PHENIX Data analysis

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for PHENIX Collaboration

mini-PAC 2020/05/27

PHENIX

Publications in last 12 months

4 Papers published

PRC101,034910 (2020)	**RpA of hadrons in forward**
PRD101,052006 (2020)	**J/ψ and $\psi(2S)$ in pp at 510 GeV**
PRL123,122001 (2019)	**Suppression of A_N in pAu**
PRL123,022301 (2019)	**Scaling of low p_T direct photon yield**

3 papers in Journal review

arXiv:2004.02681	**charged pion A_{LL} in pp at 510 GeV**
arXiv:1910.14487	**Forward J/ψ in p+Al, p+Au, ^{3}He+Au**
arXiv:1805.04066	**$\mu\mu, e\mu, ee$ correlations in pp 200 GeV**

4 papers are ready to submit

PPG231	$b\bar{b} \rightarrow \mu\mu$ in forward in pp at 510 GeV
PPG230	J/ψ polarization and xsection in pp at 510 GeV
PPG229	π^0, η, K_s in U+U at 193 GeV
PPG210	Direct γ – hadron correlation in AuAu 200 GeV

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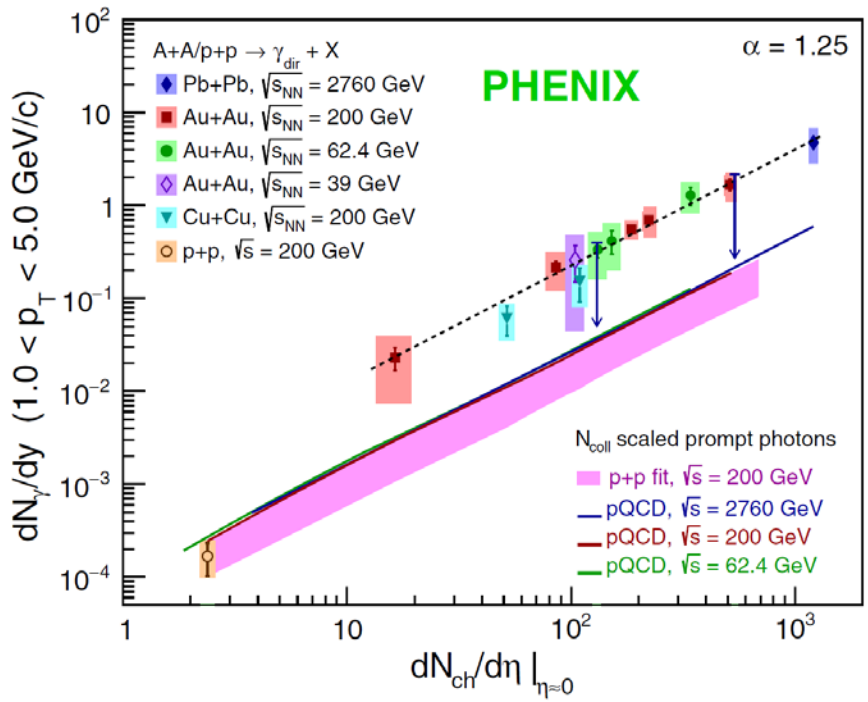
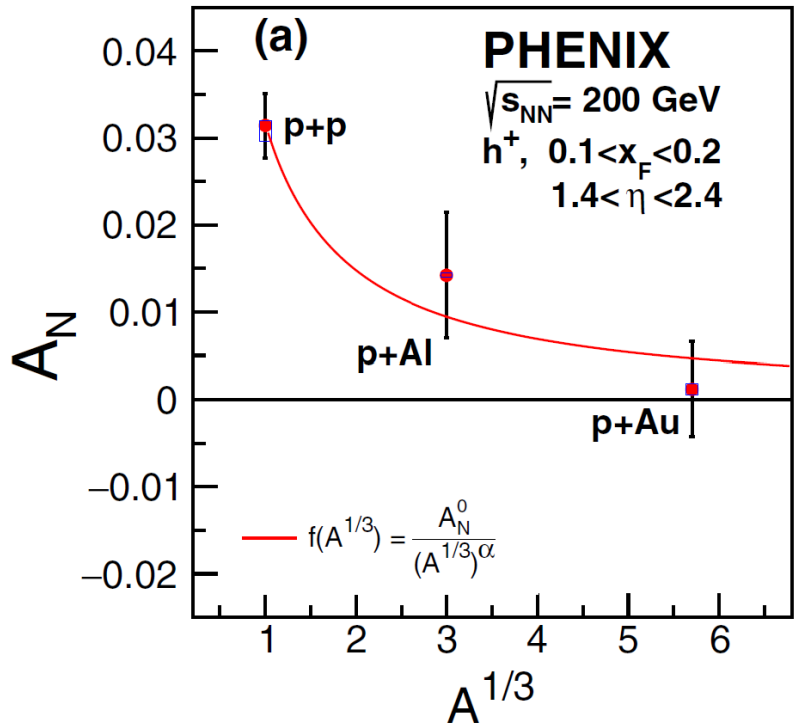
Highlights

