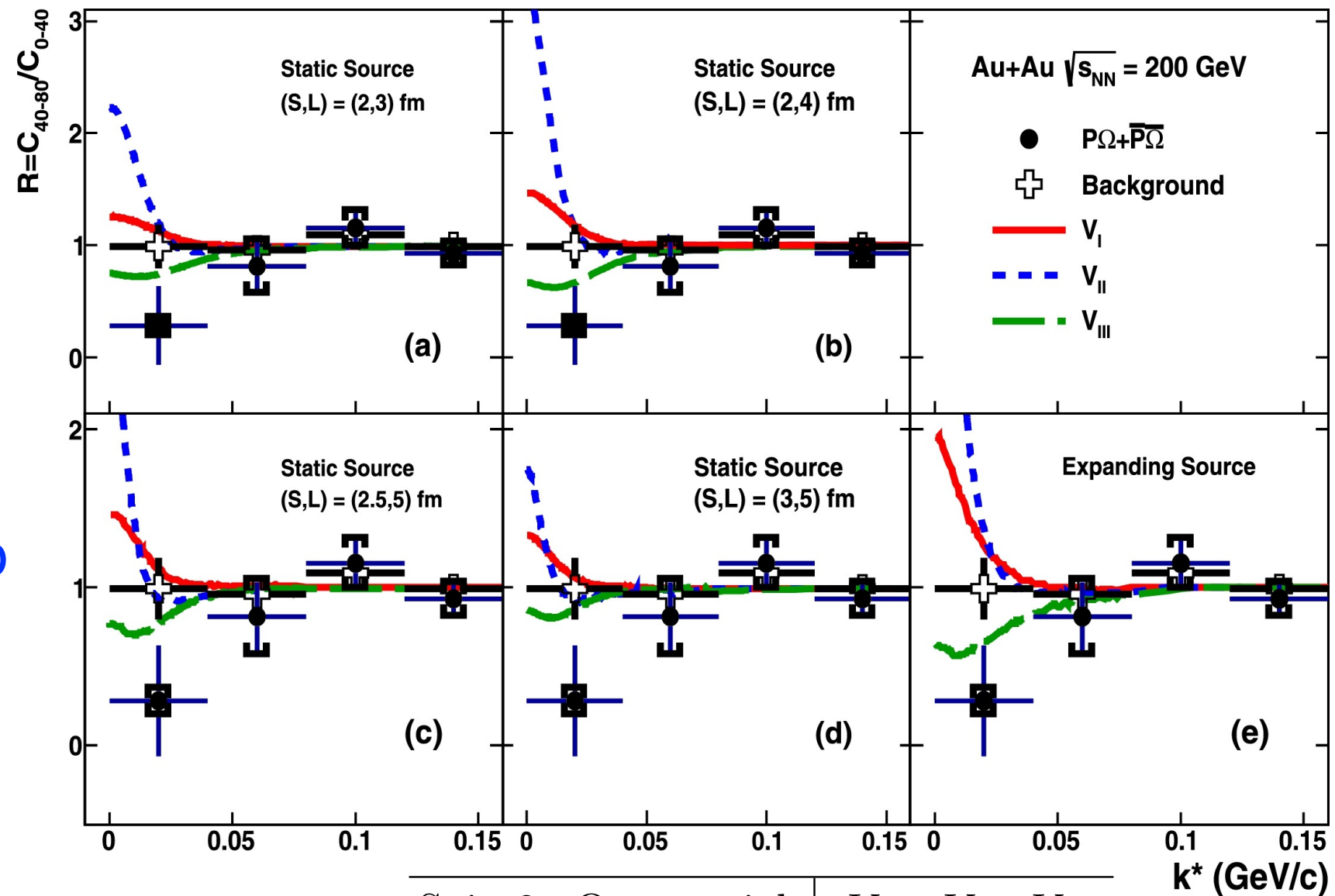
Less sensitive to Coulomb interaction

$k^* < 40$ MeV/c:

Data < 1

Background = 1

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



Spin-2 p Ω potentials	V_I	V_{II}	V_{III}
E_b (MeV)	-	6.3	26.9
a_0 (fm)	-1.12	5.79	1.29
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 - [Run-10](#), [Run-11](#), and [Run-14](#)

Charge-dependent pair correlations relative to a third particle in p+Au and d+Au collisions at RHIC - [Run-3](#) and [Run-15](#)

First observation of directed flow of the D^0 and D^0 -bar in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV - [Run-14](#) and [Run-16](#)

Measurement of away-side broadening with self-subtraction of flow in Au+Au collisions at 200 GeV - [Run-11](#)

Bulk properties of the system formed in Au+Au collisions at $\sqrt{s_{NN}} = 14.5$ GeV using the STAR detector at RHIC - [Run-14](#)

Strange hadron production in Au+Au collisions at $\sqrt{s_{NN}} = 7.7, 11.5, 19.6, 27$ and 39 GeV - [Run-10](#)

Precise measurement of mass difference and binding energy B_Λ of hypertriton and antihypertriton - [Run-14](#) and [Run-16](#)

Measurements of dielectron production in Au+Au collisions at $\sqrt{s_{NN}} = 27, 39$ and 62.4 GeV from the STAR experiment - [Run-10](#) and [Run-11](#)

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

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

3.1B events each for Isobar

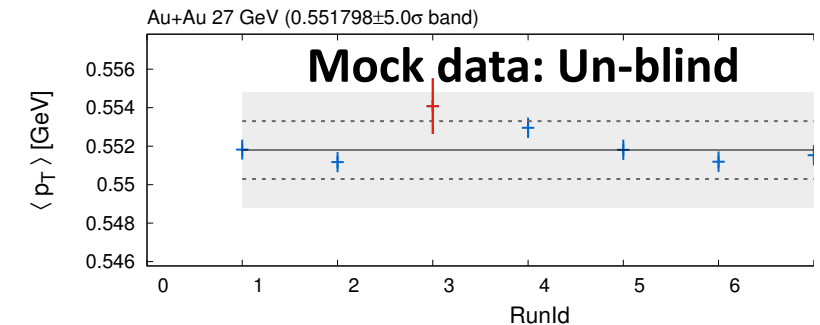
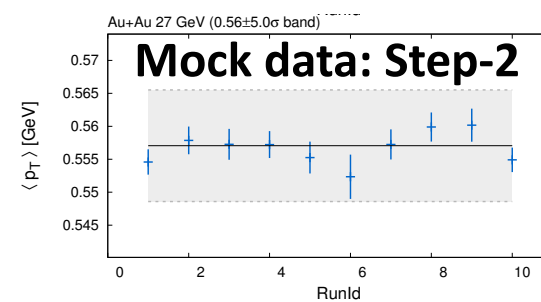
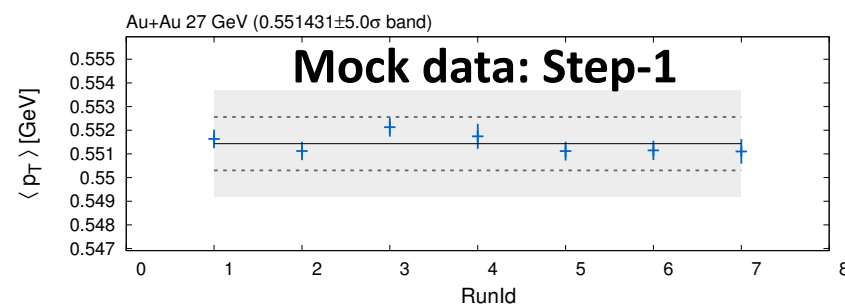
GPC already formed to allow rapid publication of final results

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

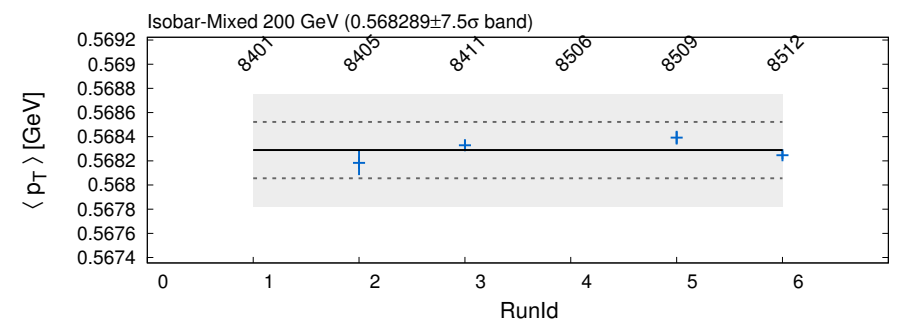
Initial steps: “Mock data challenge” Sanity-check of feasibility and implementation



- 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

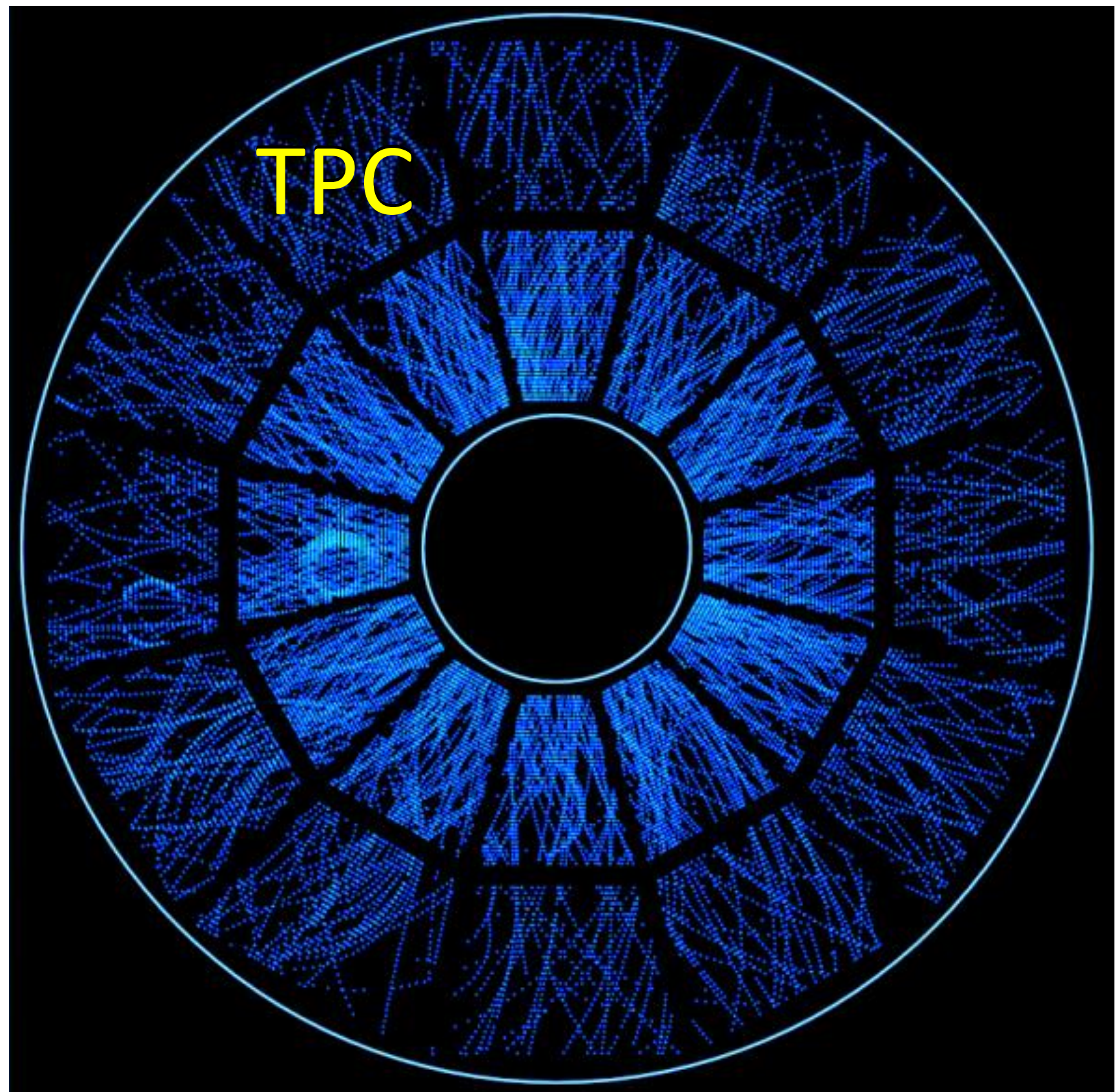


Table 7: Event statistics (in millions) needed in the collider part of the BES-II program for various observables. This table updates estimates originally documented in STAR Note 598.

