

# 講演報告

## “sPHENIX Cold-QCD Program”

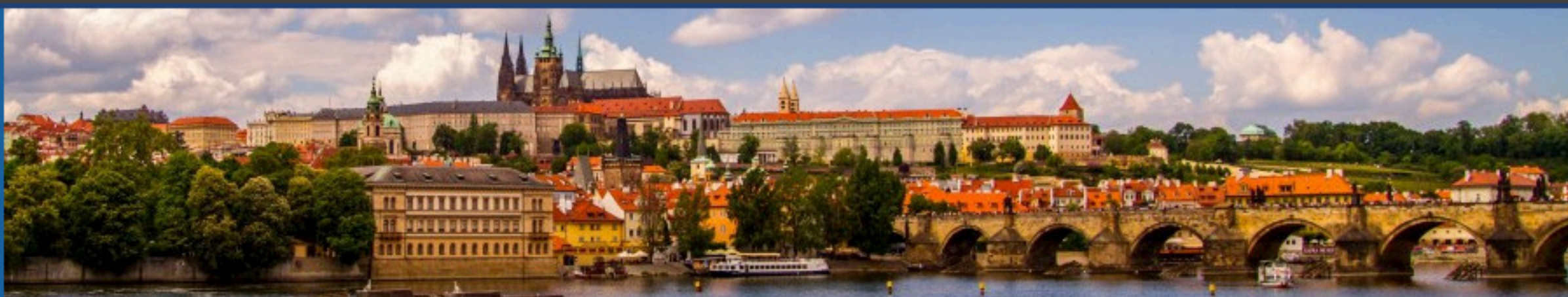
### @IWHSS2023

糠塚元気 (理研・RBRC)





# IWHSS2023 での招待講演



**International Workshop on Hadron Structure and Spectroscopy 2023**

25–28 Jun 2023  
Prague, Czechia  
Europe/Prague timezone

COMPASS | FACULTY OF NUCLEAR SCIENCES AND PHYSICAL ENGINEERING CTU IN PRAGUE | CHARLES UNIVERSITY Faculty of mathematics and physics

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The three day long "International Workshop on Hadron Structure and Spectroscopy 2023" (IWHSS-2023) is taking place in Prague from June 26th to 28th in fully in-person mode. It is going to be followed by the COMPASS Collaboration meeting on June 29th and 30th.

IWHSS-2023 is the 19th workshop in the series of annual workshops on Hadron Structure and Spectroscopy, with most recent editions being the IWHSS-2022 (CERN, celebration of 25 years since COMPASS approval and 20 years since the first data taking), IWHSS-2020 (remote due to COVID-19), IWHSS-2019 (Aveiro, Portugal) and IWHSS-2018 (Bonn, Germany).

<https://indico.cern.ch/event/1250132/>

- Cold-QCD プログラムの紹介を 15 + 5 分で行ってきた
- STAR の結果が  $A_N$  へのグルーオン寄与が小さいことを示唆しているけど、大丈夫か? といった質問
- 理論屋は sPHENIX より EIC に注目しているという印象

**sPHENIX Cold-QCD Program**

26 Jun 2023, 15:05  
20m  
Czech Technical University, Main lecture hall (Prague, Czechia)

Session

Speaker  
Dr Genki Nukazuka (RIKEN BNL Researc...)

Presentation materials

IWHSS2023\_sPHENIX\_Genki\_v2.pdf

<https://indico.cern.ch/event/1250132/contributions/5361530/>

IWHSS 2023  
25/June/2023 – 28/June/2023

**sPHENIX Cold-QCD Program**

Genki Nukazuka (RIKEN/RBRC) on behalf of the sPHENIX Collaboration

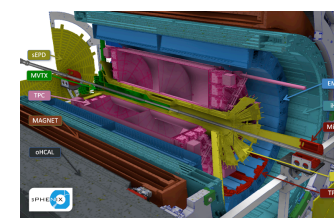
**sPHENIX Physics Programs**

- Jet Physics**: Jet correlations, Nuclear Modification Factor, Jet structure, Jet flavor dependencies
- Quarkonium Spectroscopy**: Sequential quarkonia melting, Suppression of quarkonium depending on the state
- Energy Loss in QGP**: Flavor (mass) dependence of parton energy loss in QGP
- Cold-QCD**: Origin of the transverse single spin asymmetries, Nucleon structure, Fragmentation functions, Nuclear effects

**sPHENIX Detector**

**Tracking detectors**: TPC, TPOT, INTT, MVTX, MBSD

**Forward Detectors**: ZDC



**sPHENIX Run Plan**

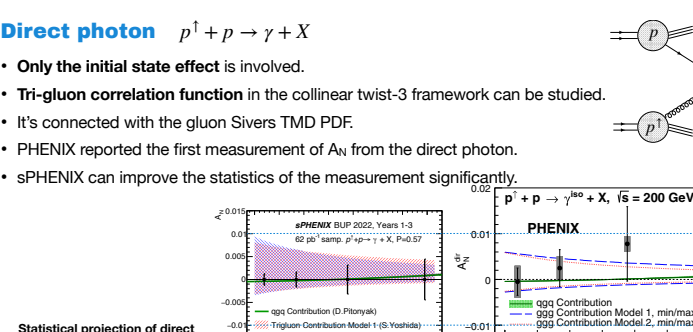
Year	Beam	$\sqrt{s_{NN}}$ (GeV)	Data Taking (Weeks)	Luminosity (Recorded)	Luminosity (Sampled)
2023	Au + Au	200	9	3.7 nb <sup>-1</sup>	4.5 nb <sup>-1</sup>
2024	p <sup>+</sup> + p <sup>-</sup>	200	12	0.3 pb <sup>-1</sup> (5 kHz)	45 pb <sup>-1</sup>
2024	p <sup>+</sup> + Au	200	5	0.003 pb <sup>-1</sup>	11 pb <sup>-1</sup>
2025	Au + Au	200	20.5	13 nb <sup>-1</sup>	21 nb <sup>-1</sup>

2023: Commissioning & Calibration  
2024: p<sup>+</sup> + p<sup>-</sup> and p<sup>+</sup> + Au  
2025: Au + Au

**sPHENIX Cold-QCD Program**

**Direct photon**  $p^+ + p^- \rightarrow \gamma + X$

Only the initial state effect is involved.  
Tri-gluon correlation function in the collinear twist-3 framework can be studied.  
It's connected with the gluon Sivers TMD PDF.  
PHENIX reported the first measurement of  $A_N$  from the direct photon.  
sPHENIX can improve the statistics of the measurement significantly.



**sPHENIX Today**

**EMcal**: Peak by nD decay in  $d_0$  photon mass distribution!

**INTT**: High hit rate by beam-beam collisions means successful tuning of timing.

**ZDC**: Neutron peaks in ADC distribution. Correlation b/w the North and the South parts.