PRL123, 022301(2019)



PRL123, 122001(2019)



- Scaling of low pT direct photon yield
- Most photons are emitted near phase boundary

- Suppression of AN in p+A
- *A*-independence hypothesis of TSSA is unfavored

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PHENIX publications

- **197 physics papers published**
  - Phys. Rev. Lett. 74
  - Phys. Rev. C 80
  - Phys. Rev. D 37
  - Nature Physics 1
  - Phys. Letter B 4
  - Nucl. Phys. A 1
- **Total citation: ~28300**
- Topcite 1000+ 2
  - 500-1000 7
  - 250-500 18
  - 100-250 50
  - 50-100 48

PHENIX White Paper: 2880 cites

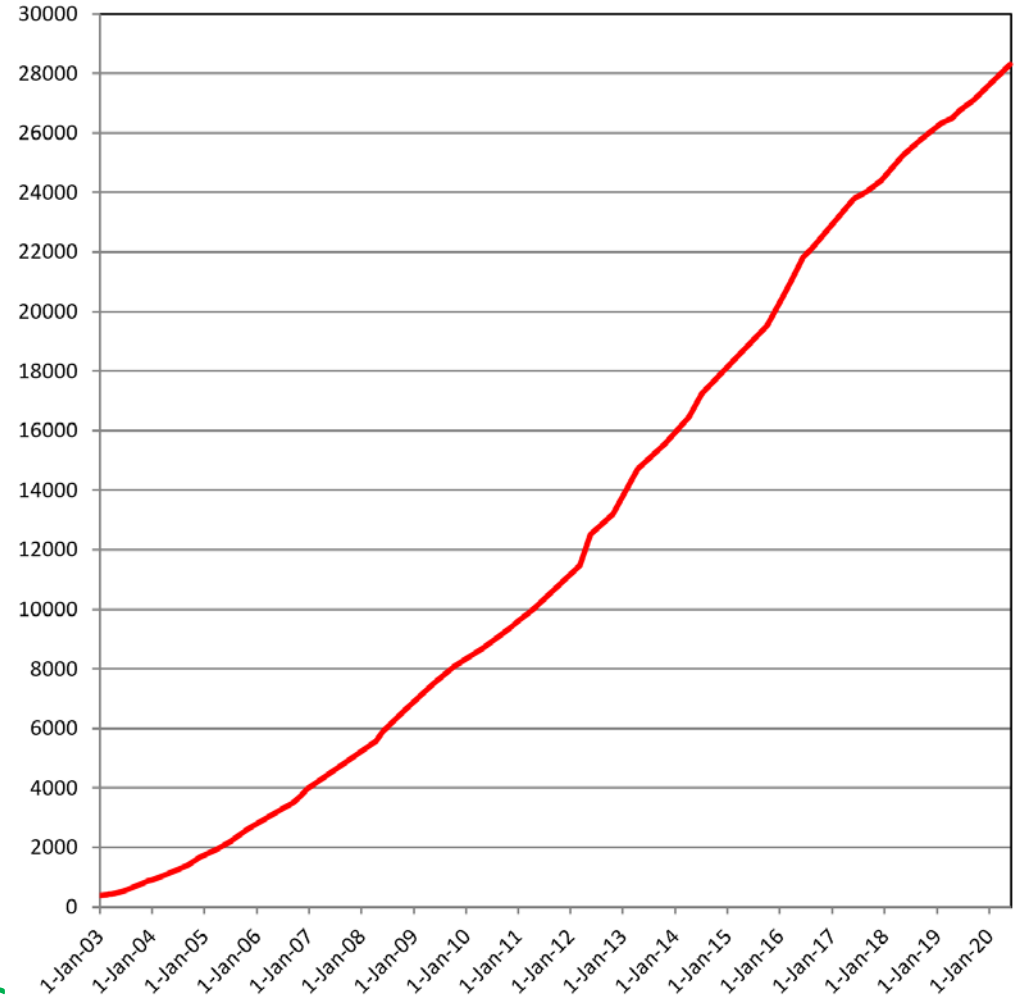
Jet quenching discovery: 1070 cites

125 physics papers in topcite 50+

(147 if proceedings and NIM papers are included)

Nature P paper 87cites in 1.5 year.

