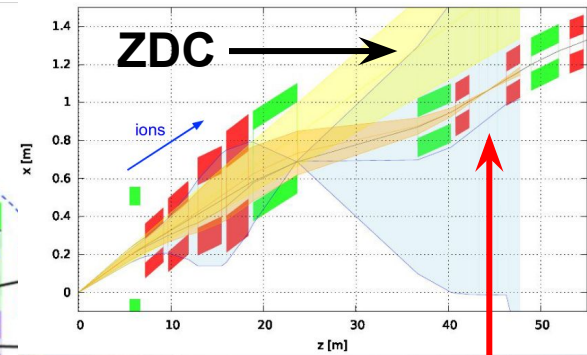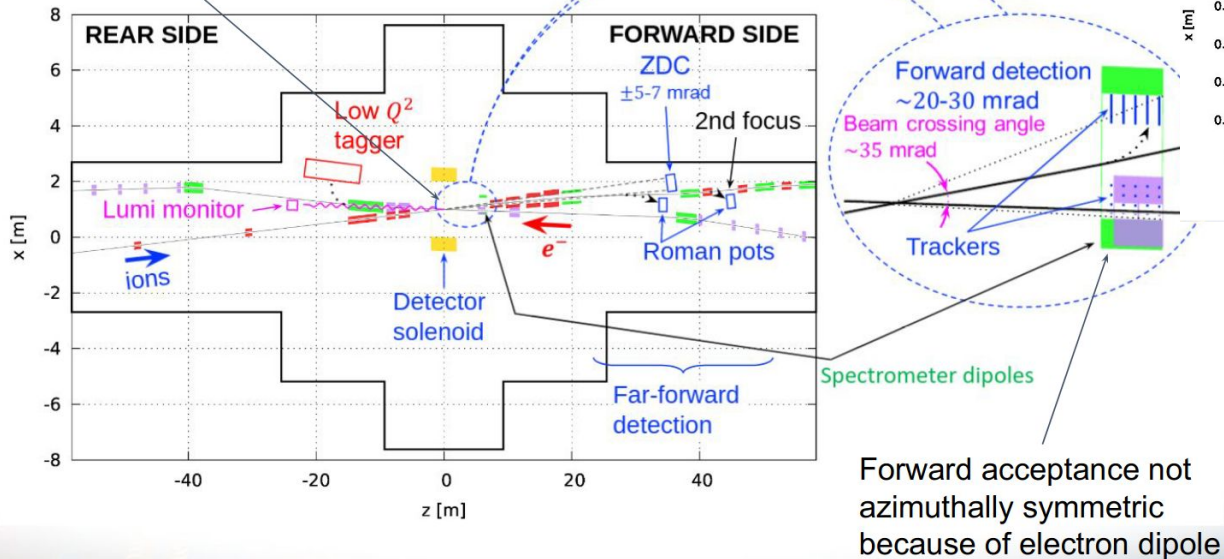# IP8 Magnet Configuration, implementation status in Fun4all and Detector Placement

**Wenliang (Bill) Li, Yulia Furletova, Dmitry Romanov**
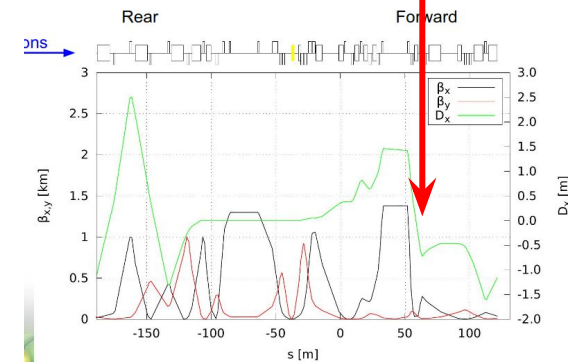
**June 14, 2021**

# IP8 Overall (Current focus: Far-forward Region)



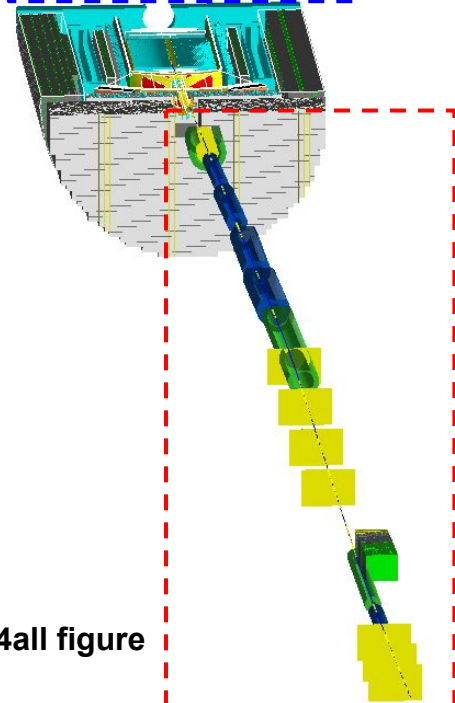IP is 1m towards the center of the ring from the center of the experimental hall.