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

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

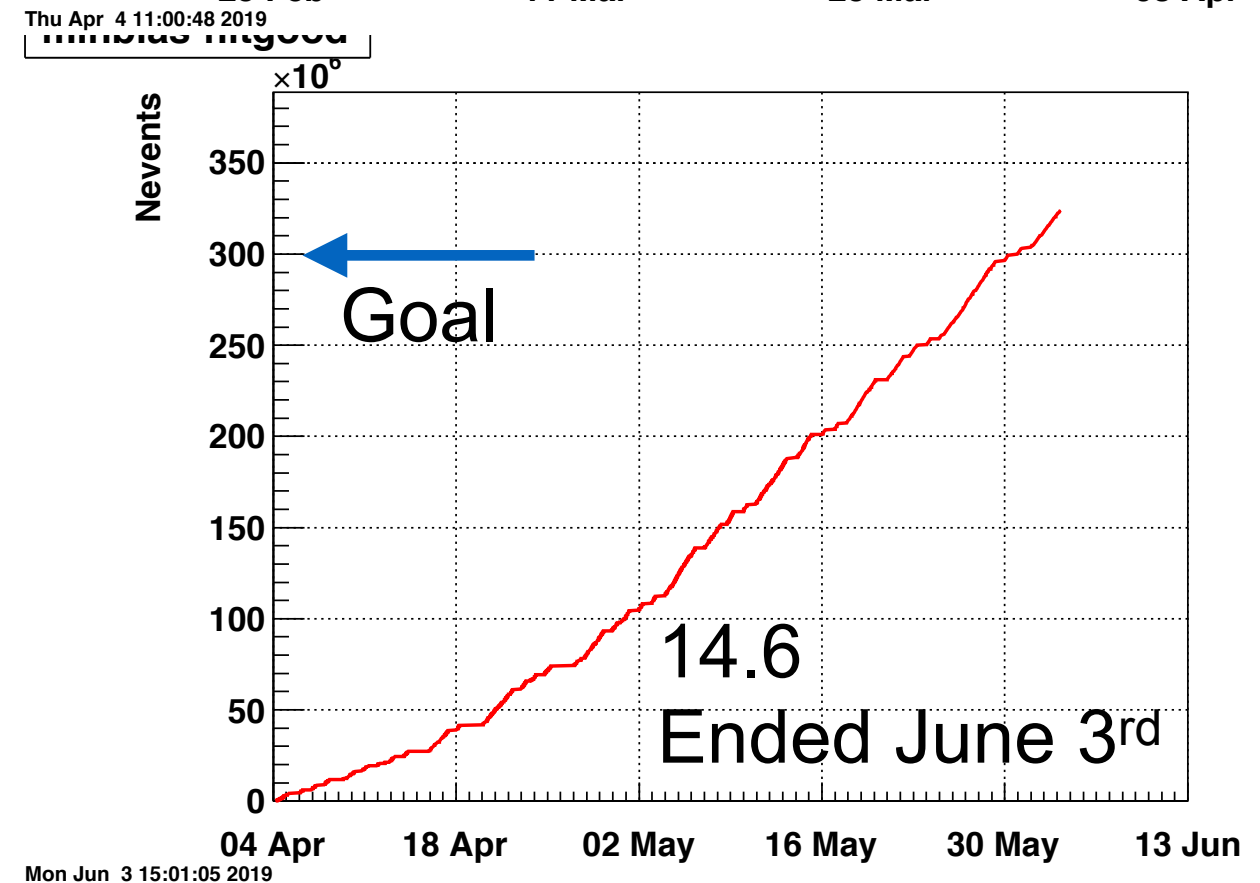
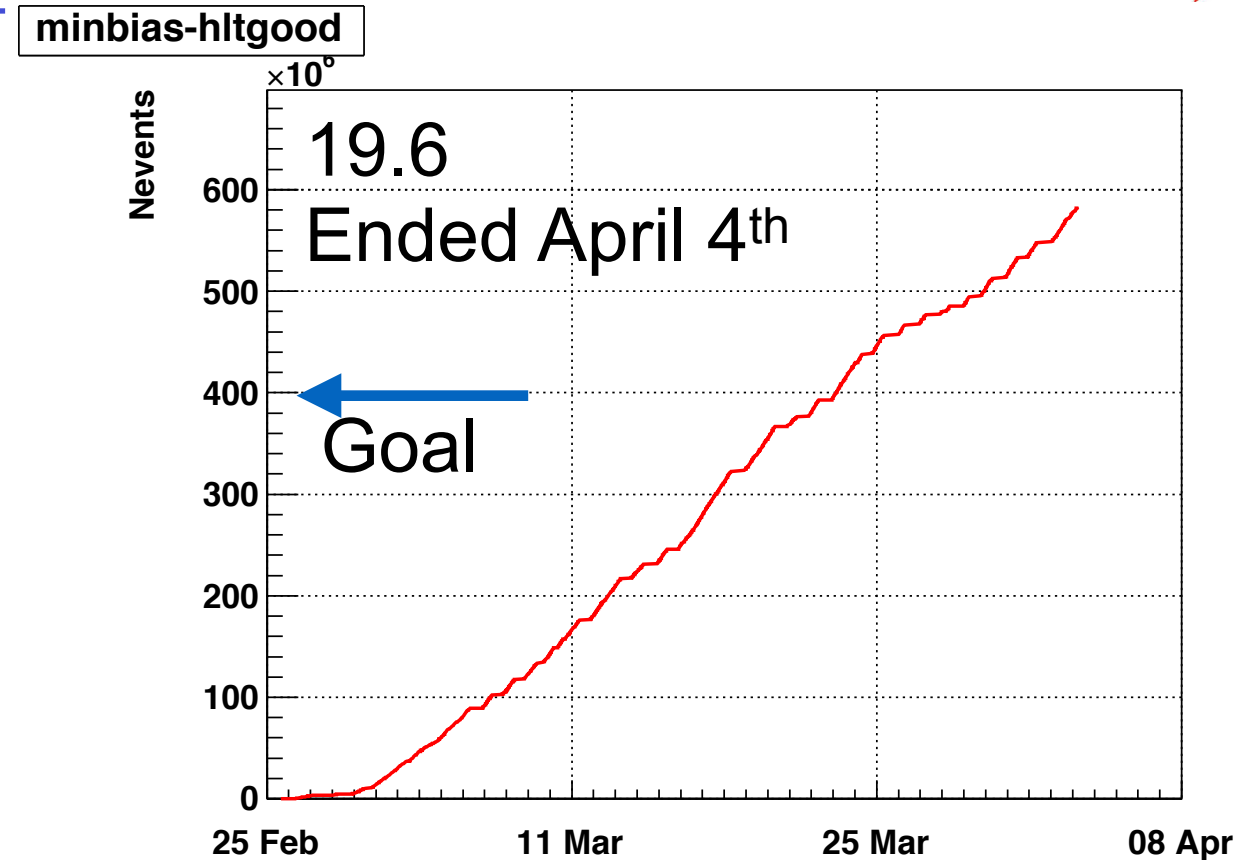
Run 19 - Overall went very well



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:

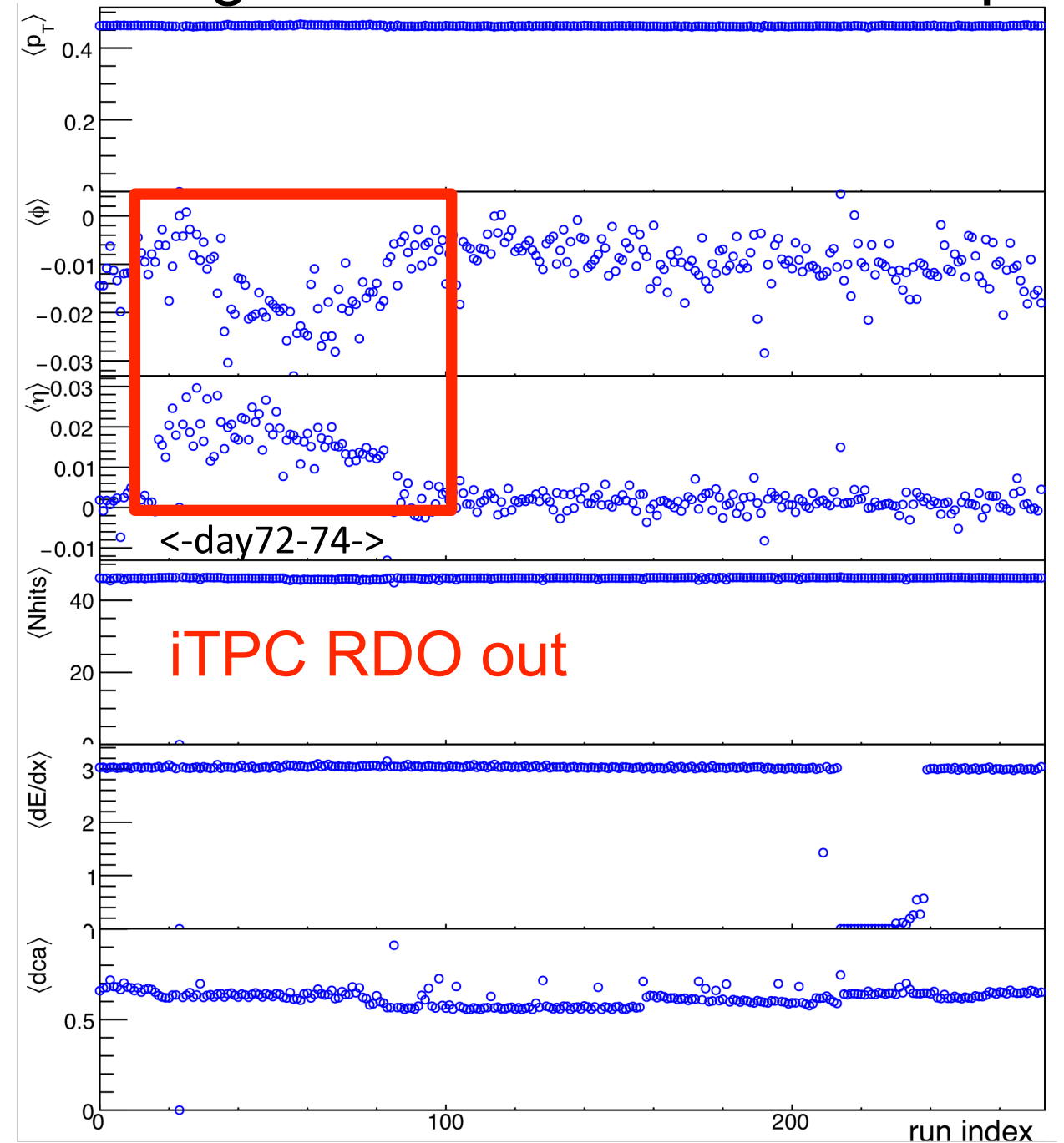
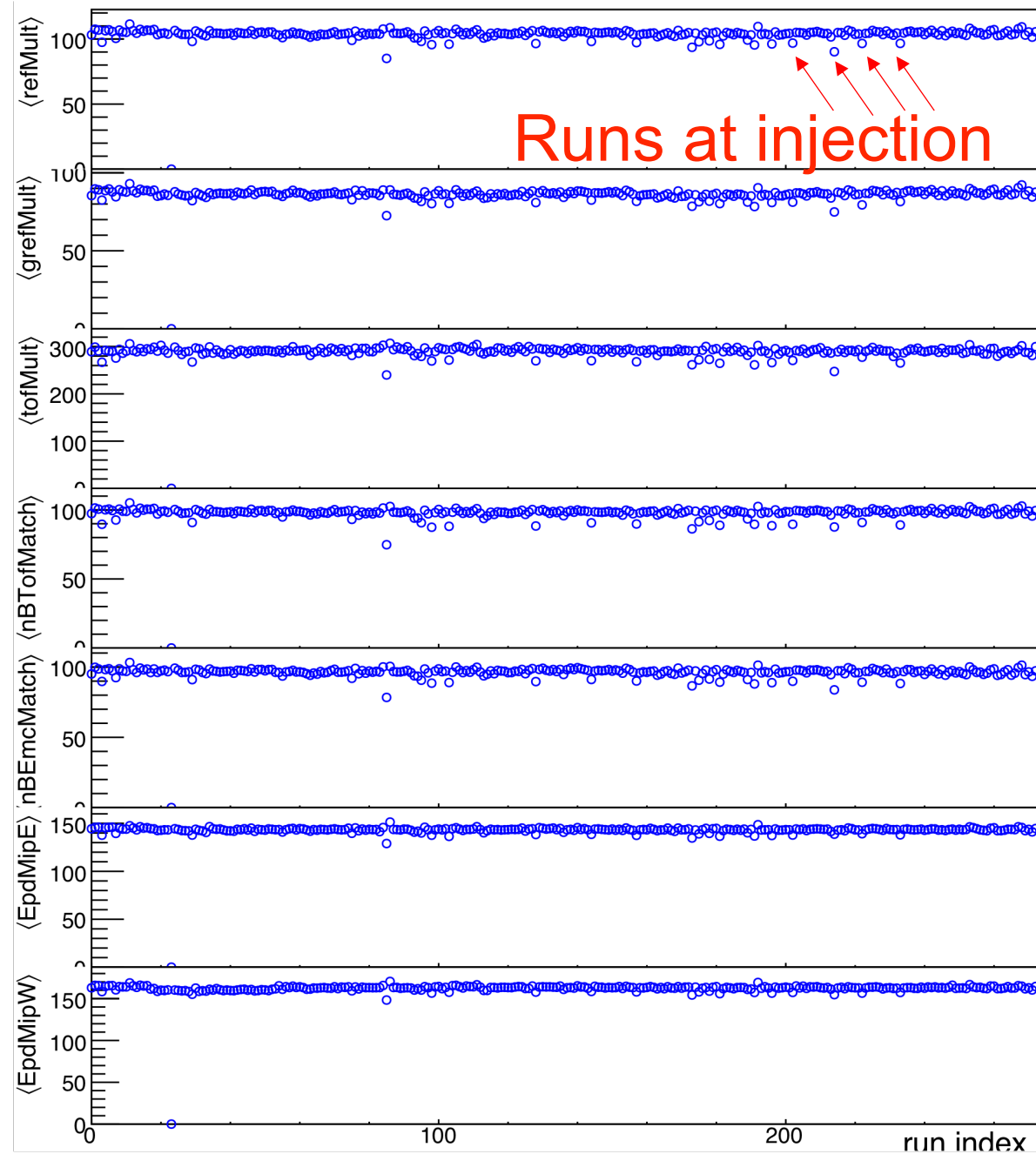
31.2 - 51 M “good” minbias
7.3 - 42 M “good” minbias
4.59 - 201 M “good” minbias
3.85 - 3.7 M “good” minbias
(+300M in Run-18)



