

Communications

SPD Detector Advisory Committee



SPD DAC chair

Andrea Bressan
INFN/Univ. of Trieste

Experience:

Experiments: LEAR, PS206, COMPASS
(spokesman, 2012-2015)

Activity: hardware, data analysis

DIS 2021 conference

SECTION TALK: The SPD experiment at NICA A. Korzenev

PLENARY TALK: Recent highlights from Spin-Physics Experiments C. Riedl

Selected near future - before the EIC

◆ JLab 12 GeV high-luminosity facility:

- Has started experimental program
- New generation of precision data for valence quarks to come from CLAS12, SoLID, *et al.*

CLAS12: see talk by M. Battaglieri, Wednesday, 8:00

SoLID: see talk by JP. Chen, Wednesday, 8:25



◆ STAR cold QCD with forward upgrade at RHIC:

- 2022/24, $p^{\uparrow}p^{\uparrow}$ & $p^{\uparrow}A$, $\sqrt{s_{NN}}=200$ & 500 GeV
- Tracking system of silicon & small TGC
- Forward electromagnetic & hadronic calorimetry, $2.5 < \eta < 4$
- midrapidity: improve statistics of Sivers via dijet & W/Z, Collins via hadrons in jets, GPD E via J/Psi UPC
- forward rapidity: TMDs at high- x & GPD E
- and more, <https://drupal.star.bnl.gov/STAR/files/ForwardUpgrade.v20.pdf>



see talk by O. Tsai, Tuesday, 12:25

◆ sPHENIX cold QCD program at RHIC:

- 2024, $p^{\uparrow}p^{\uparrow}$ & $p^{\uparrow}A$, $\sqrt{s_{NN}}=200$ GeV, $\eta=\pm 1.1$
- Design optimized for heavy-flavor measurements with jets and displaced vertices with MAPS-based vertex tracker
- Gluon Sivers TMD via A_N in single-photon & heavy flavor
- Di-hadron IFF / Collins asymmetry & transversity TMD via hadron-charge tagging & hadron-in-jet
- and more, sPHENIX-note sPH-cQCD-2017-002



see talk by A. Bazilevsky, recorded flash talk

◆ SpinQuest / E1039 at FNAL (2021++):

- Transversely polarized NH_3/ND_3 target with E906 spectrometer
- First polarized DY experiment with proton beam
- Sivers & transversity TMDs of sea quarks.



◆ COMPASS transversity run 2021

- transversely polarized 6LiD target for d-quark transversity *et al.*

◆ AMBER / NA66 at the CERN M2 beamline:

- Beam time approved for phase 1 after 2021 after the end of the COMPASS d-quark transversity run, no time window yet.
- Pion structure in phase I with pion beams
- Kaon structure in phase II with kaon beams
- TMDs with π , K, anti-proton beams
- and more (e.g., proton radius in elastic μp scattering), <https://nqf-m2.web.cern.ch>

see talk by D. Banerjee, Thursday, 12:40

◆ J-PARC, meson & anti-proton beams, <https://j-parc.jp/Hadron/en/index.html>

◆ LHCspin at CERN, fixed trans.polarized H2 & D2 targets with LHCb as forward spectrometer, >2025, <https://inspirehep.net/literature/1821190>

see talk by M. Santimaria, Wednesday, 8:50

◆ AFTER @LHC, CERN fixed target, >2025, <https://doi.org/10.1016/j.physrep.2021.01.002>



◆ SPD at NICA, JINR: collider experiment with polarized proton and deuteron beams, >2025, <http://spd.jinr.ru/>