Cumulative Citations of PHENIX papers



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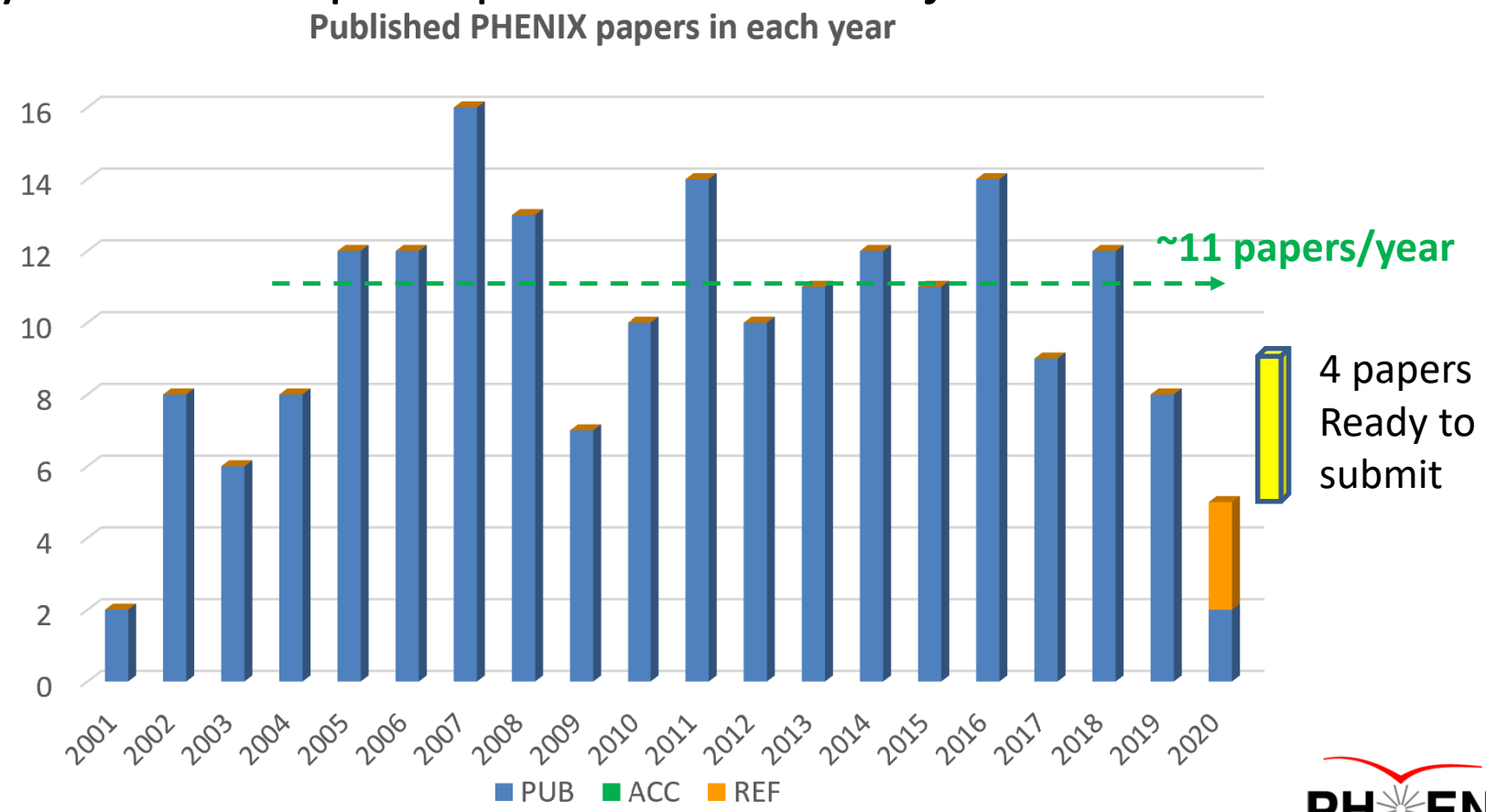
PHENIX publications

- ~11 papers per year since 2005
- 2 papers published in 2020, 3 papers in journal review
  4 papers to be submitted this Friday.
- 3 years to complete publication of major results