Continuous data QA



Data QA occurs: On shift during data taking, 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

EPD: Enhanced event plane resolution

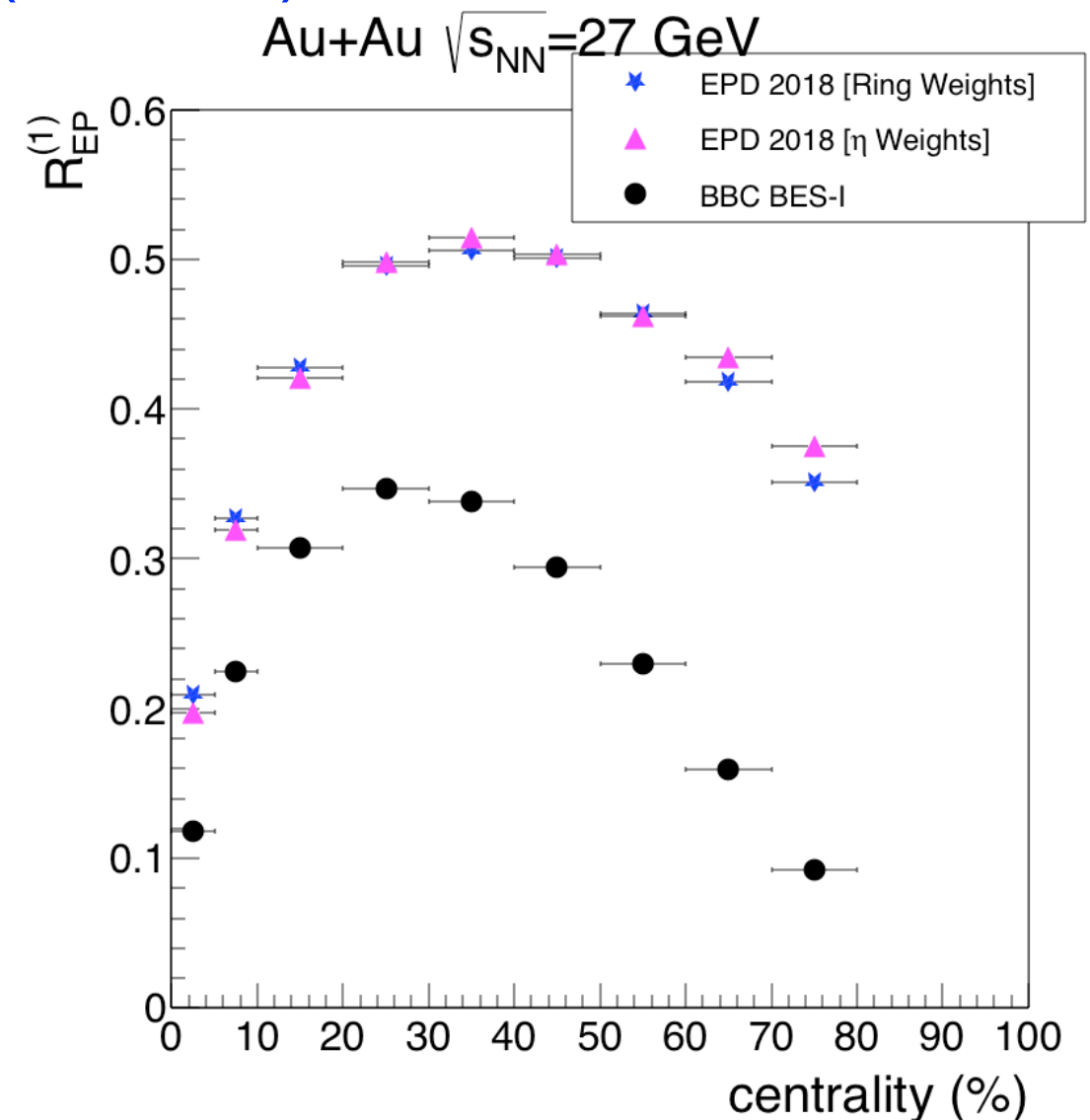
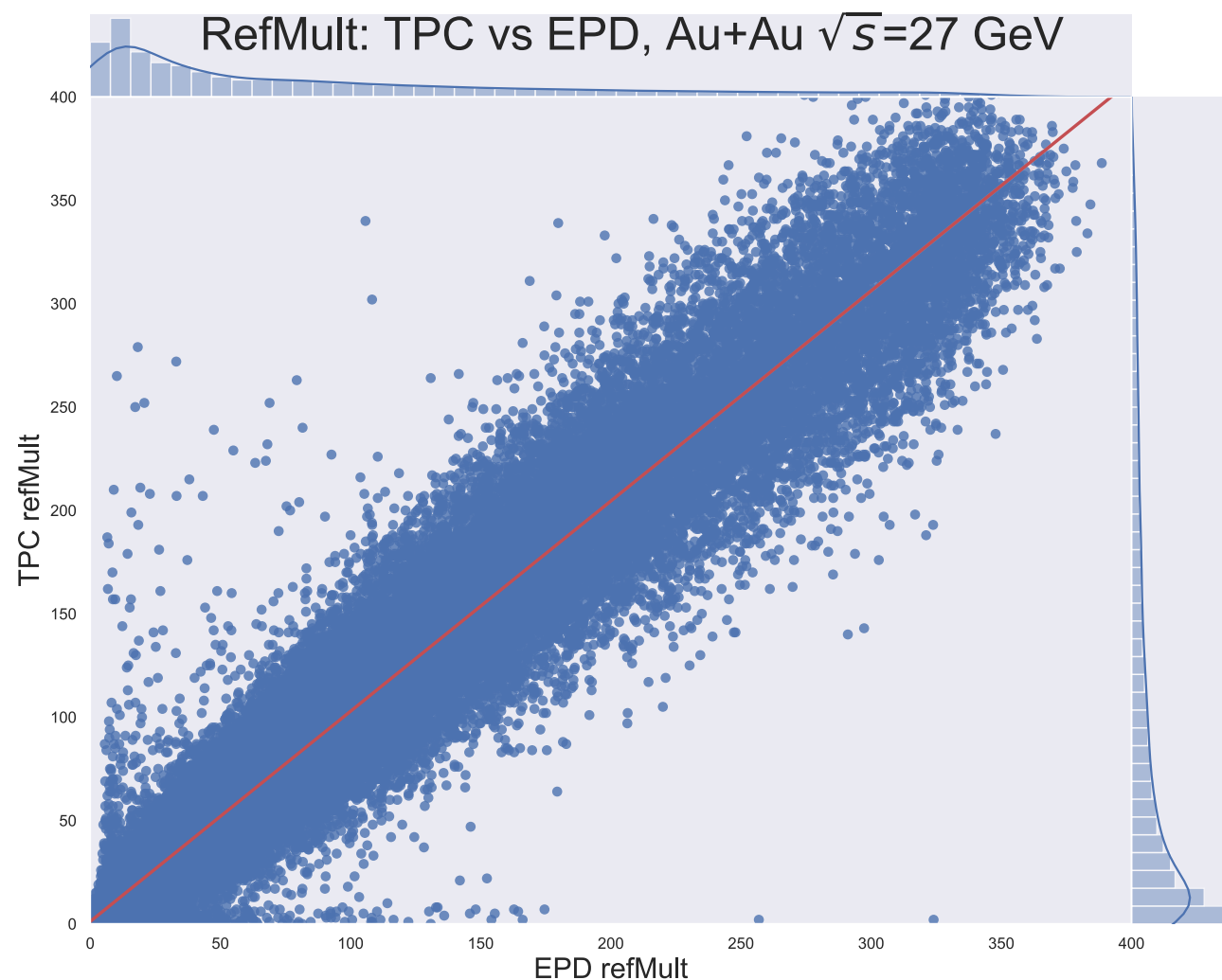