REAR SIDE

FORWARD SIDE

ZDC
±5-7 mrad

2nd focus

Low $Q^2$ tagger

Lumi monitor

ions

$e^-$

Detector solenoid

Roman pots

Far-forward detection

Forward detection
~20-30 mrad
Beam crossing angle
~35 mrad

Trackers

Spectrometer dipoles

Forward acceptance not azimuthally symmetric because of electron dipole

ZDC

Secondary focus

Rear

Forward

ions

https://indico.bnl.gov/event/12068/contributions/50456/attachments/34996/56934/2nd_IR_layout.pdf

# IP8 Configuration Released June 7th



**Fun4all figure**

**Not align properly**

| | X center [m] | Y center [m] | Z center [m] |
|---|---|---|---|
| **Rear elements** | | | |
| ionBXUS01 | 0.40249228105 | 0 | -17.73979064 |
| ionQFFUS03 | 0.5538411038 | 0 | -12.742191425 |
| ionQFFUS02 | 0.7095593068 | 0 | -8.294916769 |
| ionQFFUS01 | 0.78304430145 | 0 | -6.1962028875 |
| **Forward elements** | | | |
| ionBXSP01 | 0.212097365102 | 0 | 6.09600210598 |
| ionQFFDS01A | 0.260495441074 | 0 | 8.19569108373 |
| ionQFFDS01B | 0.347217216172 | 0 | 10.7942654355 |
| ionQFFDS02A | 0.482534996502 | 0 | 14.1918489261 |
| ionQFFDS02B | 0.573577466652 | 0 | 17.1904505591 |
| ionBXDS01A | 0.737879152469 | 0 | 21.2880193505 |
| ionBXDS01B | 0.905112088983 | 0 | 38.4880970566 |
| ionQDS01 | 0.9834278683 | 0 | 41.537066035 |

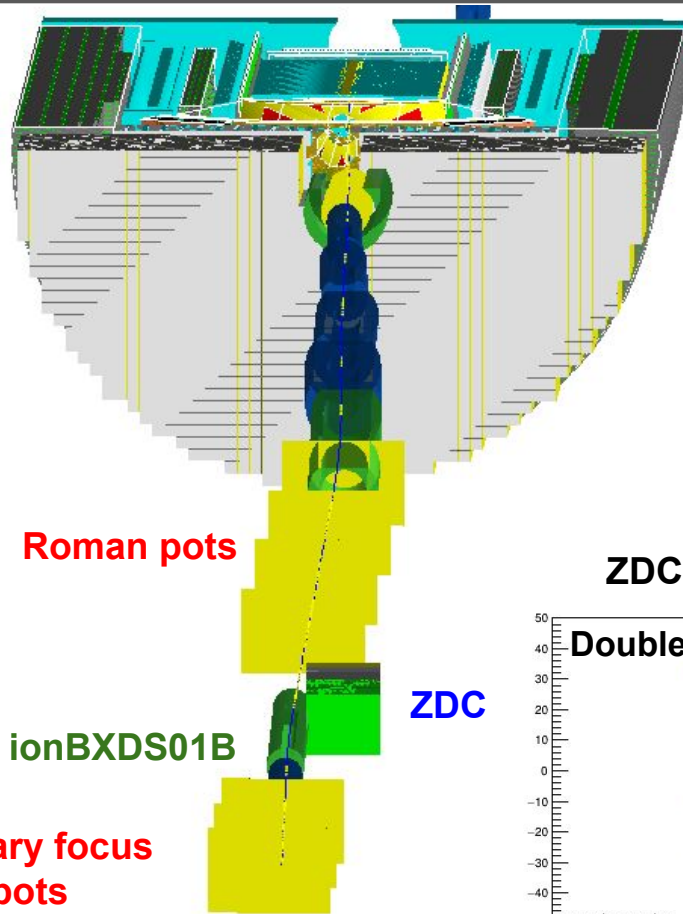**Released June 7th, fully implemented in g4e (Yulia) and EIC-root (A. Jentsch) and Fun4all (Bill)**

**Configuration available at:** https://indico.bnl.gov/event/12068/overview
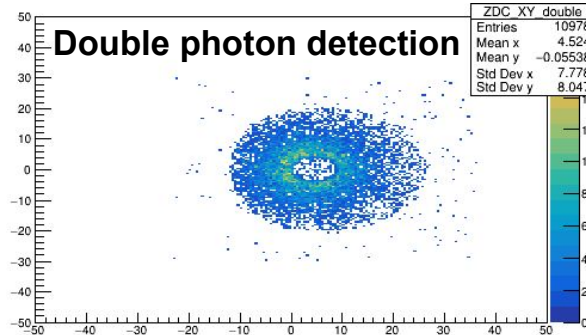
# IP8 Configuration Steering Looks Good!

