General status of the SPD project

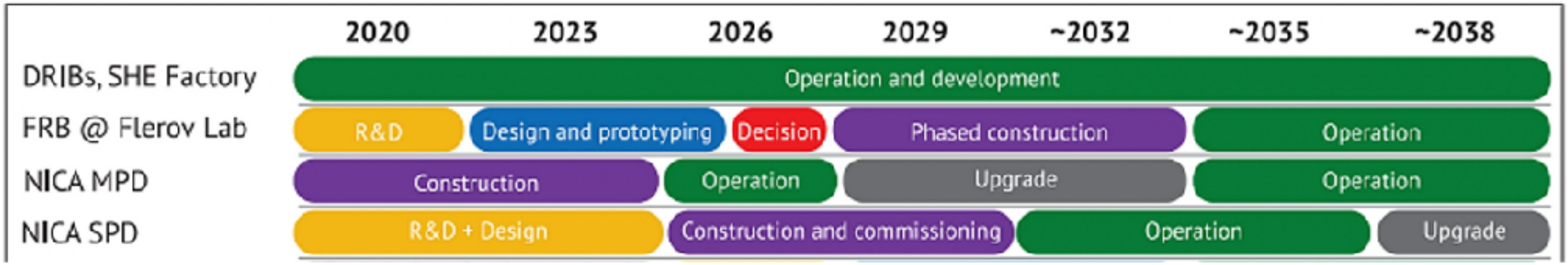
2-nd meeting with SPD DAC

A. Guskov 1.10.21

General news

- June, 4: SPD CB adopted the constitution.
- June: remote collaboration meeting
- Work on MoU
- Communication with accelerator people and MPD
- Work on TDR. Special attention was paid to:
    - magnet
    - ZDC

NICA running plans



SPD: first run not before 2028

MPD (from A. Kisiel):

“ In particular MPD will have the following goals for the next few years:

2023 - first beams and collisions, Bi+Bi at 9.2 AGeV

2024 - achieving Au+Au collisions at 11 AGeV

beyond 2024:

- first priority: achieving maximum luminosity for Au+Au at 11 AGeV
- second priority: beam energy scan
- third priority: beam species scan”

MPD has no well-defined plans for the second phase at the moment

Polarized infrastructure for SPD

Till 2028 NICA will have the following modes:
1) A-A
2) polarized p-p (spin transparency mode) with beam kinetic energy up to 3.75 GeV
3) polarized d-d (spin transparency mode) with beam kinetic energy up to 1.3 GeV

If 2 Sibirian snakes will be installed in each ring (8-10 M$) and electron cooling in booster, the following modes will be available:

1) Transversely polarized p-p with any beam kinetic energy up to 12.6 GeV
2) Longitudinally polarized p-p with beam kinetic energy up to 12.6 GeV with a step 0.5 GeV
3) Transversely polarized d-d at any energy till 6.3 GeV/u
4) Longitudinally polarized d-d at any energy till 4.2 GeV/u

Polarized infrastructure for SPD

ISSN 1063-7796, Physics of Particles and Nuclei, 2021, Vol. 52, No. 5, pp. 987–1017. © Pleiades Publishing, Ltd., 2021.
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Formation of Polarized Proton Beams in the NICA Collider-Accelerator Complex

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Received December 1, 2020; revised January 11, 2021; accepted February 26, 2021

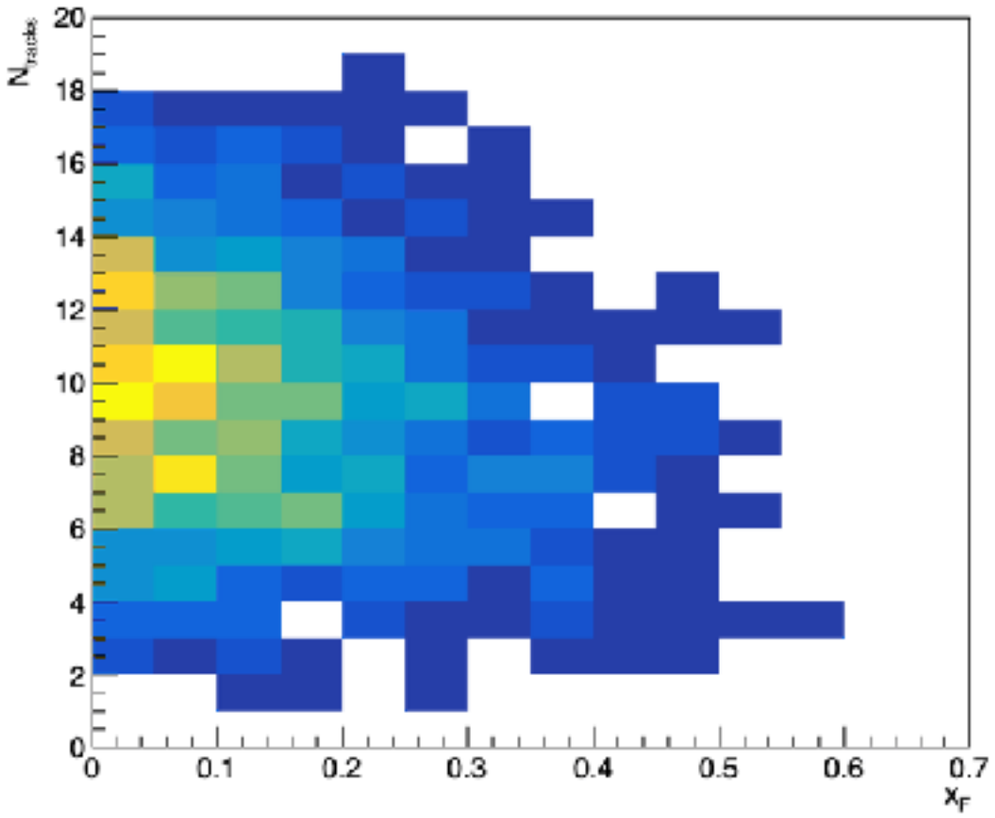
Abstract—Two schemes of the polarized proton beam formation are considered for the NICA accelerator complex. In the first scheme, the polarized proton beams are injected from the LILAC linear accelerator into the Nuclotron, where they are accelerated up to a kinetic energy of 1.5–2 GeV and then extracted to the Collider. The injected proton beams are accumulated in the Collider using the RF barriers and electron cooling. After accumulation, the protons are accelerated by the RF1 induction voltage up to the critical relativistic fac-