All tiles operational for Run-18 and Run-19 : $2.1 < |\eta| < 5.1$

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

iTPC: Enhanced acceptance

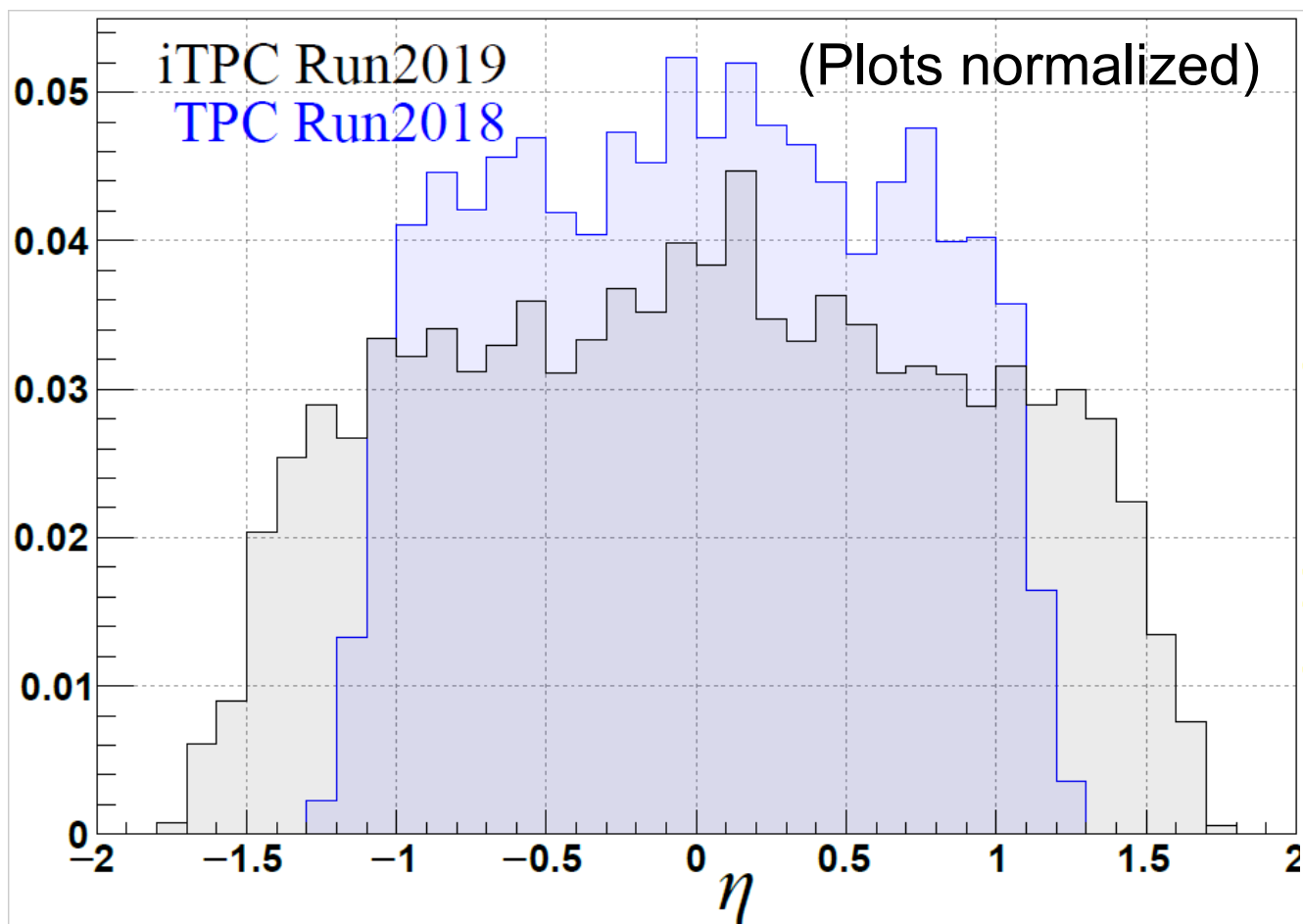


Successfully integrated into data-taking since day 1 of Run-19

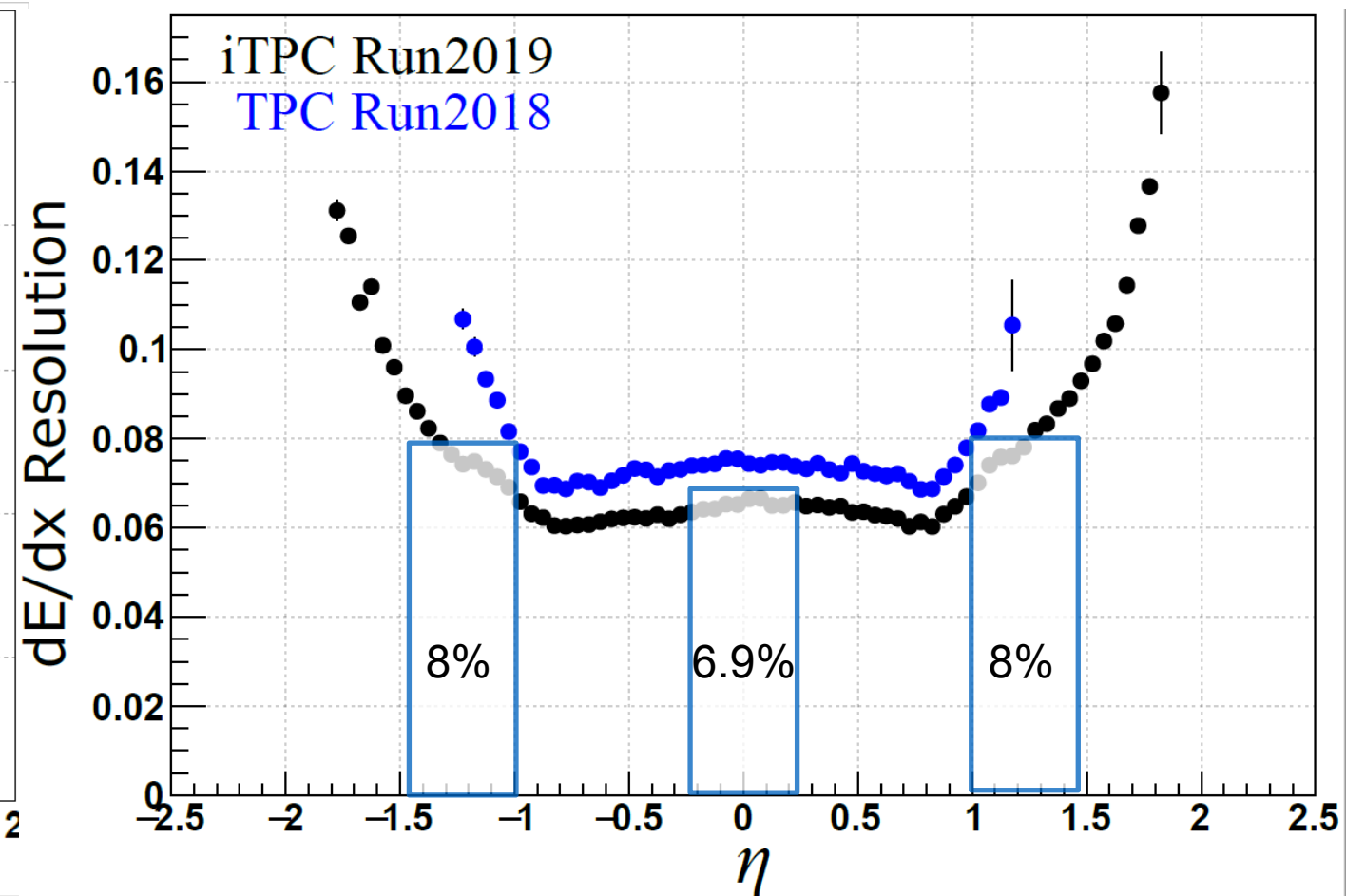
Passed DoE close-out review
All KPP and UPPs met or passed

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

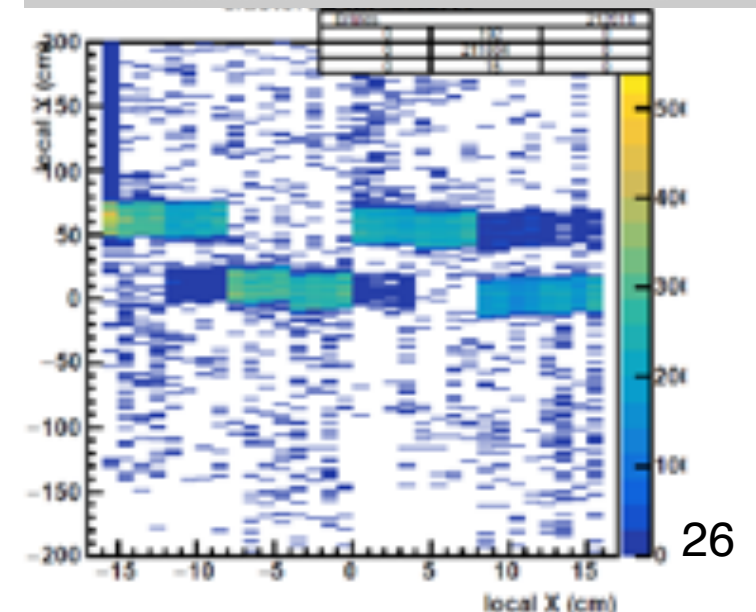
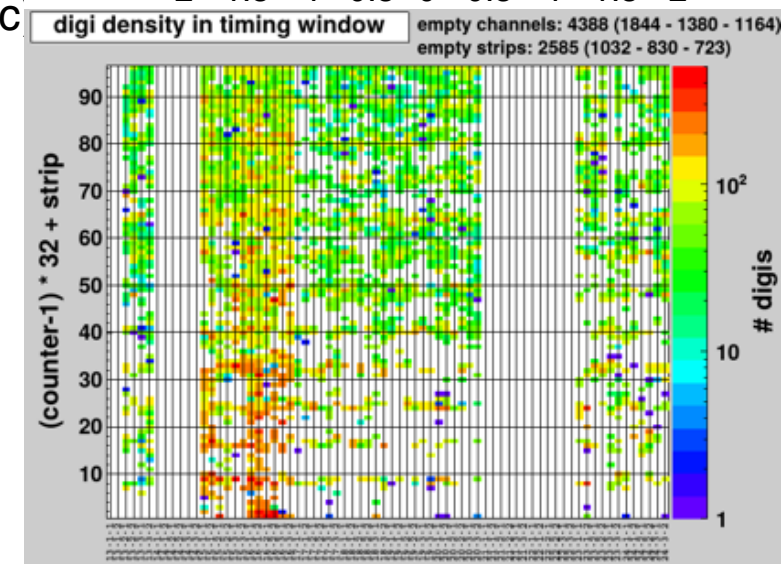
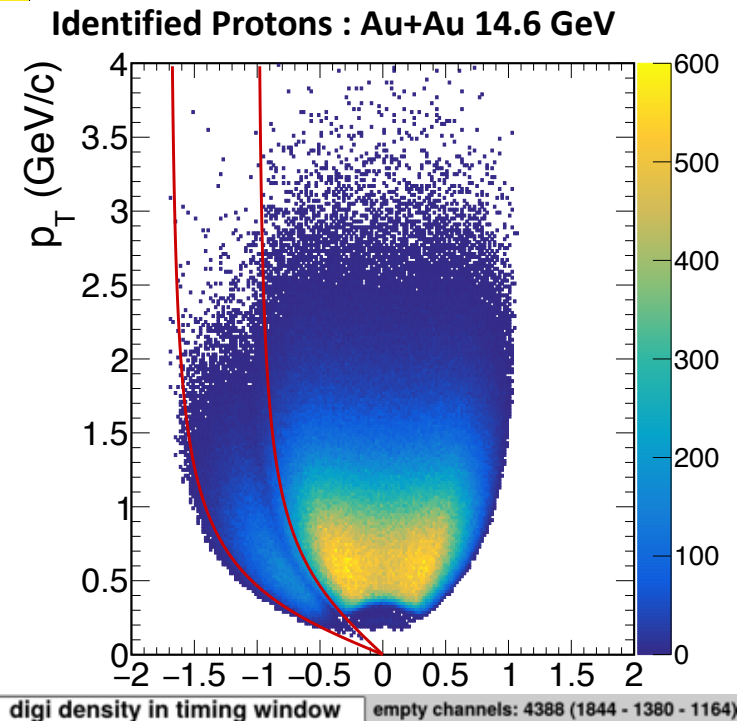
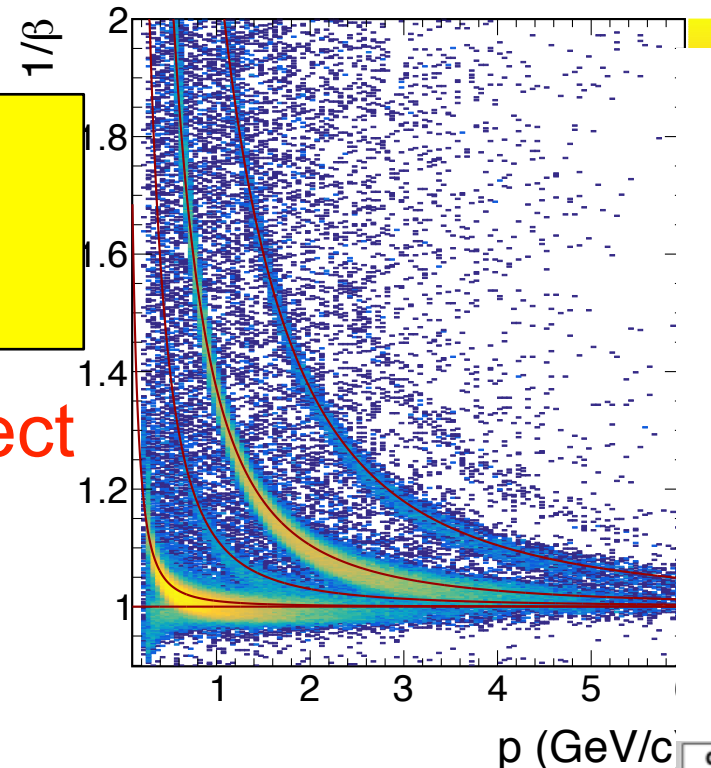
System started to lose performance
Loss of ~50% of readout channels (PADI) - beam related events