Datasets of PHENIX

year	Beam, E(GeV)	Recorded data (pp equiv)	upgrade	Physics
2016	AuAu 200 dAu 200 dAu 62,39,20	2.3/nb (90/pb) **15B events** 1G & 73/nb (29/pb) 0.6G 0.1G, 8M	VTX,FVTX MPC-EX	Heavy Flavor Gluon nPDF Small QGP
2015	pp 200 pAu 200 pAl 200	23/pb 80/nb (16/pb) 275/nb (7.4/pb)	VTX, FVTX	Heavy Flavor Transverse spin CNM, small QGP
2014	AuAu 200, 15 ^{3}HeAu 200	2.3/nb (90/pb) **15 B events** 25/nb (15/pb)	VTX, FVTX	Heavy Flavor Small QGP
2013	pp 510	240/pb	W-trigger	Anti-quark spin Gluon spin
2012	pp 510 pp 200 CuAu 200 UU 193	50/pb 4/pb 5/nb (60/pb) 0.17/nb (10/pb)	W-trigger VTX, FVTX	Anti-quark spin Transverse spin Heavy flavor Geometry
2011	pp 510 AuAu 200 AuAu 19, 27	28/pb 0.8/nb (32/pb)	W-trigger VTX	Anti-quark spin Heavy flavor BES-I
2010	AuAu 200 AuAu 62,39,7	1.1/nb (44/pb)	HBD	Low mass ee BES-I

- DST production completed except for 2016 HF data

Data analysis review in Dec 2019

- Review of PHENIX data analysis and workforce on 2019/12/12

  Review panel:

  J.Nagle, P. Steinberg, U. Heinz, and D. Arkhipin

  PHENIX requested for additional resource to complete key analyses (HF with VTX, HF with FVTX, and thermal dilepton) and data/analysis preservation
- Review report
  - Endorse importance of the three key analyses topics
  - Support for data preservation effort
- BNL provided additional resource
  - 1 new Postdoc at BNL for PHENIX analysis
    - 50% for analysis support + 50% for one of the key analyses
    - The position recently approved (delayed by coronavirus)
  - 0.5 FTE from NPPS to support data preservation effort in future
- Feasibility study of key analyses for additional support from DOE NP (FVTX b/c separation almost ready)

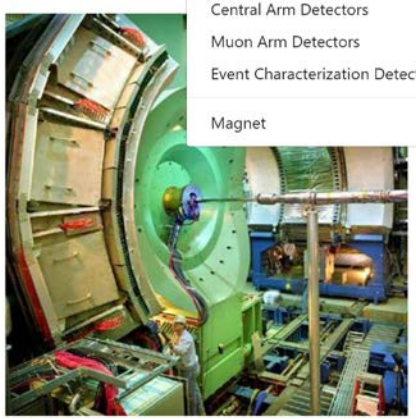
New PHENIX Data analysis page

PHENIX Home Experiment Detectors Software Analysis Resources

Detectors Overview
PHENIX Photo Gallery
Run Configuration Gallery

Central Arm Detectors
Muon Arm Detectors
Event Characterization Detectors

Magnet



PHENIX Home Experiment Detectors Software Analysis Resources

Time-of-Flight

Detector overview

The TOF (sometimes called the TOFE to contrast with the TOFW) is a time-of-flight (TOF) detector in the east (E) arm of the PHENIX central spectrometer. It was designed, developed, and assembled at Tsukuba University. It was part of the original design of PHENIX and was successfully operated for all 16 run periods.

The individual component of the TOFE is the slat. Each slat is a plastic scintillation counter made of Bicron BC404 read out on either end with a Hamamatsu R3478S photomultiplier tube.

The TOFE system consists of 10 panels. Each panel contains 96 slats for a total of 960 slats and 1920 readout channels. There are eight panels in sector 1 covering the full 22.5 degrees in azimuth and the full +/- 0.35 units in pseudorapidity, and two panels in sector 0 covering full 22.5 degrees in azimuth and the innermost rapidity range.

Archived papers

DOI 10.5281/zenodo.3836437 Felix Matathias's Ph.D. Thesis (gzipped postscript)

Variables and Accessors

These "get" methods give access to the TOF variables used for analysis. The variable type, name of the get method, and a brief description are given below.

Type	Name	Description
short	get_tofid	Ron needs to double check
float	get_ptofx	x-component of the projection of the cgl track onto the TOF
float	get_ptofy	y-component of the projection of the cgl track onto the TOF
float	get_ptofz	z-component of the projection of the cgl track onto the TOF

- We are making a new PHENIX Data analysis and preservation web site
- "reference manual" for PHENIX data analysis
- Aim to preserve full chain of one key analysis in future

Summary

- PHENIX completed its data taking in RUN16
  - Removal and Repurposing is basically completed
- Publication status
  - PHENIX continues to produce high impact results
    - Publishing ~11 papers per year, ~2000 citations/year
  - highlights
    - Scaling of low pT direct photon
    - Suppression of AN in pA
- Towards completion of Data analysis and preservation
  - Review in Dec 2019
    - Requested for resource for 3 key analysis topics and analysis support
  - New DAP page
    - Preserving the knowledge of PHENIX data analysis

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