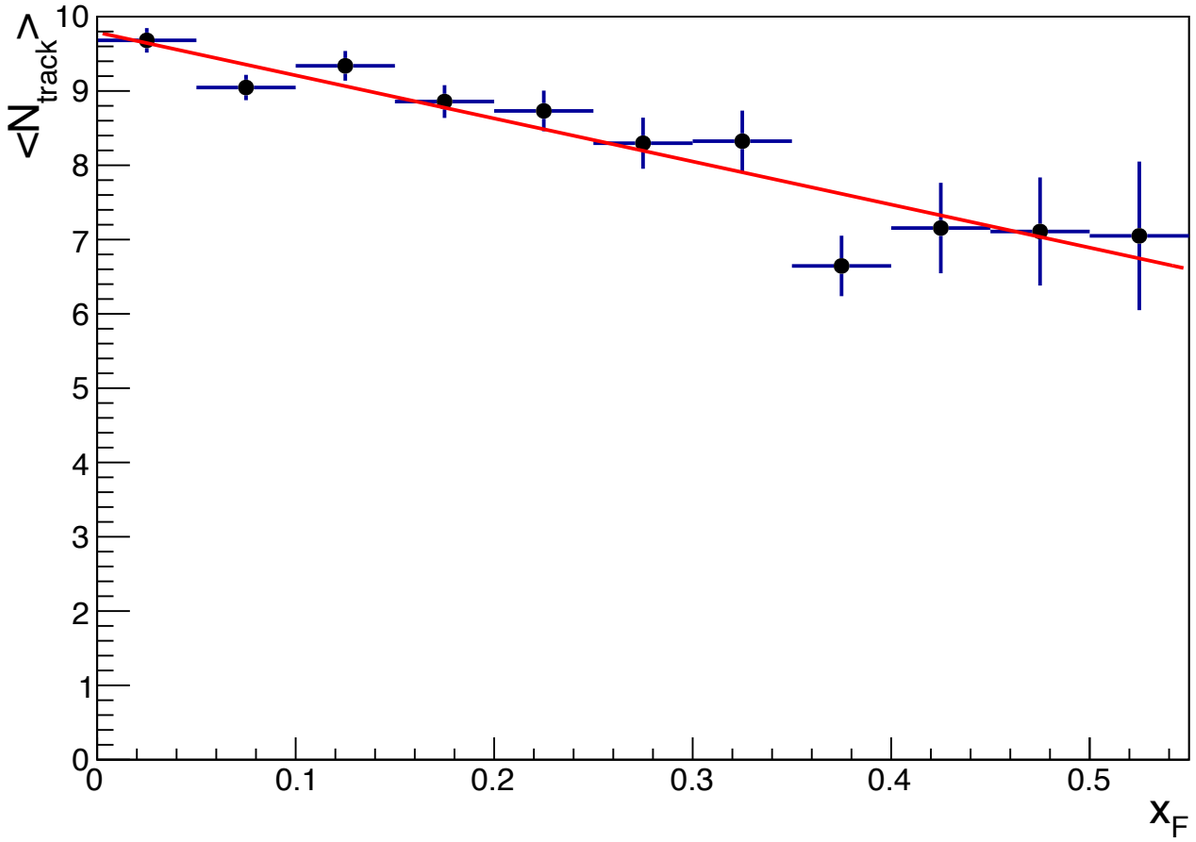
Polarized infrastructure for SPD

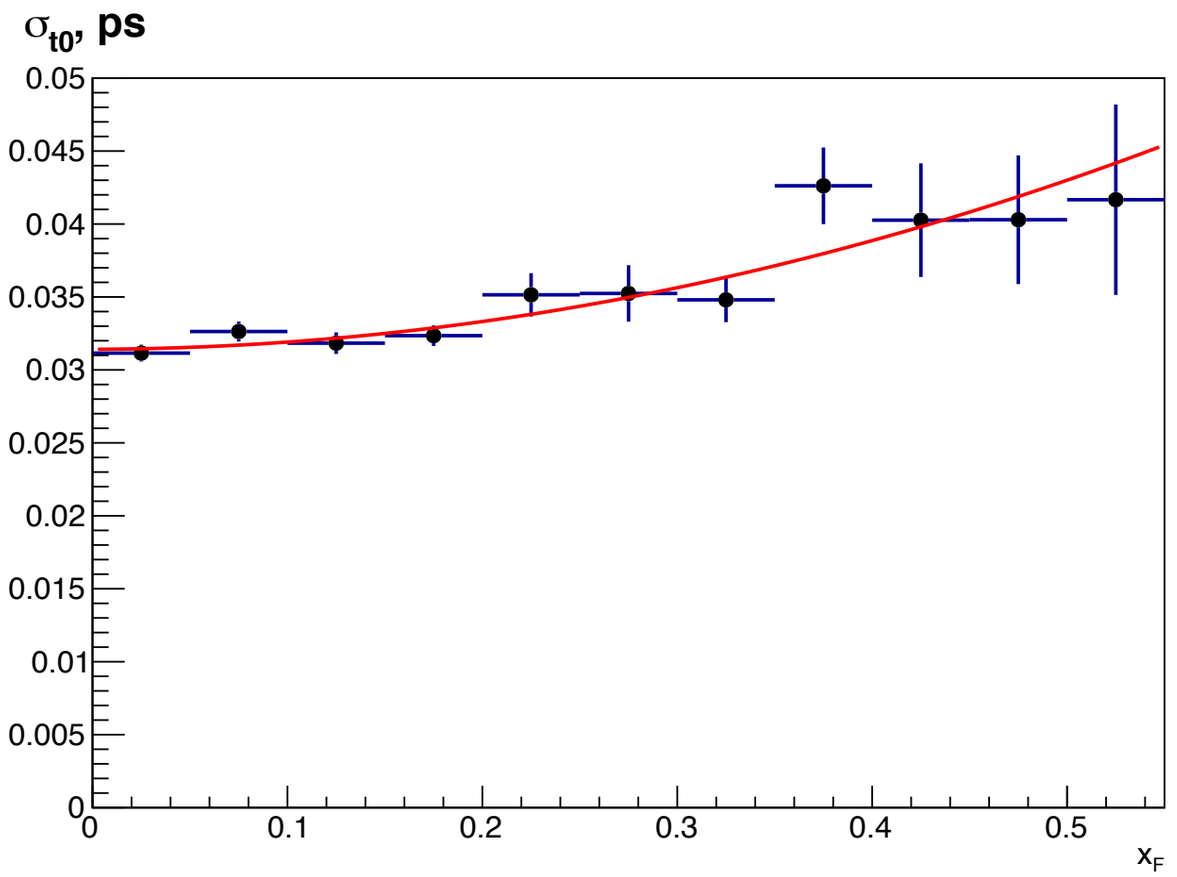
Absolute Polarimeter with an internal polarized atomic hydrogen/deuterium jet target