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

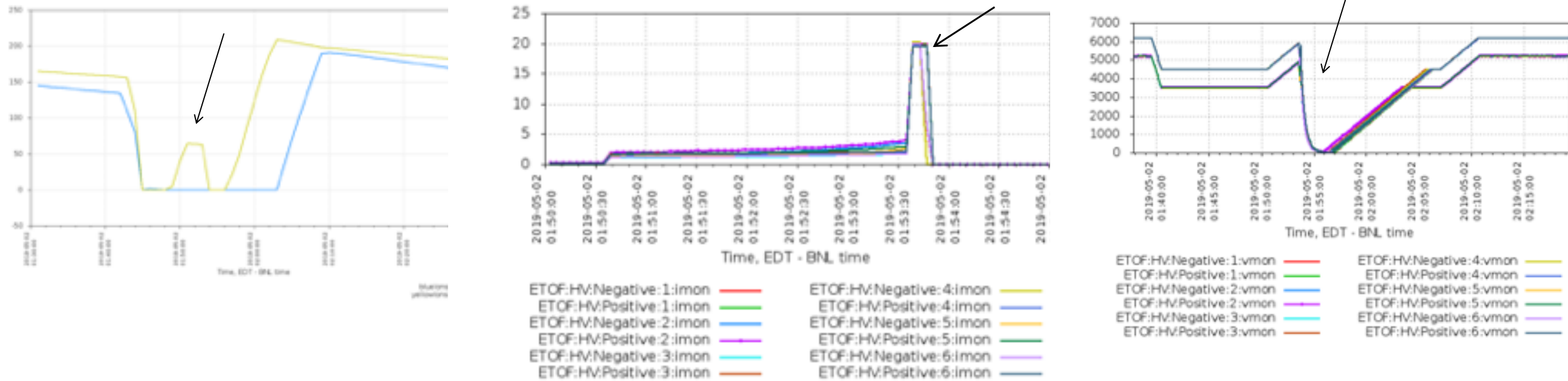
Clock jumps in data occur - Improvement to clock distribution,
offline handing of eTOF timing



eTOF: Beam loss induced damage



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

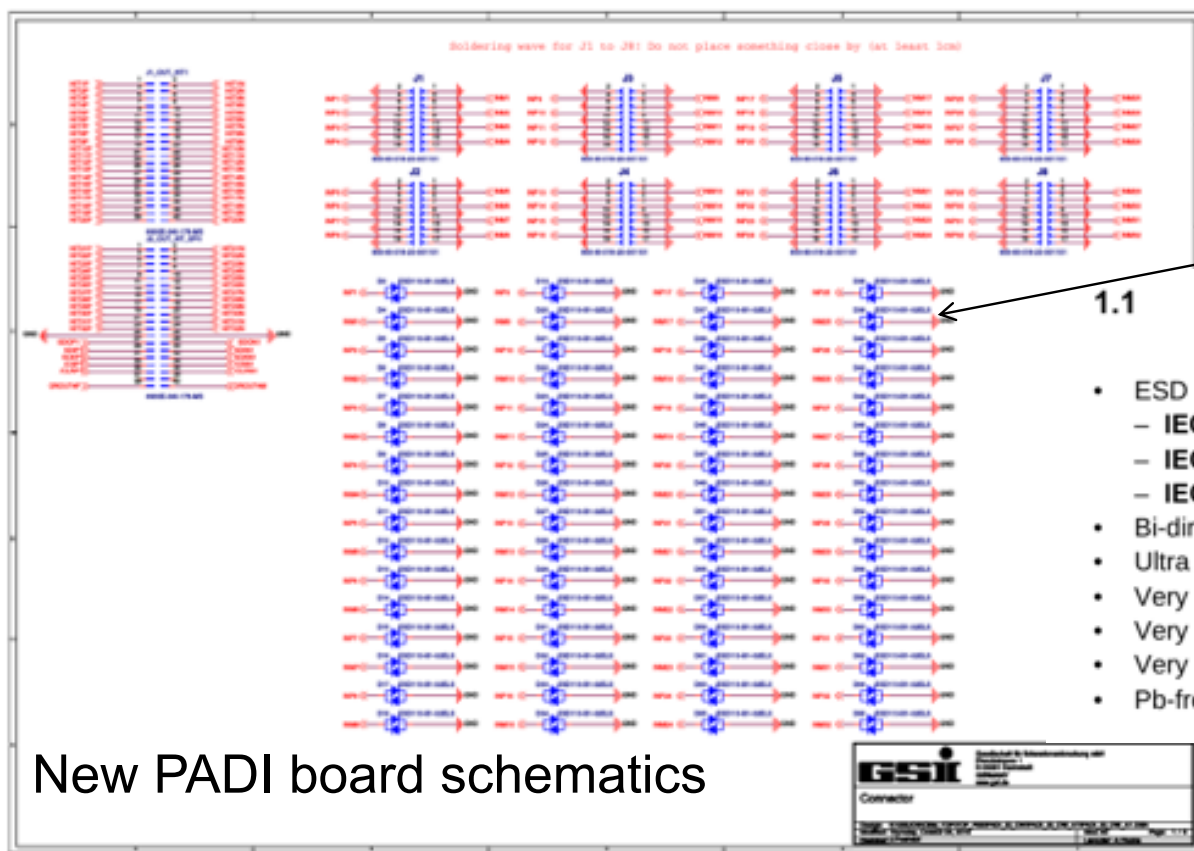


Hypothesis: beam loss events → high particle flux → induced high current in very short time in readout electrodes → damaged PADI input stage

- 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



Protection Device TVS (Transient Voltage Suppressor) ESD113-B1 Series 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 μ s)
- Bi-directional, working voltage up to: $V_{RWM} = \pm 3.6$ 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

41+(8) papers published/accepted (submitted) 2017-2019
including 9 PRL and 1 Nature

Published or preliminary results from most datasets in circulation
20 talks + 45 posters at QM19, 24 talks+5 CEU posters at DNP19

Computing

Migrated all workflows out of retired PDSF. Embedding now on Cori, an HPC system at NERSC
Caught up on all previous data collections
exceptions 2019, 2018 FXT, 1/2 27, and Isobar

BES-II underway and preparing for 2022+

Funding identified for forward 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

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

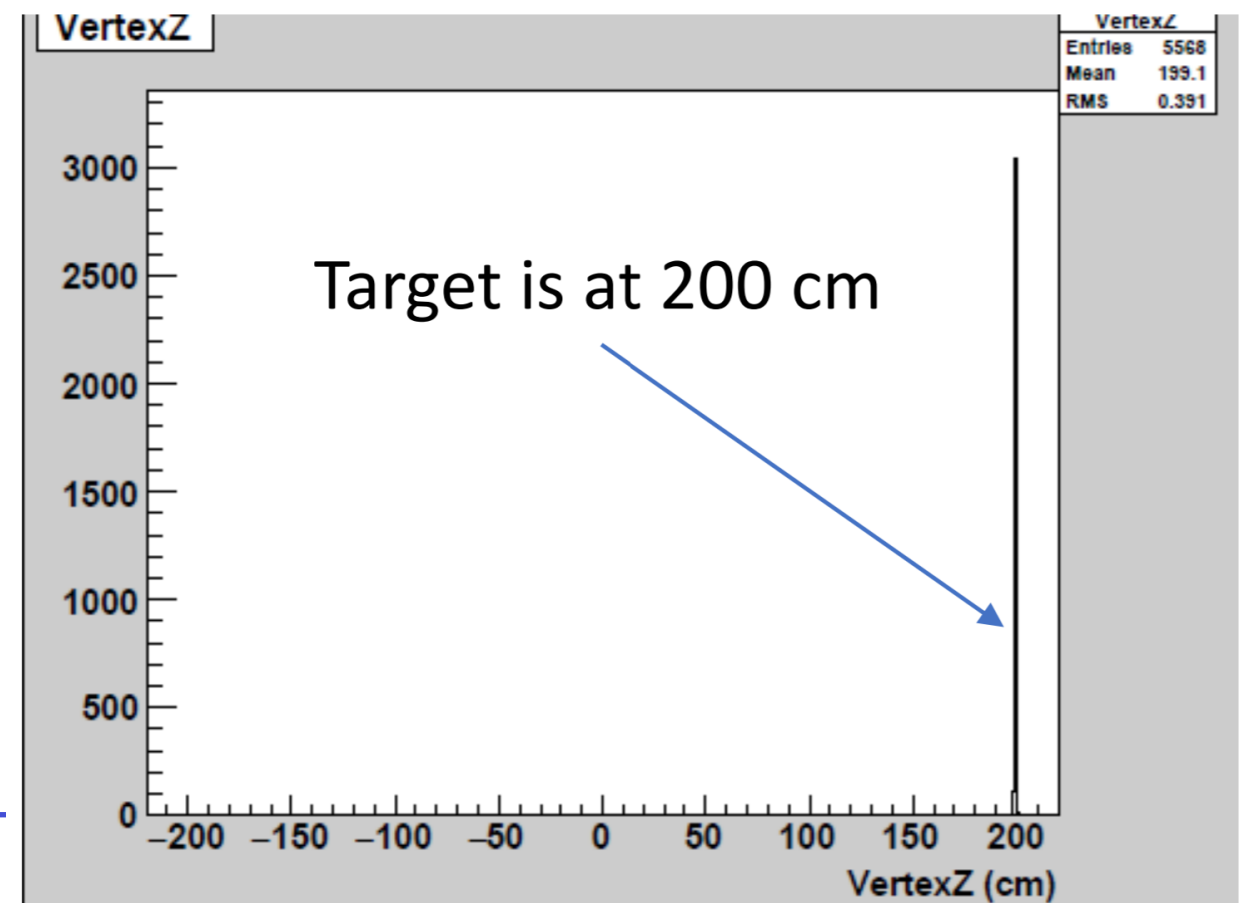
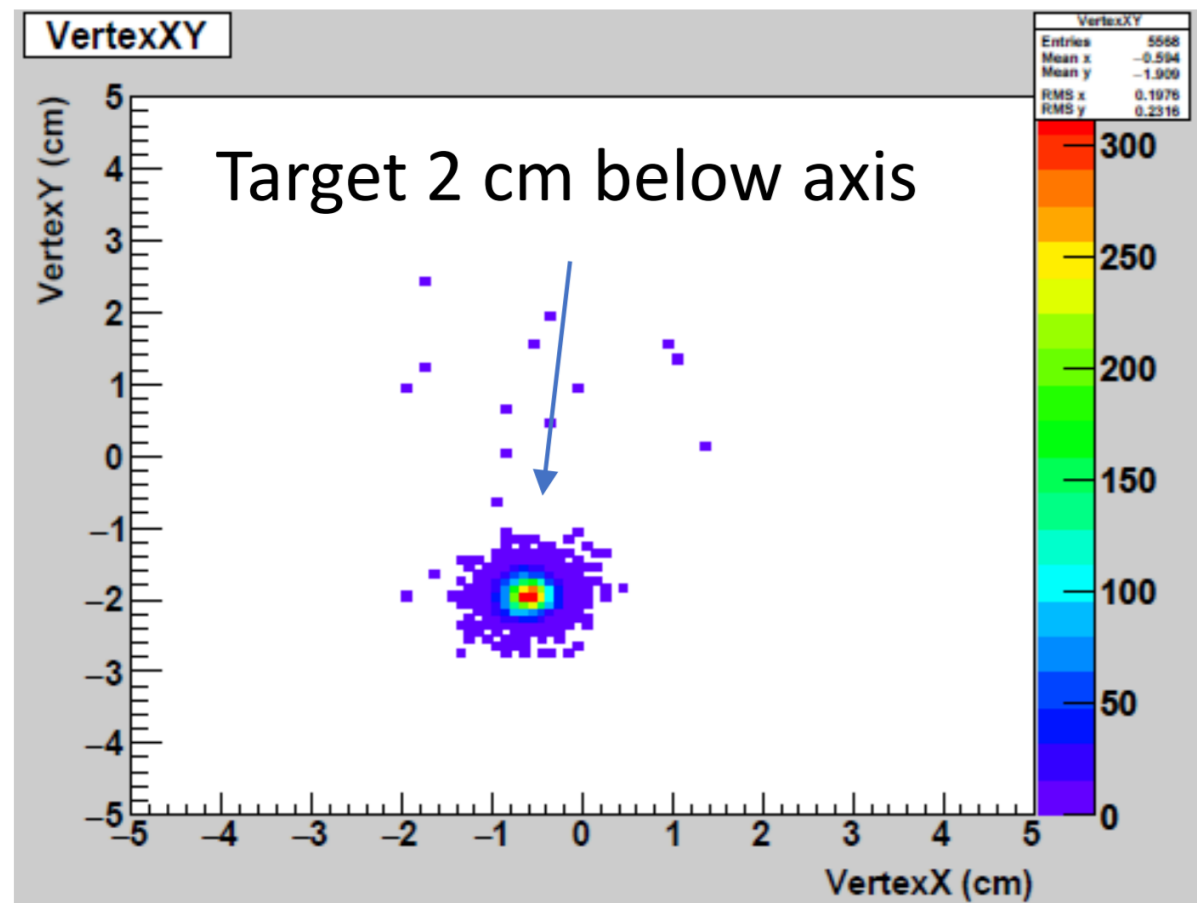
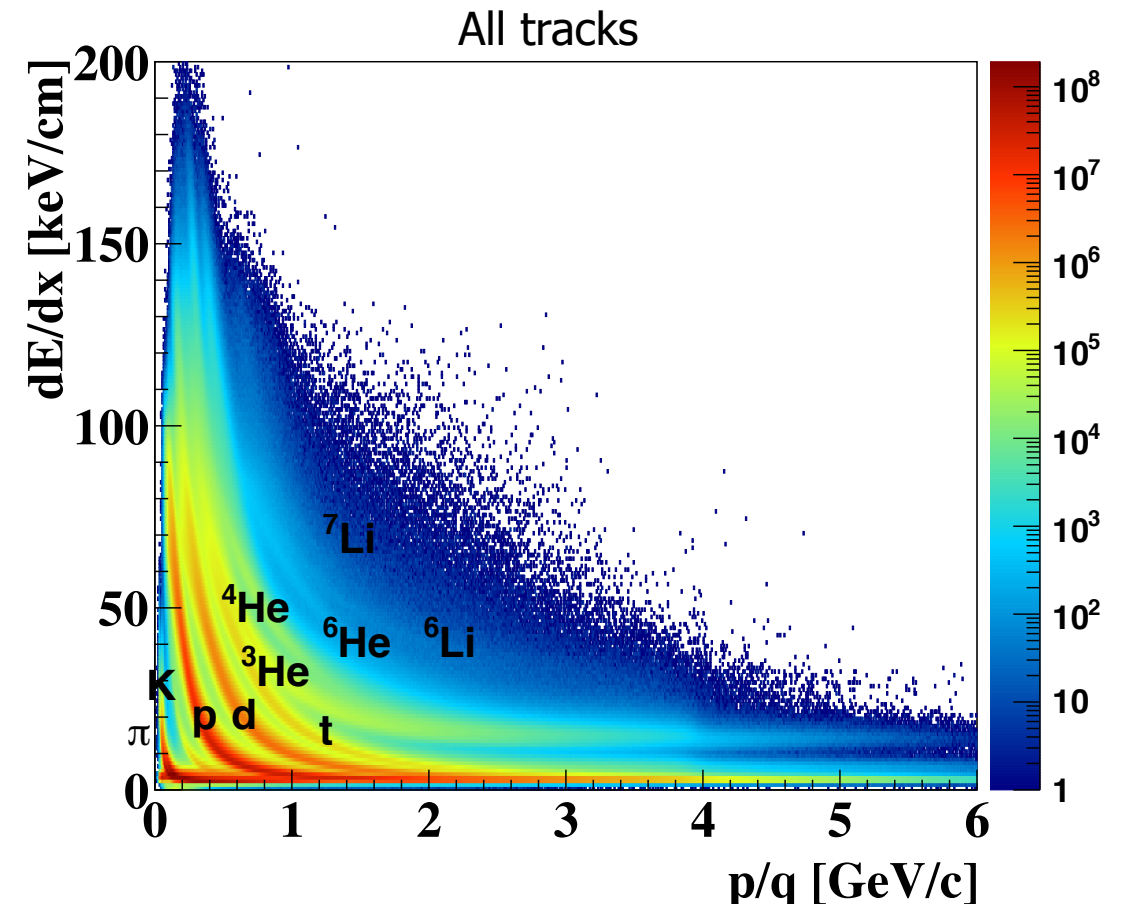