- **275 GeV proton beam steers well!**

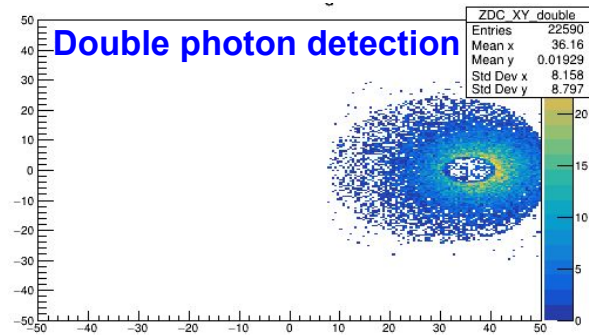- **Beam pipe is not yet available**
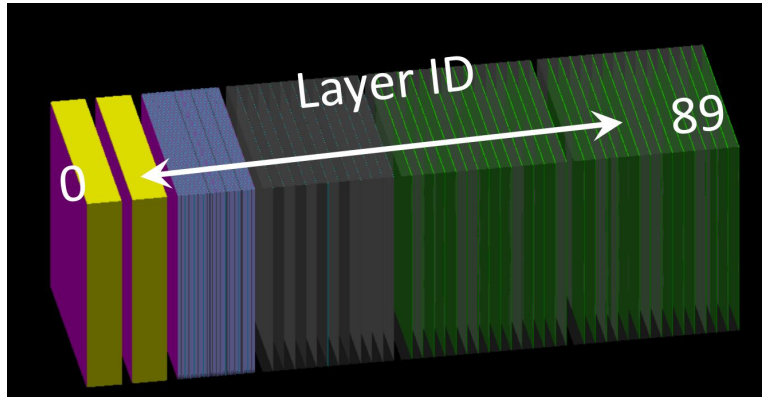  - Not only in Fun4all

**Fun4all output**

**Roman pots**

**ZDC**

**ionBXDS01B**

**Secondary focus Roman pots**

ZDC 50 GeV $\pi^0$ @IP6

Double photon detection

| ZDC_XY_double | |
|---|---|
| Entries | 10978 |
| Mean x | 4.524 |
| Mean y | −0.05538 |
| Std Dev x | 7.778 |
| Std Dev y | 8.047 |

ZDC 50 GeV $\pi^0$ @IP8

Double photon detection

| ZDC_XY_double | |
|---|---|
| Entries | 22590 |
| Mean x | 36.16 |
| Mean y | 0.01929 |
| Std Dev x | 8.158 |
| Std Dev y | 8.797 |

# ZDC Interference with BXDS01B (Fun4all)



- **ZDC is 2m long, sitting at 35mRad**

- Layer 1, 3:            Crystal 3cm x 3cm
- Layer 0, 2, 4, 25, 46:  Silicon 3mm x 3mm
- Layer 5-24, 25-45:     Silicon 1cm x 1cm (w/ Tungsten)
- Layer 47-58:          Silicon 1cm x 1cm (w/ Pb)
- Layer 59-89:          Scintillator 10cm x 10cm



Interference

ZDC

ionBXDS01B

ionQDS01

**275 GeV _p_**
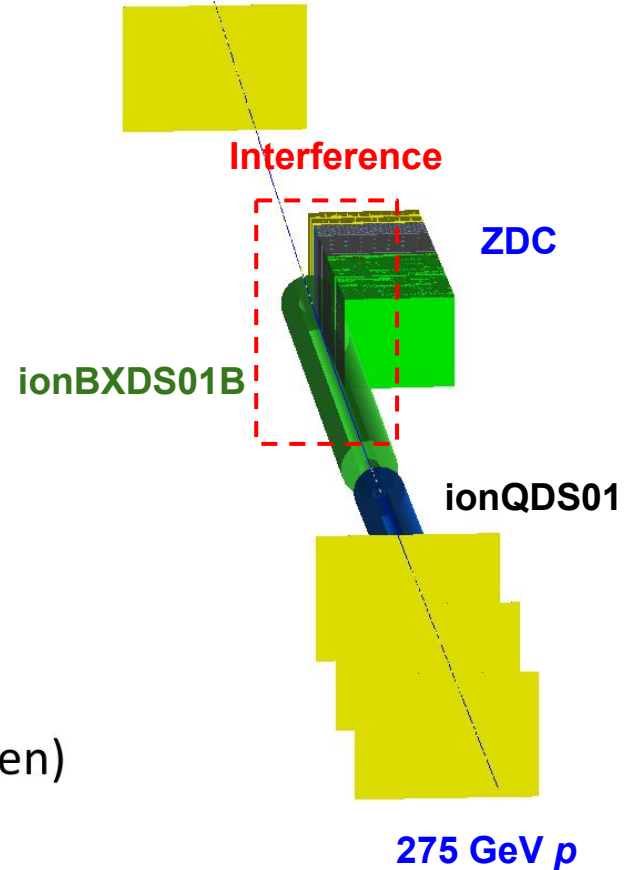
# IP8 and Fun4all to-do List

- **IP8 to-do list:**
  - **Aligning rear components**
  - **Further optimizing magnet configuration**
  - **Far-forward beam pipe**

- **Fun4all:**
  - **Step down magnetic field configuration for lower energy ion beam**
  - **Resolving detector-magnet interference ahead of the beamline design**
  - **Optimization detector location**
  - **Verifying secondary focus configuration**