t0 from TOF

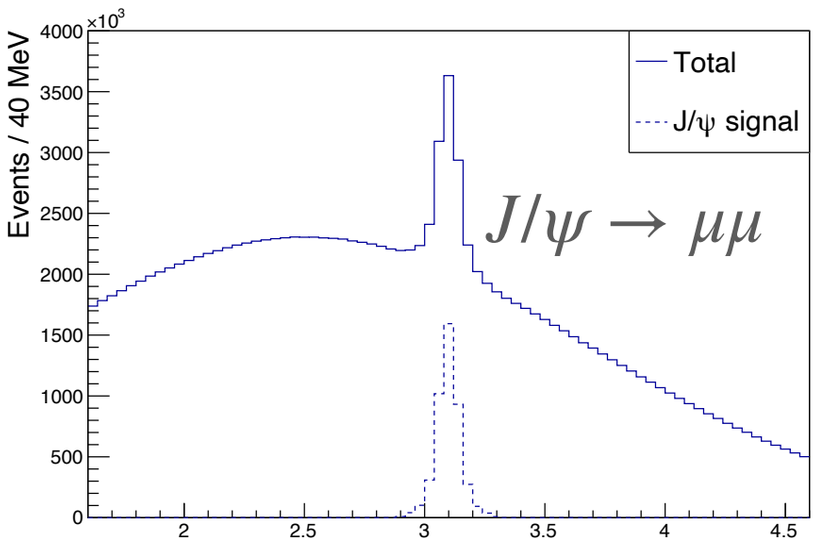
for open charm events:

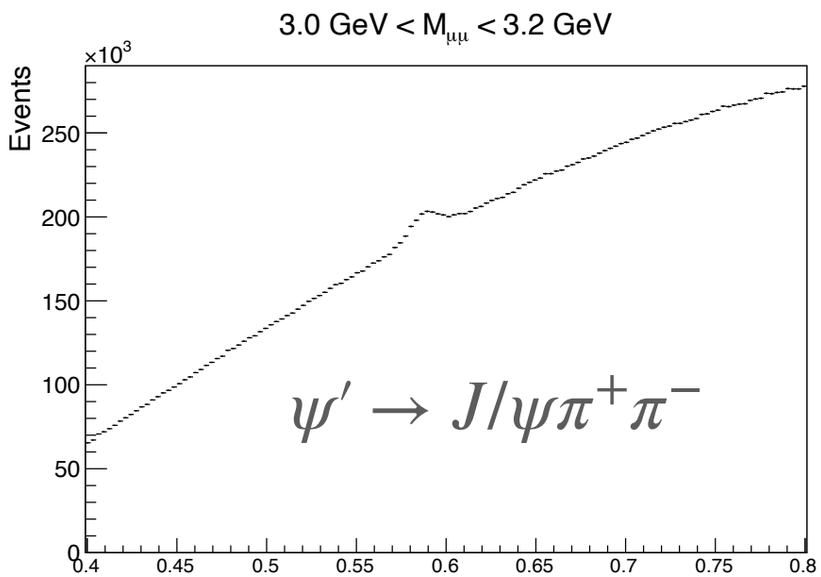


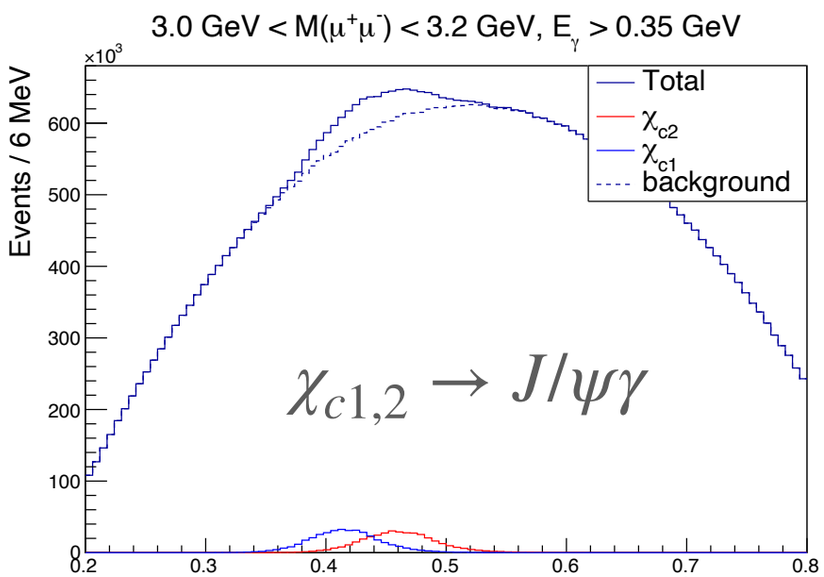


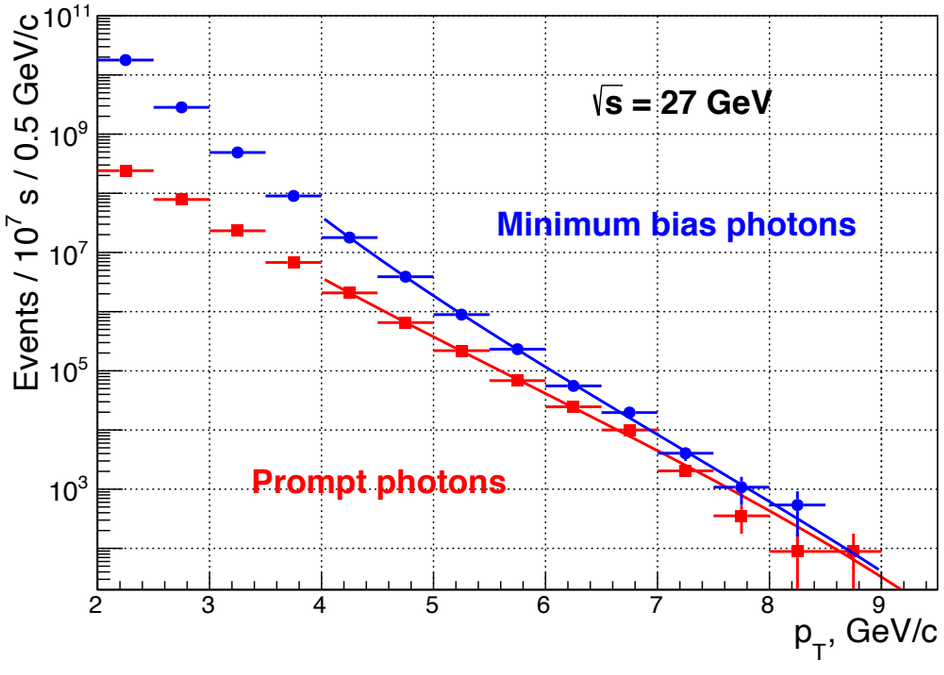


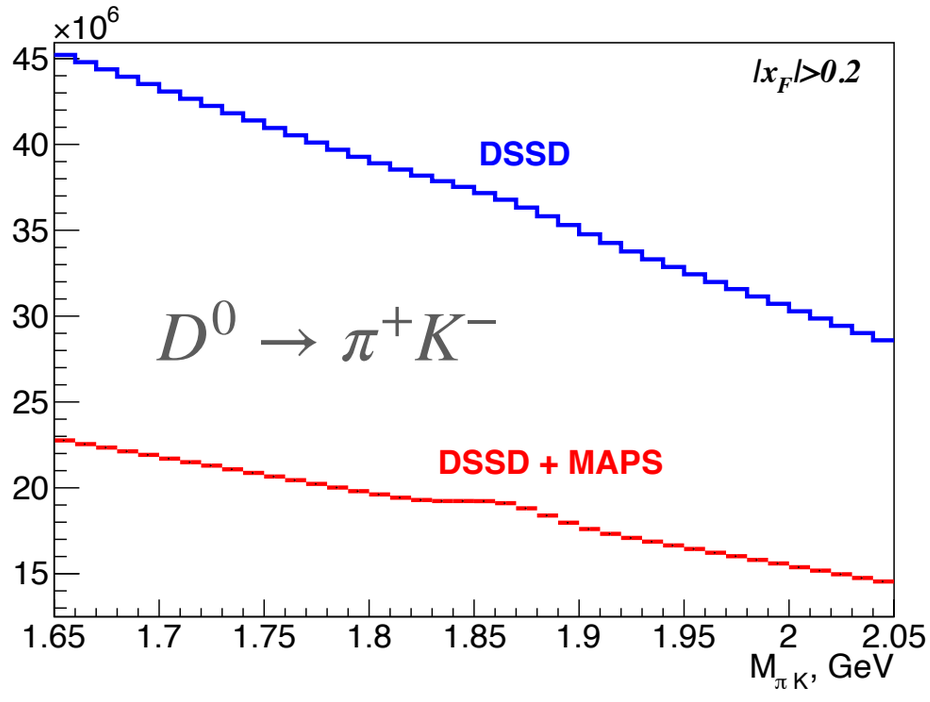
PHYSICS PERFORMANCE: GLUON PROBES (1 YEAR=10^7 S)