Quick test during LEReC operations

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

Clear PID, including heavy fragments

Confident can trigger and
collect data requested



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

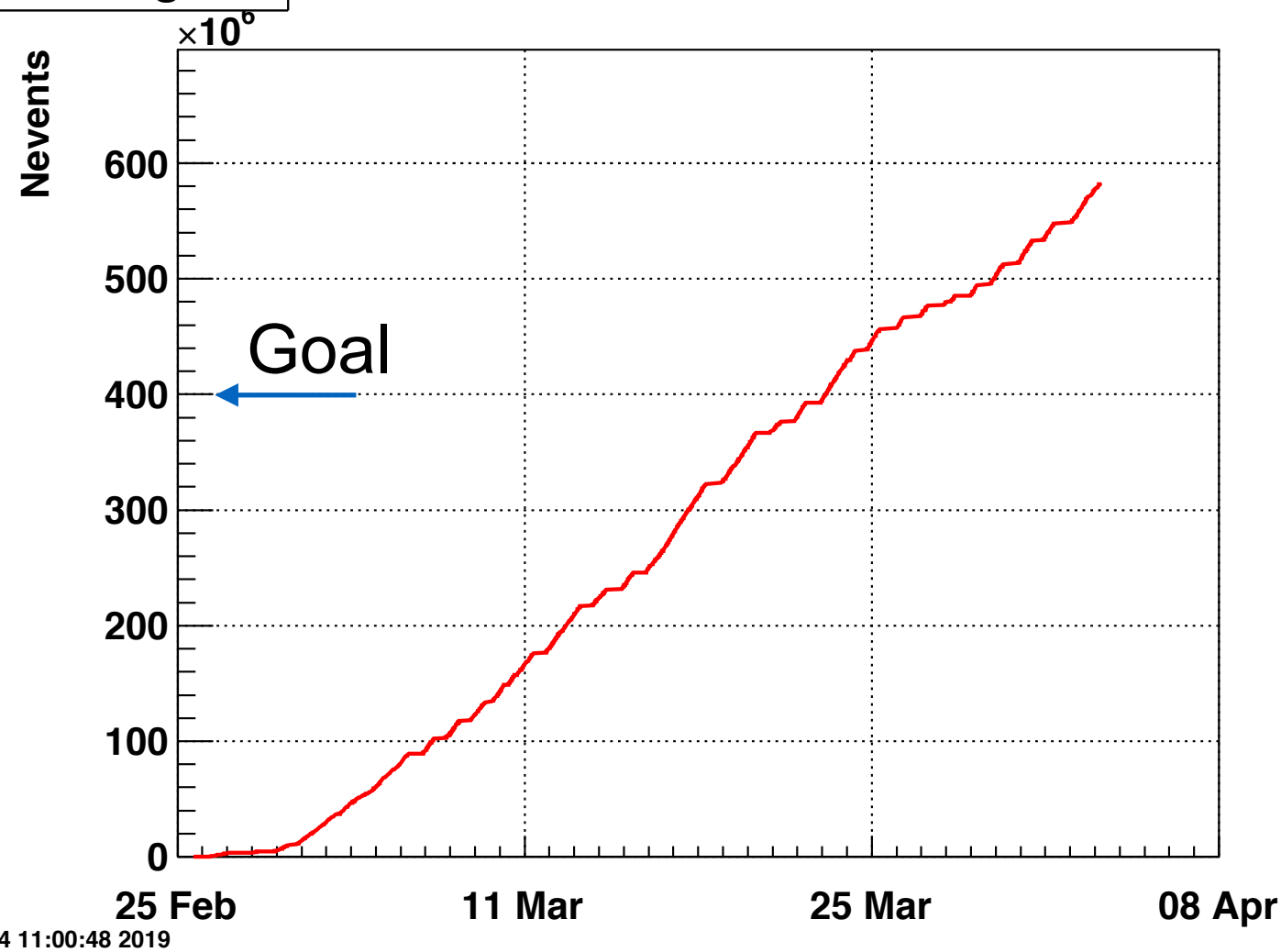
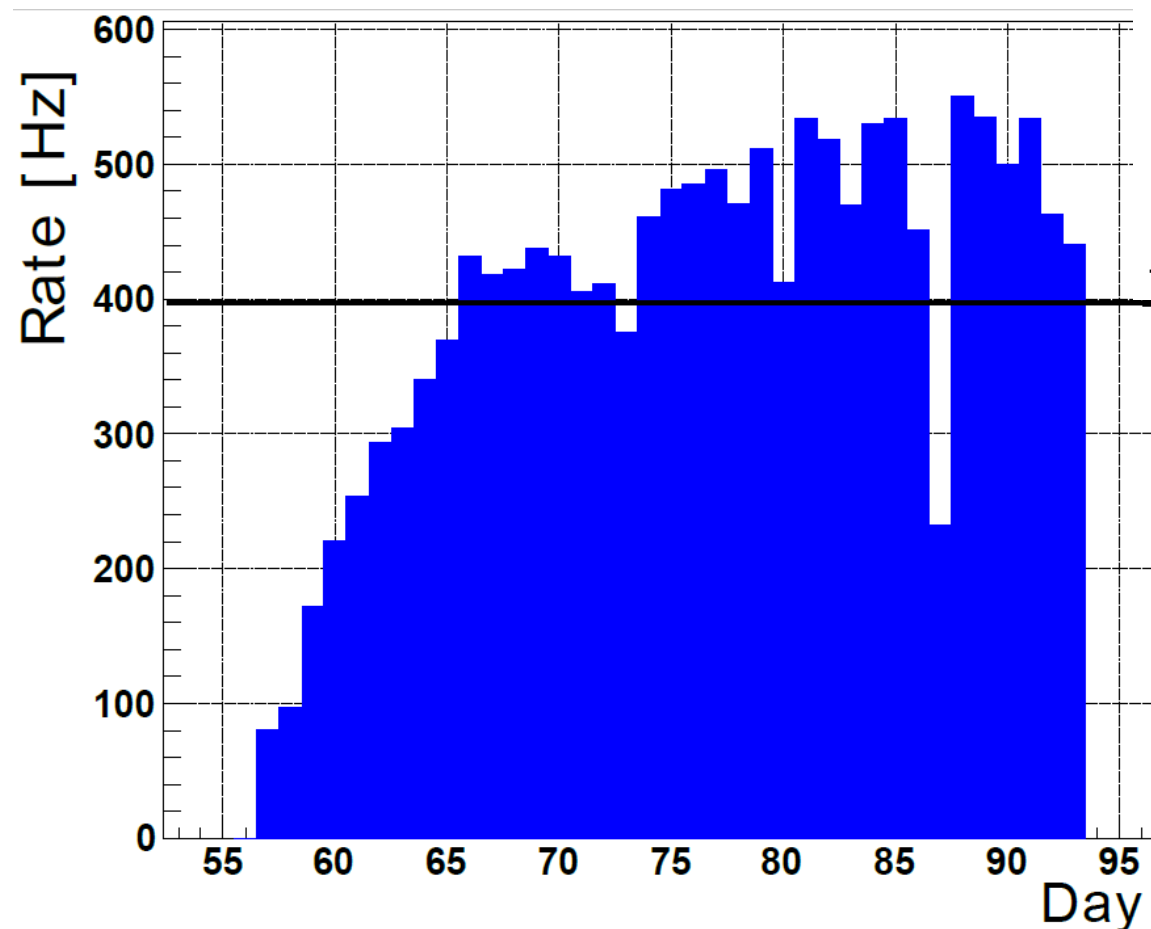


minbias-hltgood

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

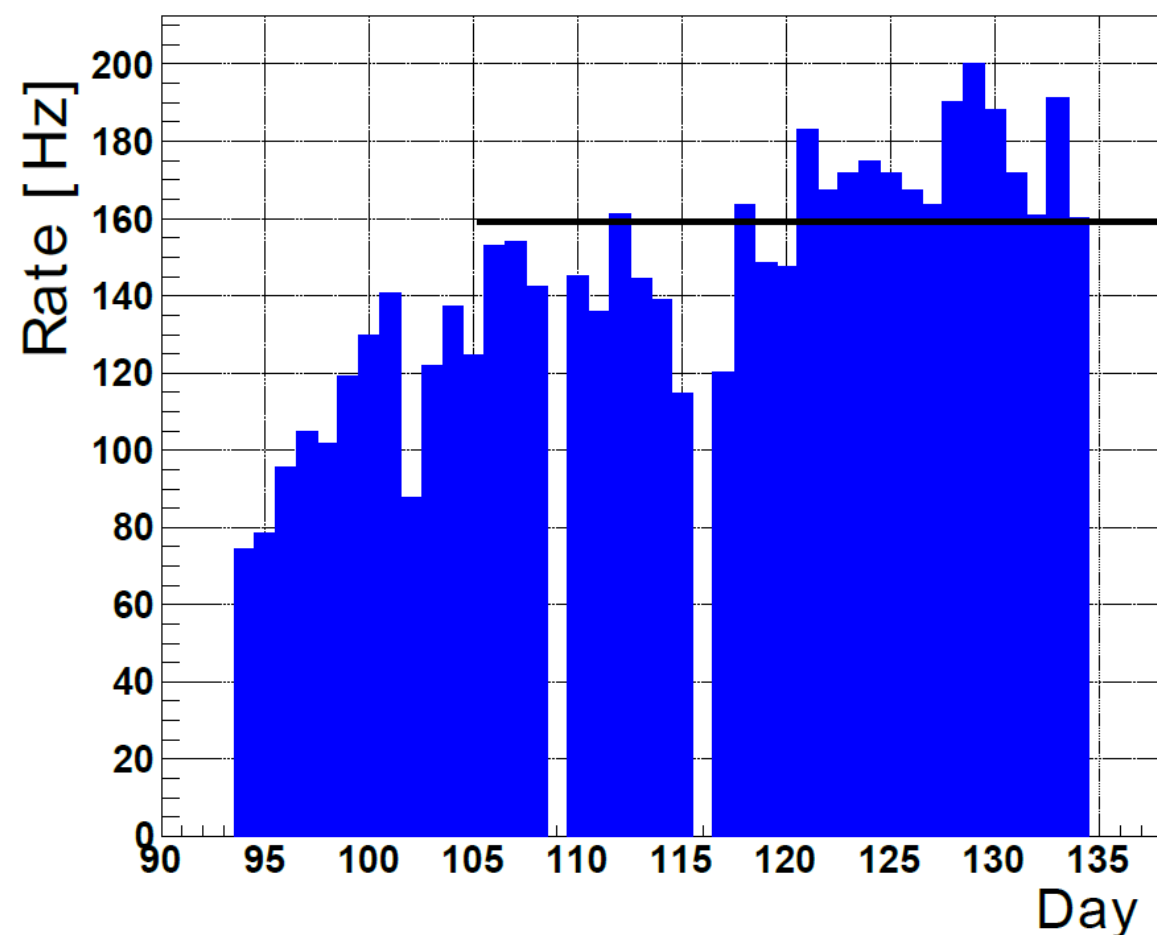
$Au+Au \sqrt{s_{NN}} = 14.6 \text{ GeV}$