see talk by A. Korzenev, Tuesday, 10:51



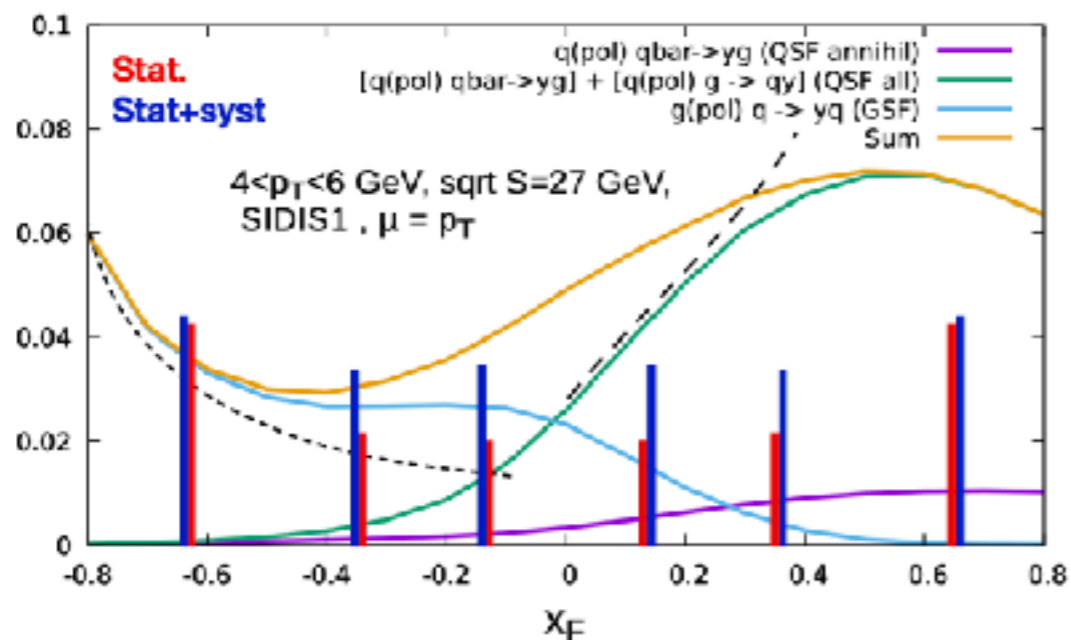
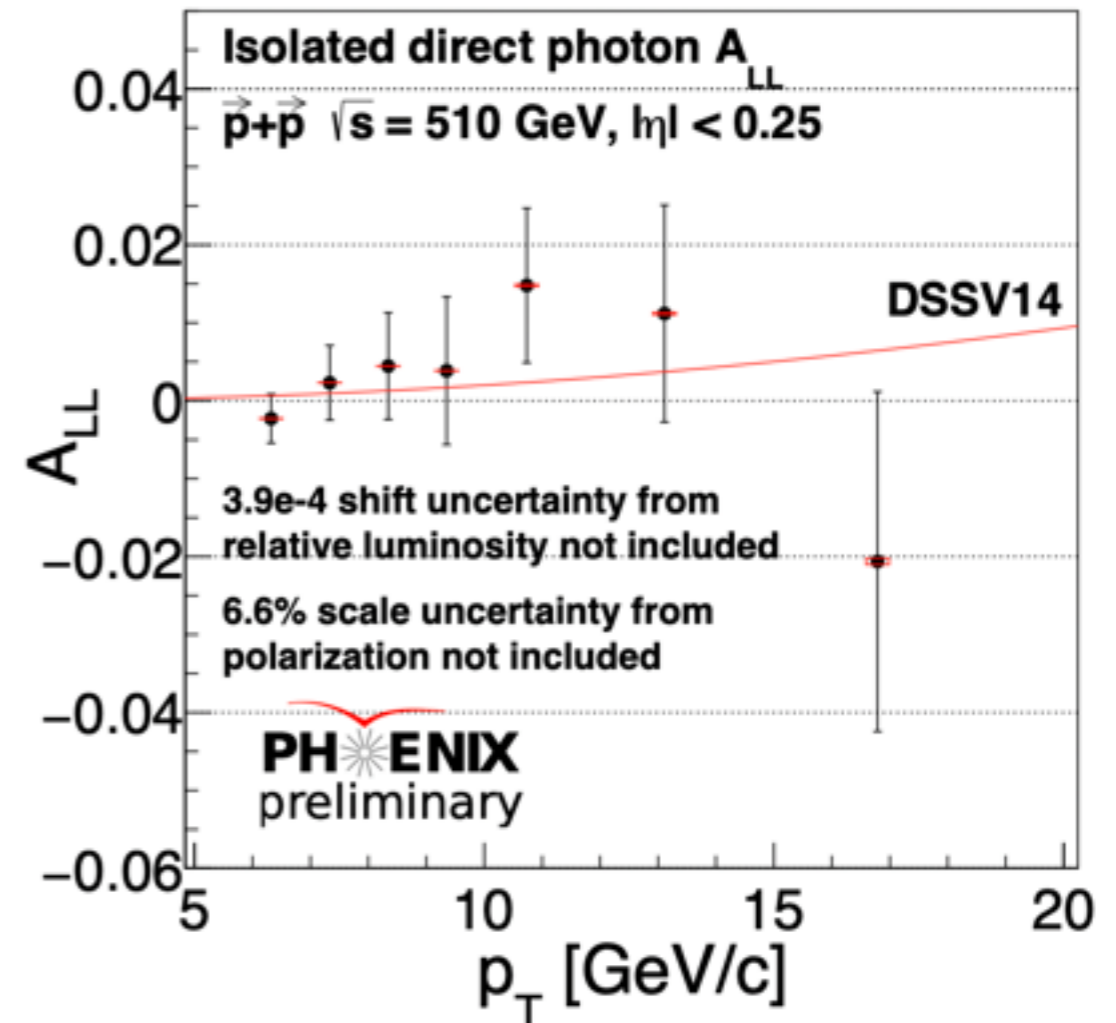