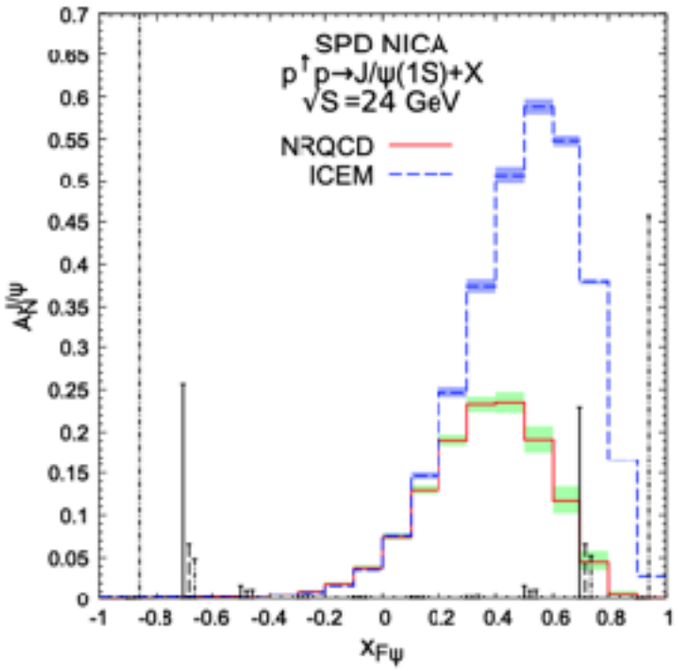




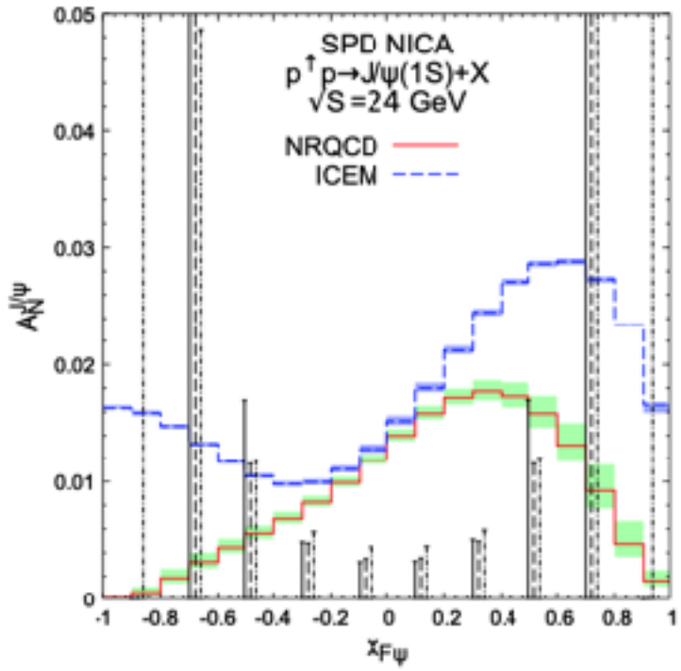


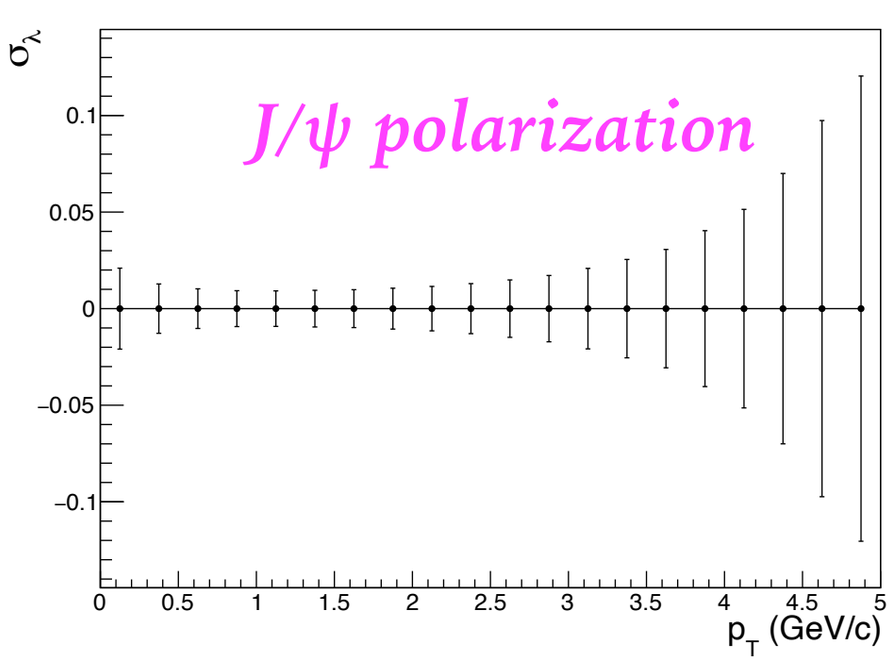


PHYSICS PERFORMANCE: ACCURACIES