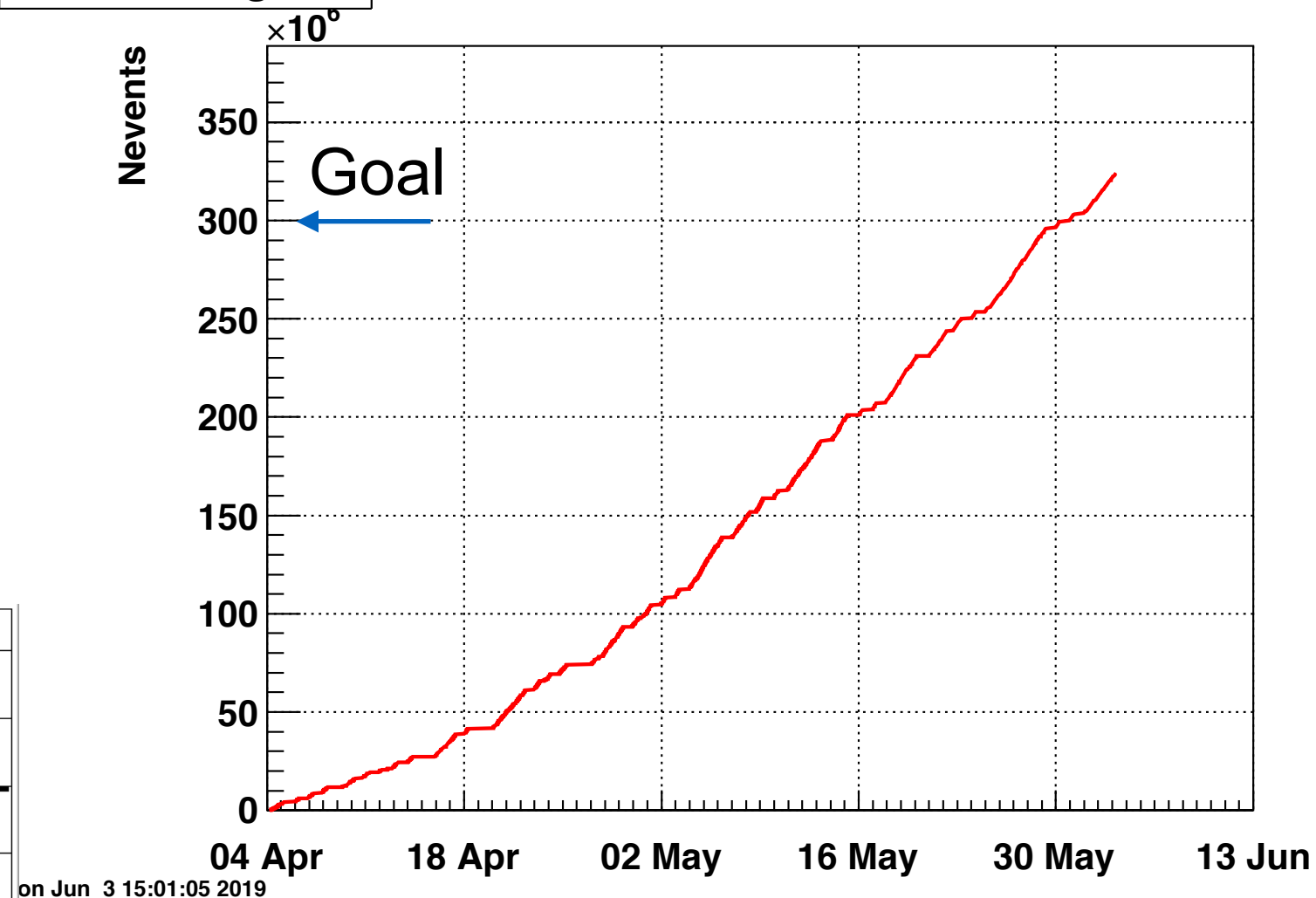
Ever-increasing collision rate as
C-AD enhanced beam

~45 min fills,
turn around ~20mins

Good event fraction 35-40%



minbias-hltgood



Concluded on June 3rd
324 M minbias “good” events collected

¹In 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.

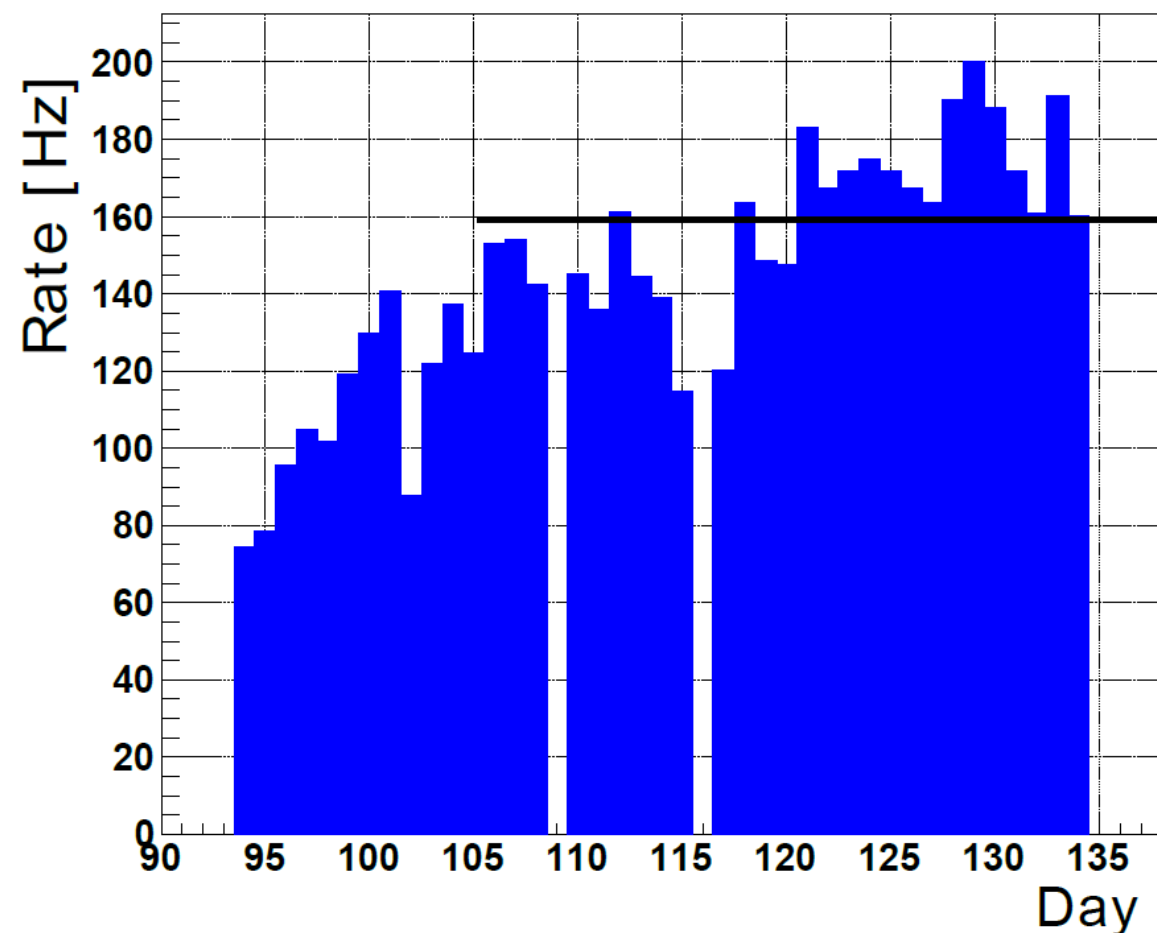
$Au+Au \sqrt{s_{NN}} = 14.6 \text{ GeV}$



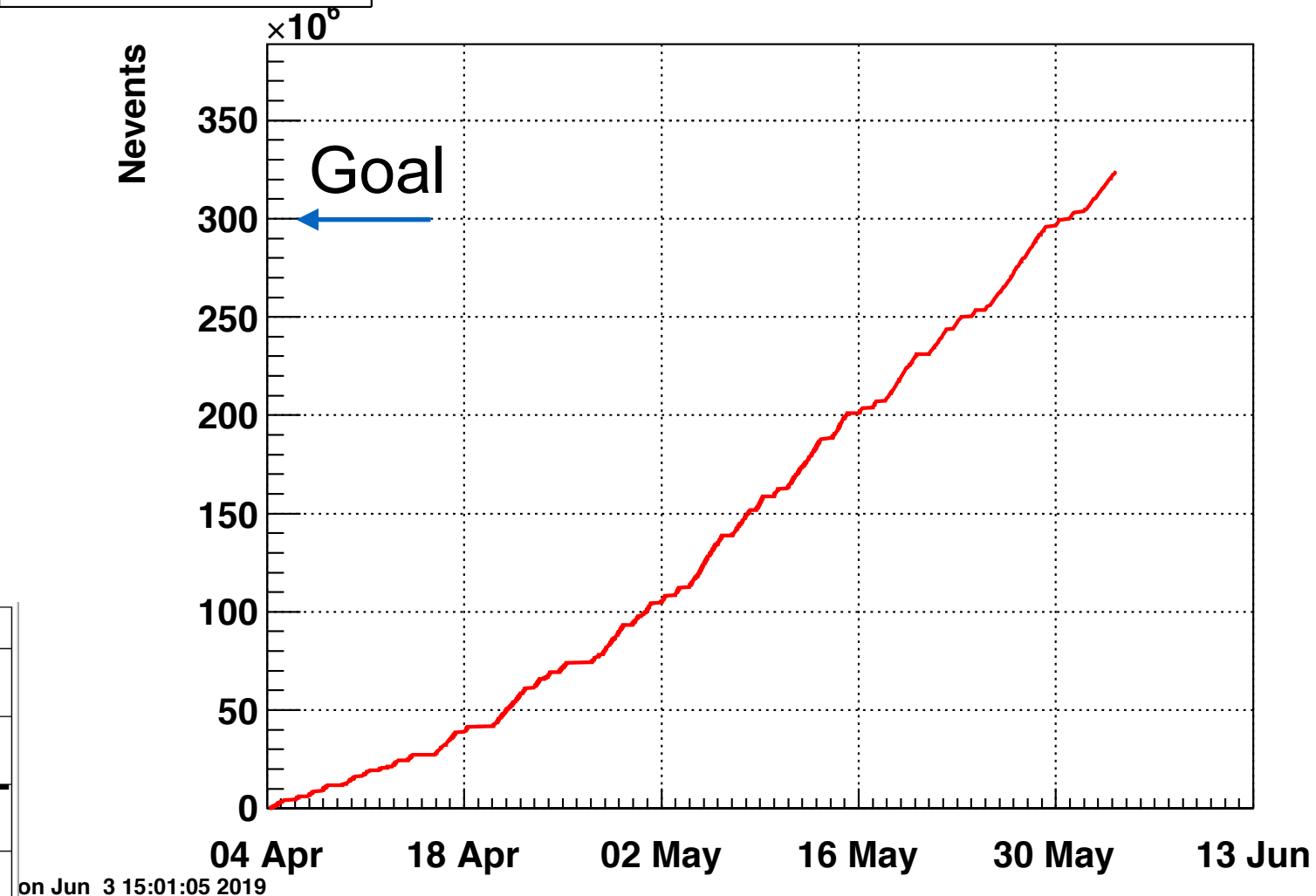
Ever-increasing collision rate as
C-AD enhanced beam