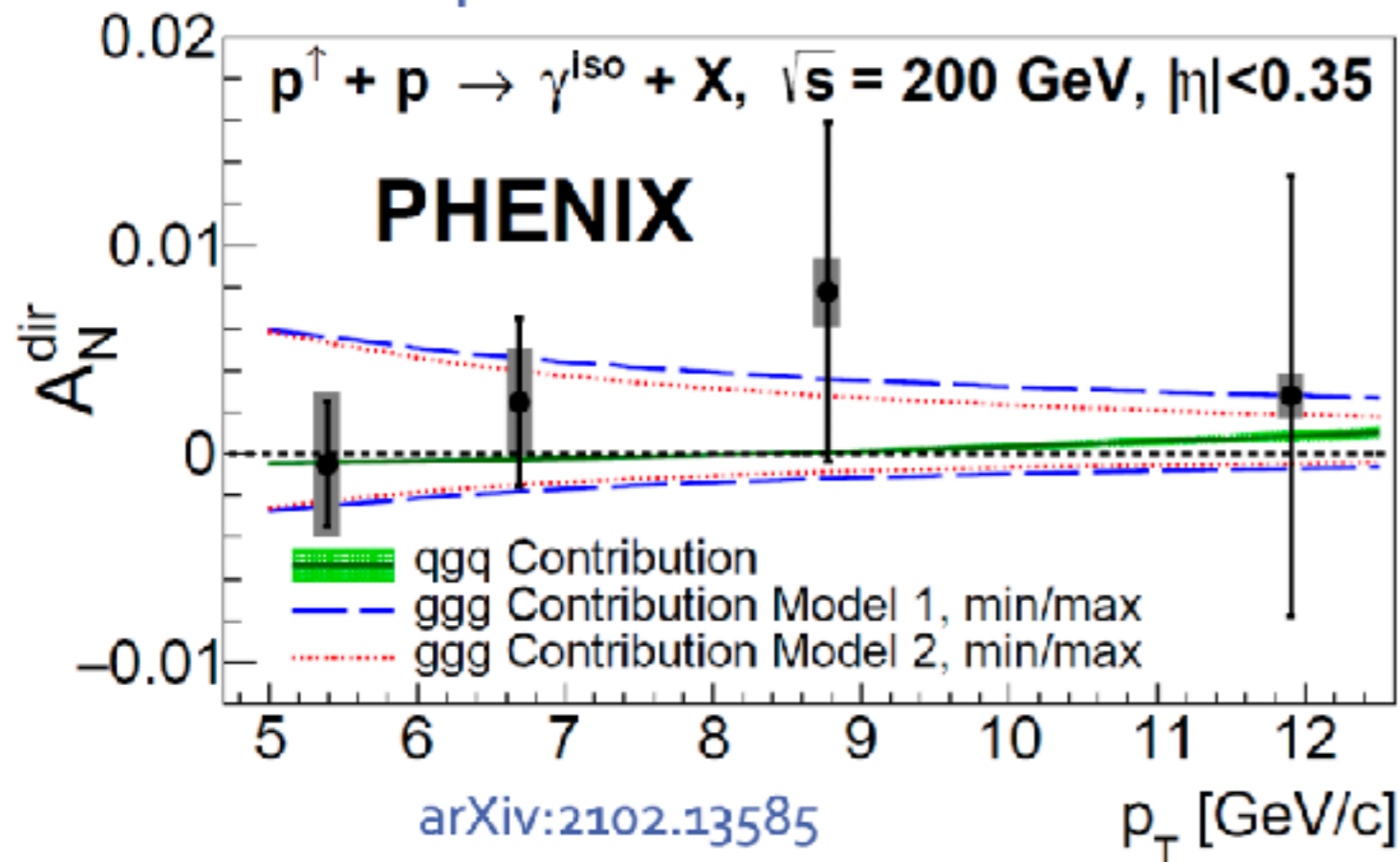
◆ PANDA at FAIR, fixed target with anti-proton beams, <https://panda.gsi.de/article/panda-physics>