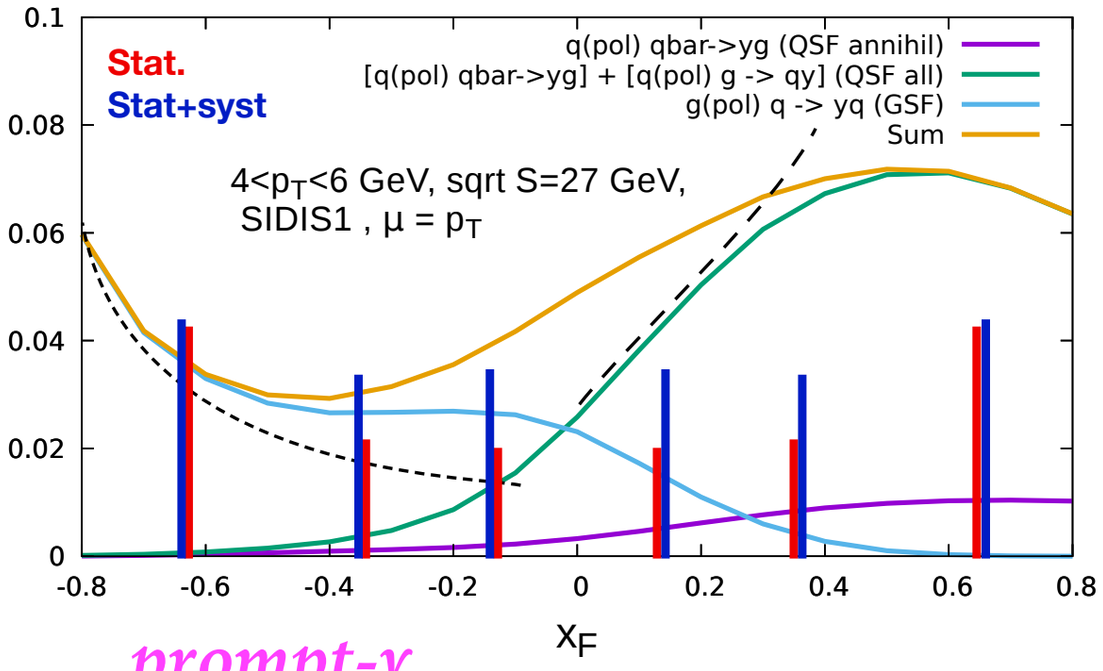
J/ψ



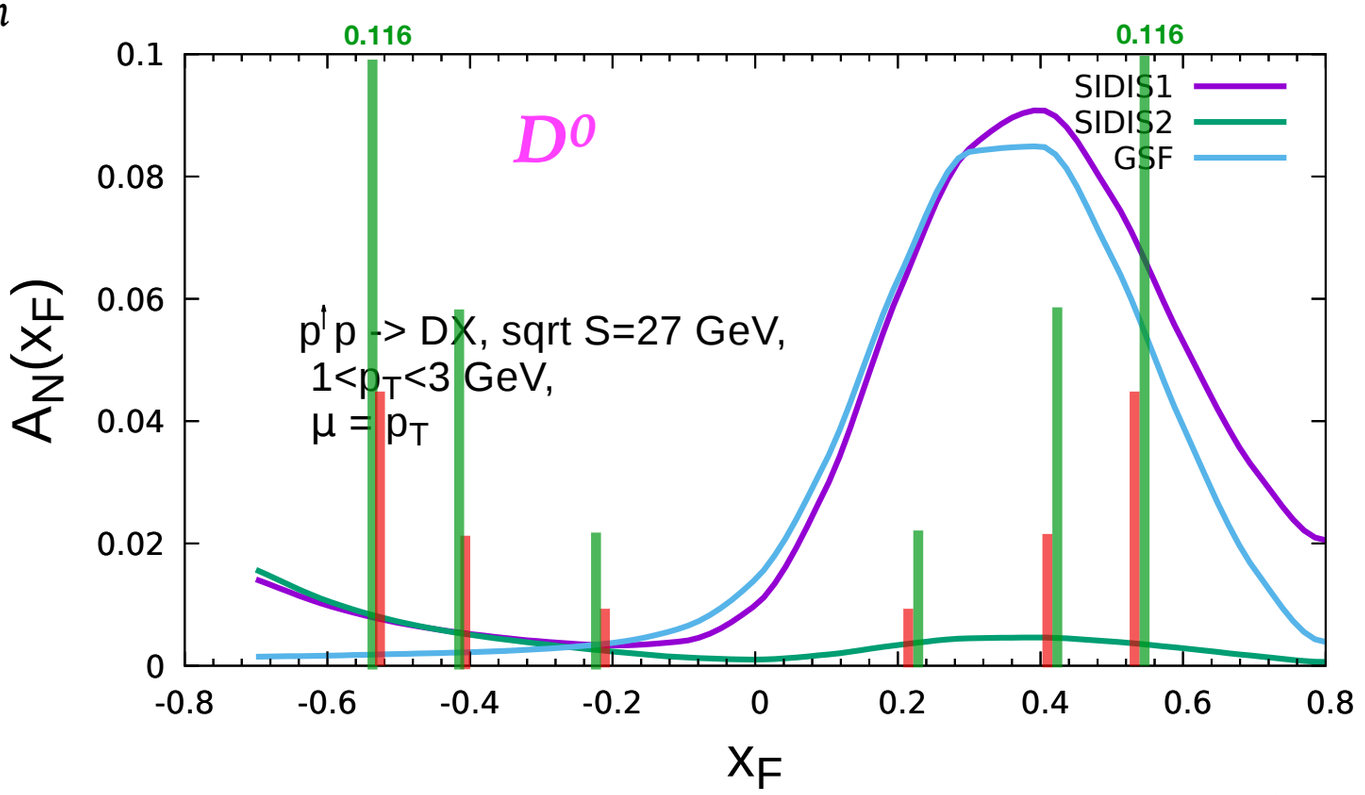


J/ψ polarization

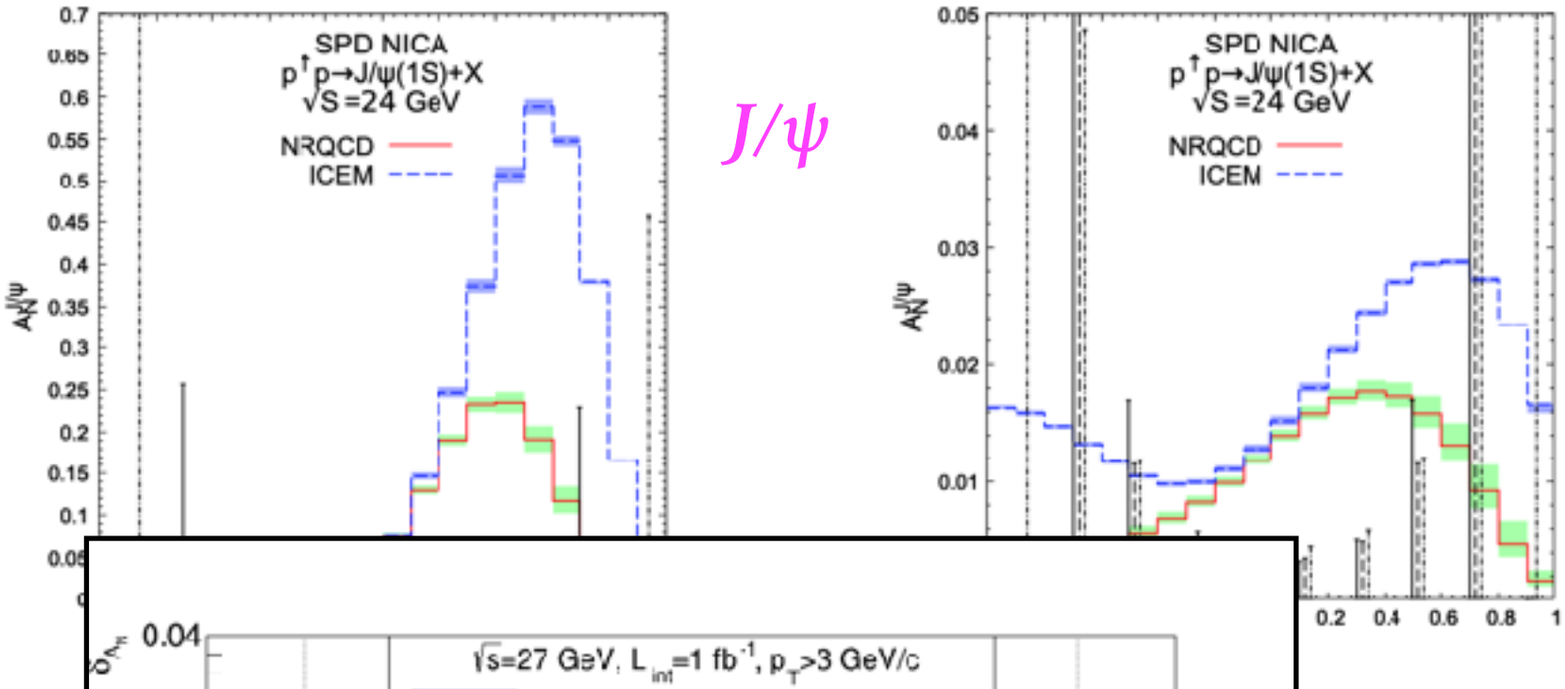
Different inputs for gluon Sivers function