~45 min fills,
turn around ~20mins

Good event fraction 35-40%



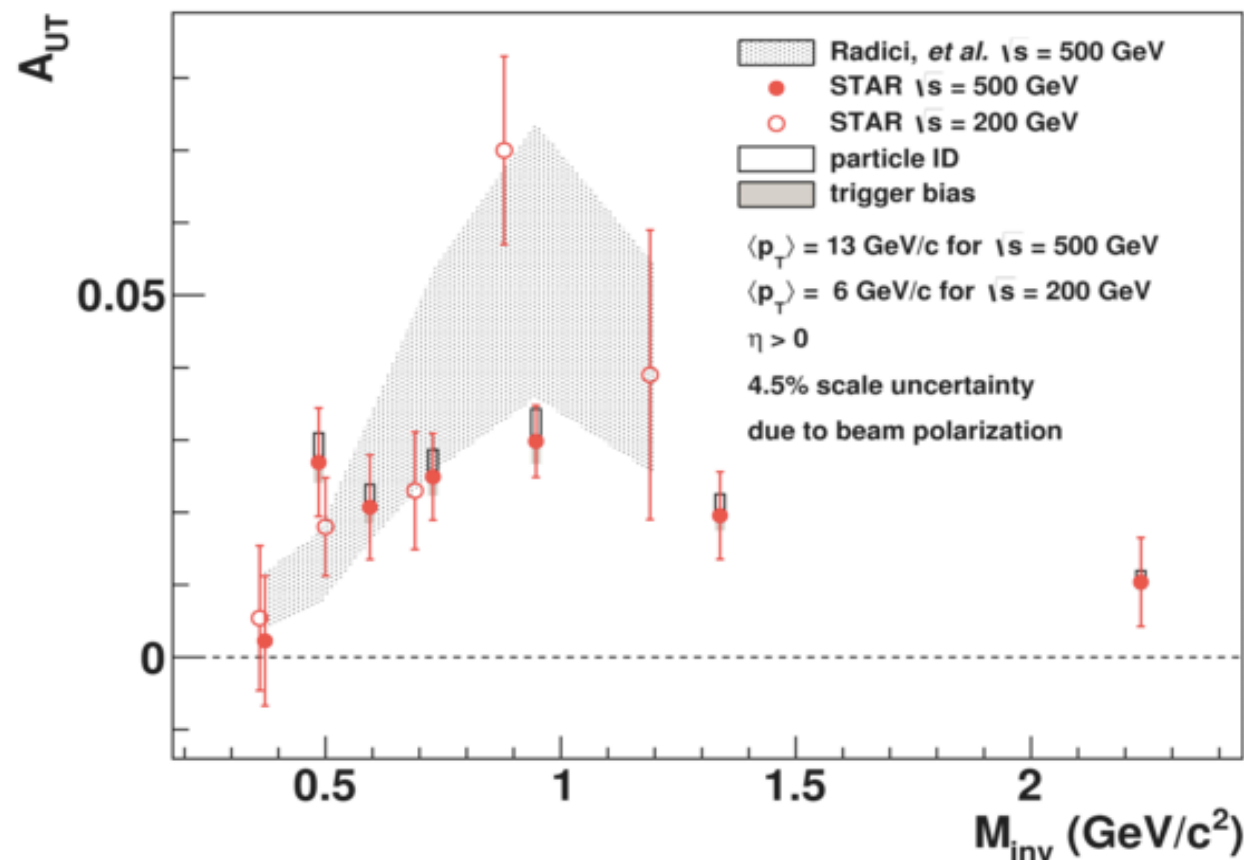
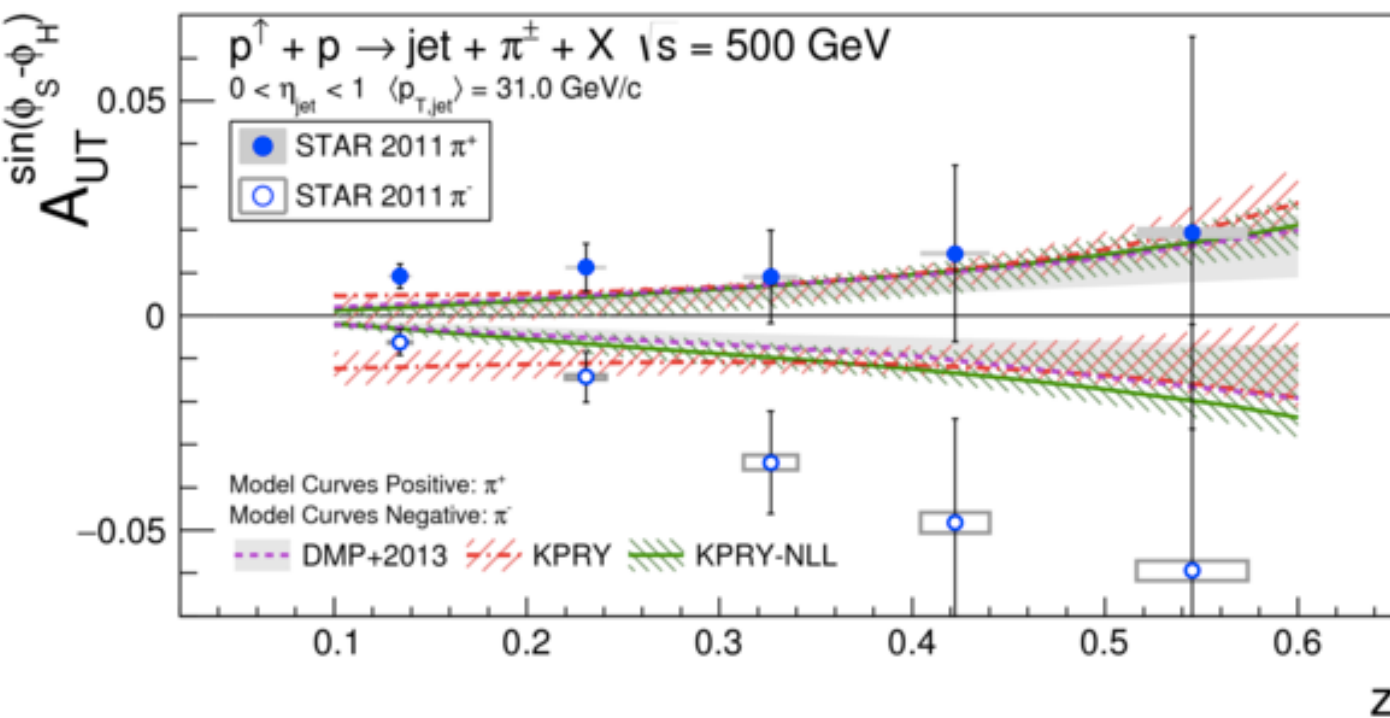
minbias-hltgood



Concluded on June 3rd
324 M minbias “good” events collected

¹In 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.

Transverse spin measurements



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

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

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 $x=0.01$

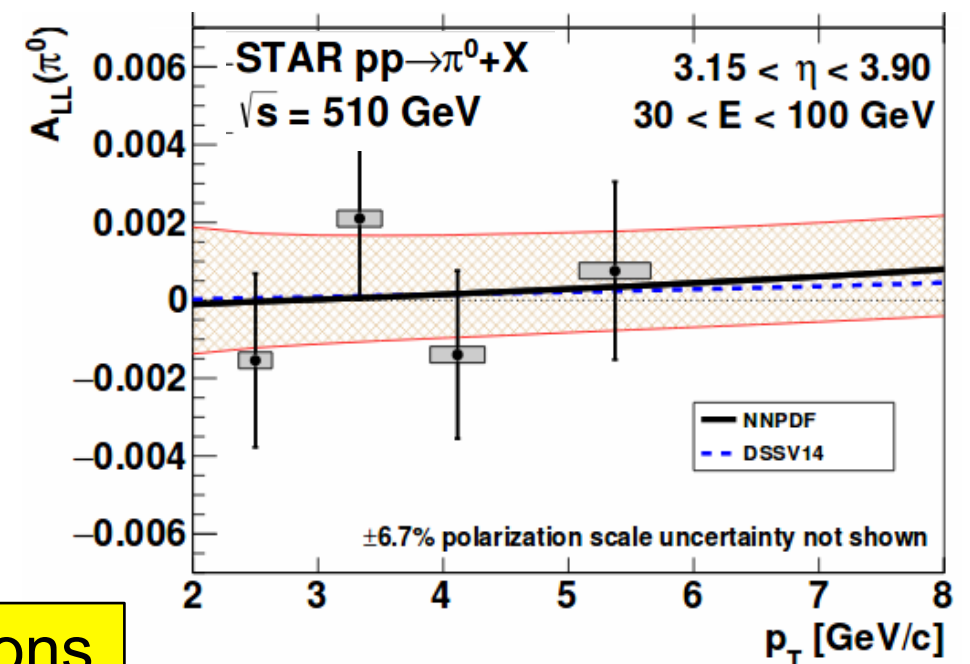
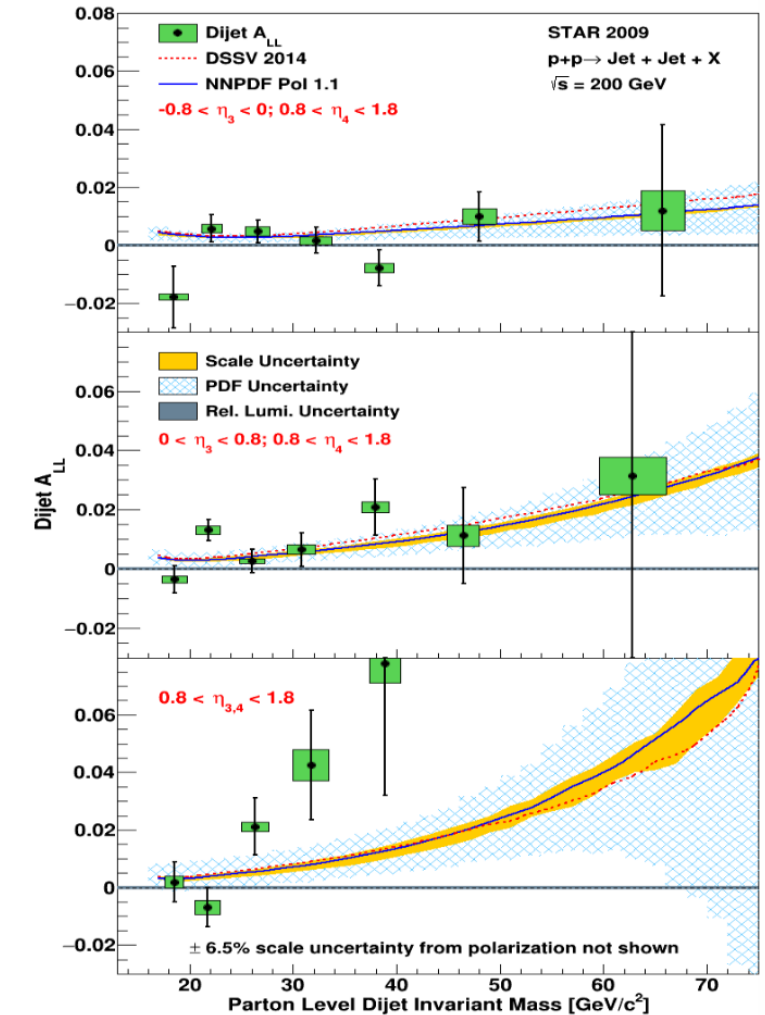
First forward dijet A_{LL} with 3 different topologies

PRD 98 (2018) 032013

Moving to higher $\sqrt{s}$ access down to $x=0.001$

Good agreement with theory

Constrains unexplored low- x region - abundant soft gluons



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

Papers Published in 2019

- Observation of excess of J/psi yield at very low transverse momenta in Au+Au collisions at $\sqrt{s_{NN}}=200$ GeV and U+U collisions at $\sqrt{s_{NN}}=193$ 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 $\sqrt{s_{NN}} = 200$ 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

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 $\sqrt{s_{NN}} = 14.5$ GeV using the STAR detector at RHIC
 - Submitted to Phys. Rev. C: 8/9/2019
- Strange hadron production in Au+Au collisions at $\sqrt{s_{NN}} = 7.7, 11.5, 19.6, 27$ and 39 GeV
 - Submitted to Phys. Rev. C: 6/9/2019
- Precise measurement of the mass difference and the binding energy B_{Λ} of hypertriton and anti-hypertriton
 - Submitted to Nature Physics: 4/24/2019
- Measurements of dielectron production in Au+Au collisions at $\sqrt{s_{NN}} = 27, 39$ 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 $\sqrt{s_{NN}} = 3.0, 3.5,$ 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 $\sqrt{s_{NN}}=200\text{GeV}$	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 $\sqrt{s_{NN}}=200\text{GeV}$	16-Mar-16	24-May-16	Subhasis Chattopadhyaya	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 $\sqrt{s_{NN}} = 27, 39,$ 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

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

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 $\sqrt{s_{NN}}=200$ 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 $\sqrt{s_{NN}} = 7.7, 11.5, 14.5, 19.6, 27, 39, \text{ and } 62.4$ 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