◆ EicC (China) at HIAF, > 2025, arXiv:2102.09222

DIS 2021 conference

Direct photon result



From our CDR

Minor update of the CDR

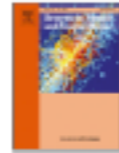
Our physics papers



Progress in Particle and Nuclear Physics

Available online 1 March 2021, 103858

In Press, Corrected Proof



Review

On the physics potential to study the gluon content of proton and deuteron at NICA SPD

A. Arbuzov^a, A. Bacchetta^{b,c}, M. Butenschoen^d, F.G. Celiberto^{b,c,e,f}, U. D'Alesio^{g,h}, M. Deka^a, I. Denisenko^a, M.G. Edchevarriaⁱ, A. Efremov^j, N.Ya. Ivanov^{k,l}, A. Guskov^{a,k,m,n}, A. Karpishkov^{k,o}, Ya. Klopot^{k,m}, B.A. Kniehl^d, A. Kotzinian^{b,p}, S. Kumano^q, J.P. Lansberg^q, Keh-Fei Liu^r, ... O. Teryaev^a

issued

Please cite this article as: A. Arbuzov, A. Bacchetta, M. Butenschoen et al., On the physics potential to study the gluon content of proton and deuteron at NICA SPD, Progress in Particle and Nuclear Physics (2021) 103858, <https://doi.org/10.1016/j.ppnp.2021.103858>.

Prepared for Physics of Elementary Particles and Atomic Nuclei. Theory

accepted for publication
many thanks to Yu. Uzikov

Possible studies at the first stage of the NICA collider operation
with polarized and unpolarized proton and deuteron beams

*V.V. Abramov¹, A. Aleshko², V.A. Baskov³, E. Boos²,
V. Bunichev², O.D. Dalkarov³, R. El-Kholy⁴, A. Galoyan⁵, A.V. Guskov⁶,
V.T. Kim^{7,8}, E. Kokoulina^{5,9}, I.A. Koop^{10,11,12}, B.F. Kostenko¹³,
A.D. Kovalenko⁵, V.P. Ladygin⁵, A.B. Larionov^{14,15}, A.I. L'vov³, A.I. Milstein^{10,11},
V.A. Nikitin⁵, N.N. Nikolaev^{16,26}, A.S. Popov¹⁰, V.V. Polyanskiy³,
J.-M. Richard¹⁷, S.G. Salnikov¹⁰, A.A. Shavrin¹⁸, P.Yu. Shatunov^{10,11},
Yu.M. Shatunov^{10,11}, O.V. Selyugin¹⁴, M. Strikman¹⁹, E. Tomasi-Gustafsson²⁰,
V.V. Uzhinsky¹³, Yu.N. Uzikov^{6,21,22,*}, Qian Wang²³, Qiang Zhao^{24,25}, A.V. Zelenov⁷*