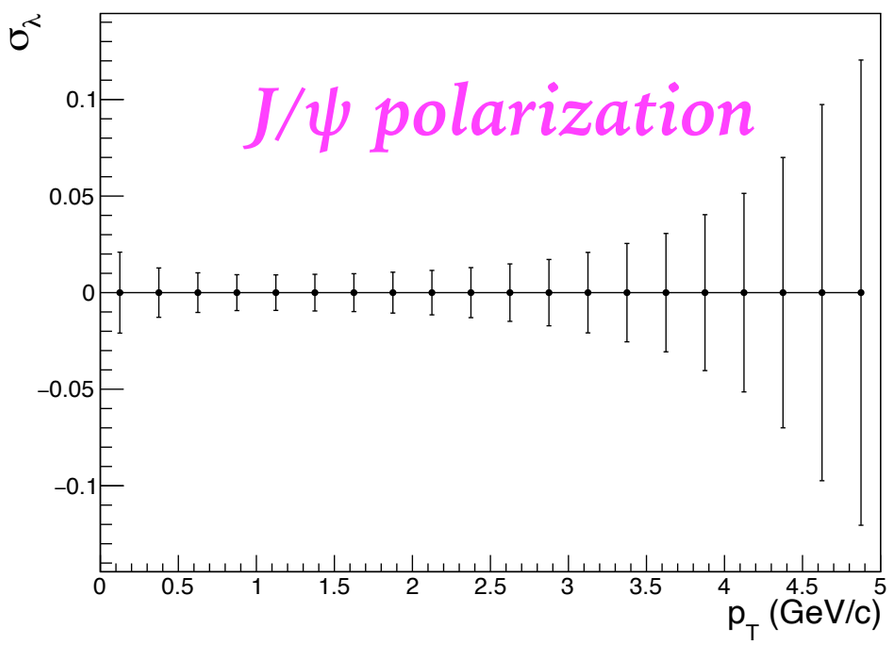
prompt-γ



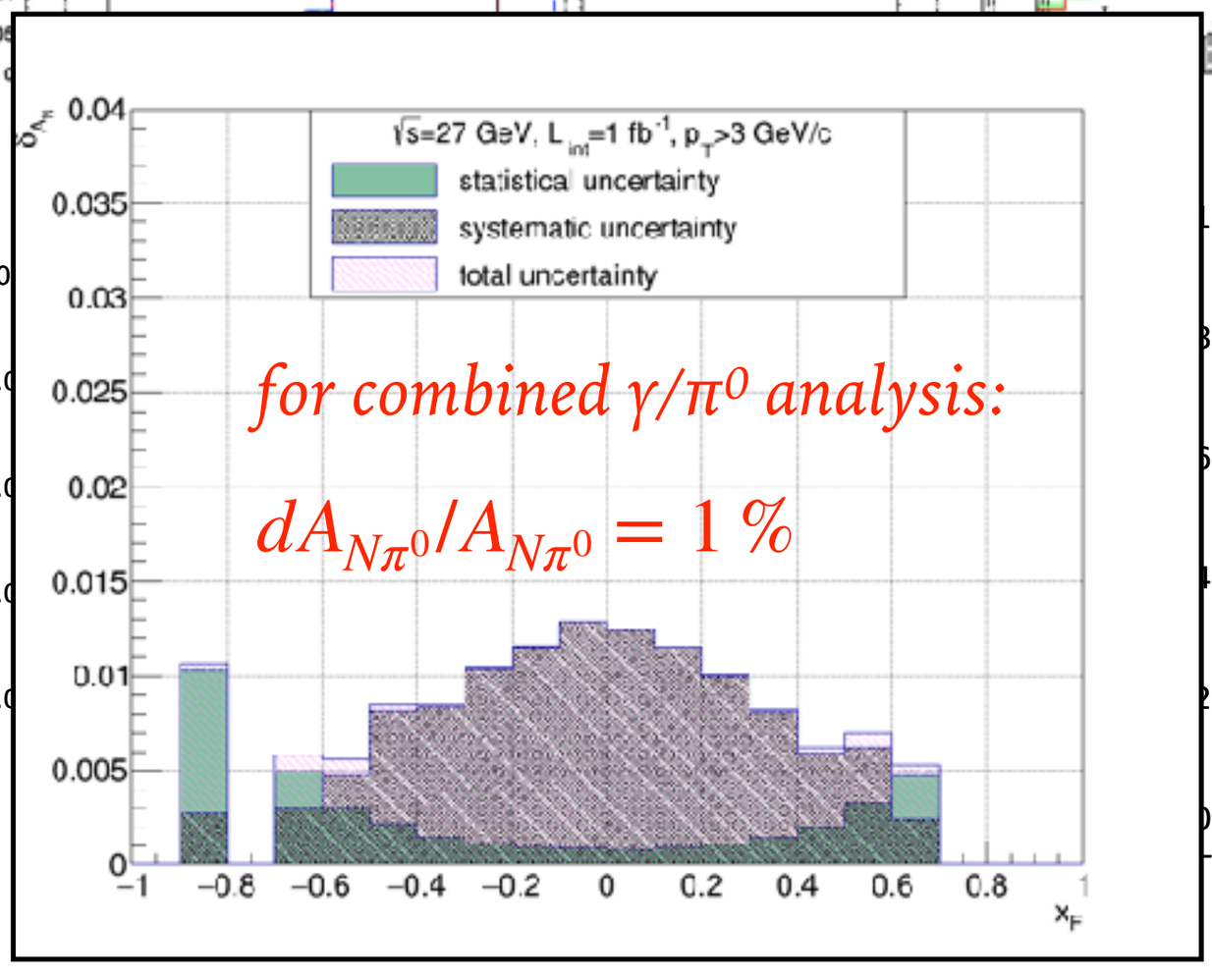
PHYSICS PERFORMANCE: ACCURACIES



J/ψ

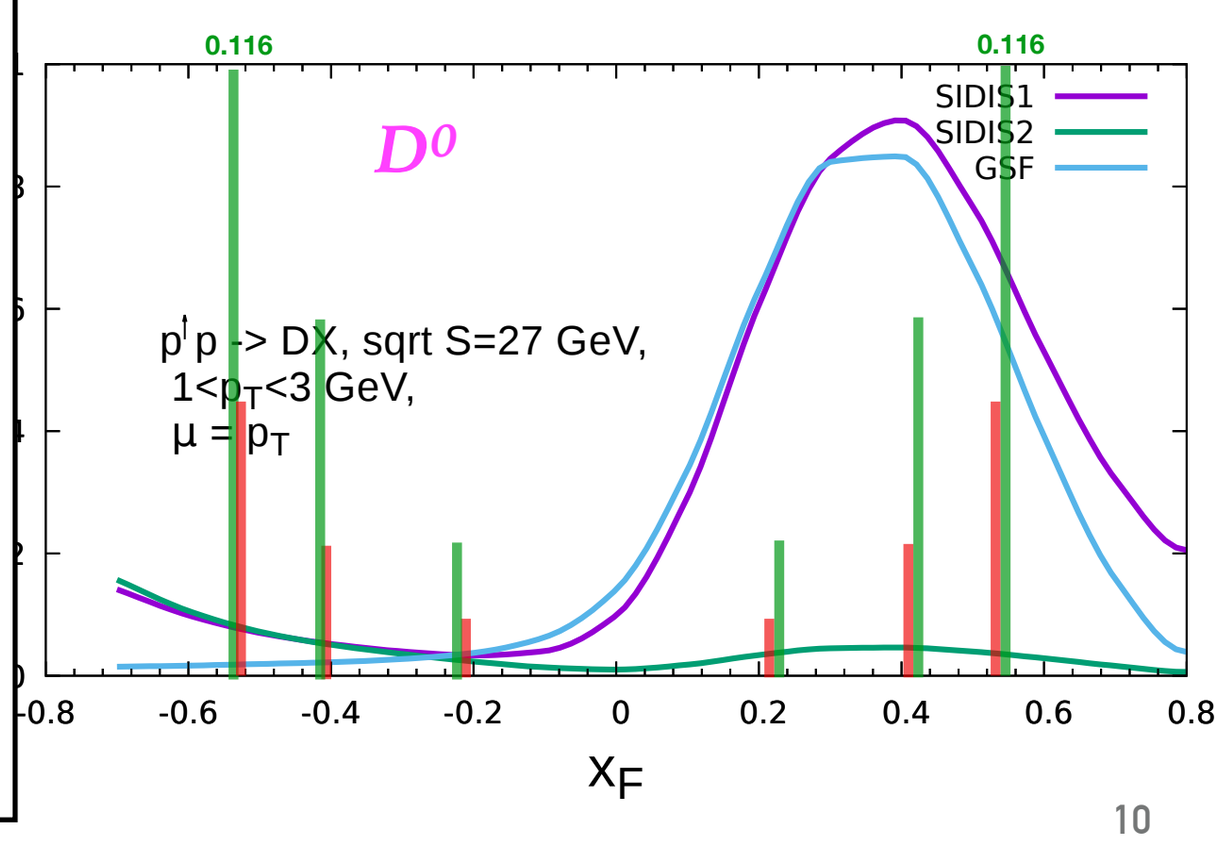


J/ψ polarization

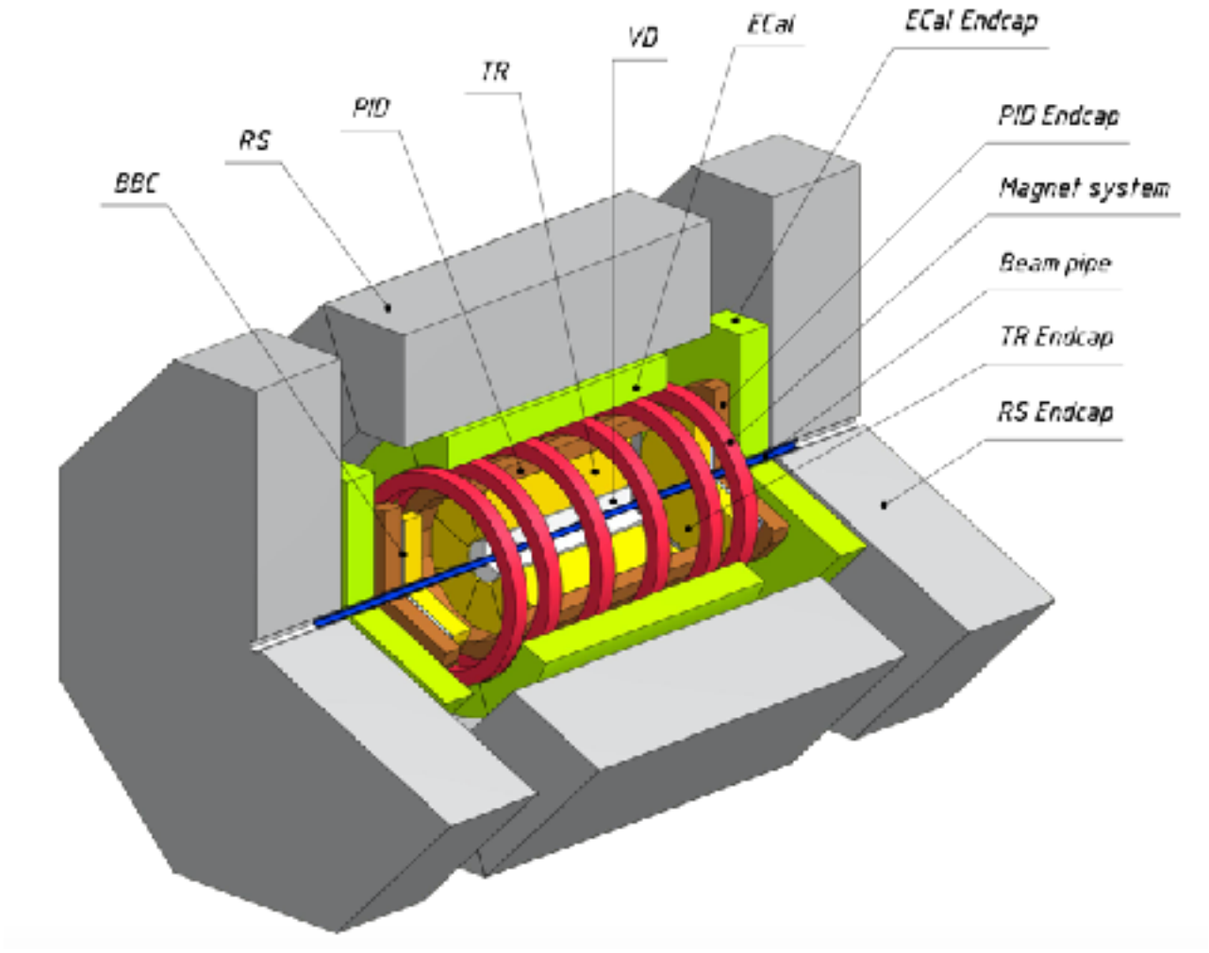


for combined γ/π⁰ analysis:

$dA_{N\pi^0}/A_{N\pi^0} = 1\,\%$



First stage of operation



Minimal possible configuration: tracker + magnet + RS

Some cheap detector should be used instead of the Vertex detector. Otherwise dP/P jumps from 1.2% to 2%.

Some material should be placed instead of the ECAL in order to compensate ~0.5 Λ_I for muID (if needed)