

Correcting Coils in IP8: An Alternative to Skewed Quadrupoles to Correct Beamline Distortion

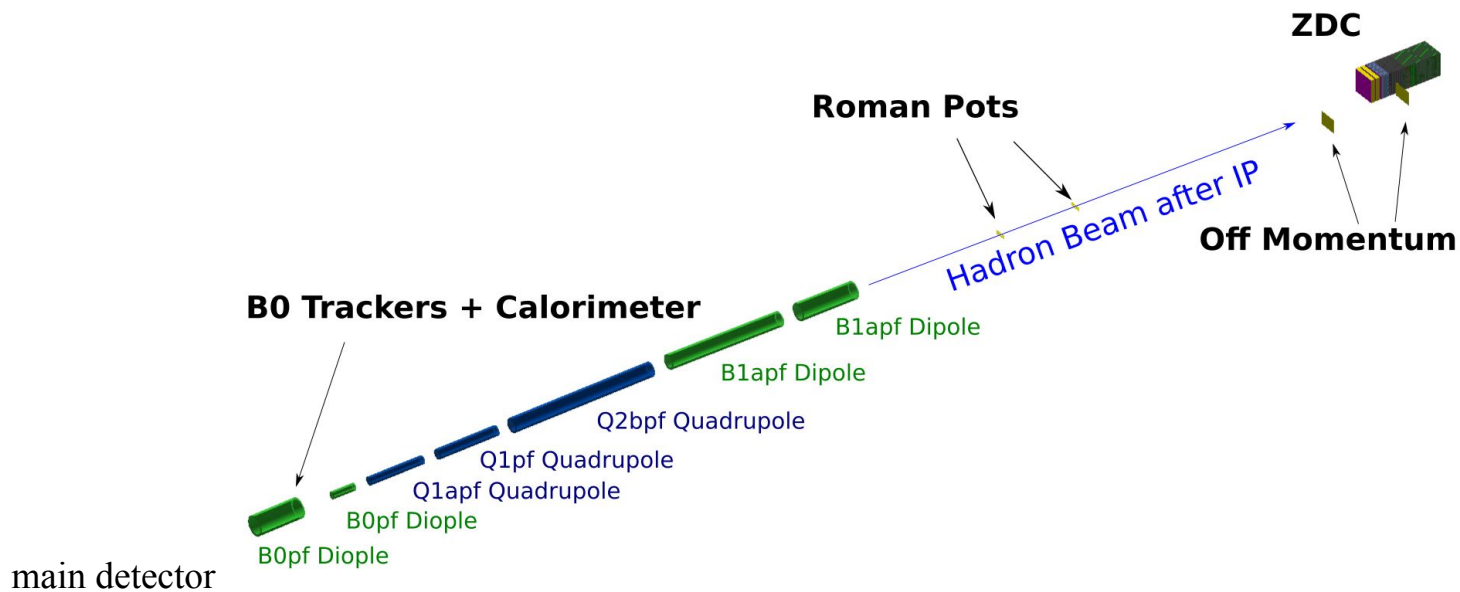
Ruthie Gu

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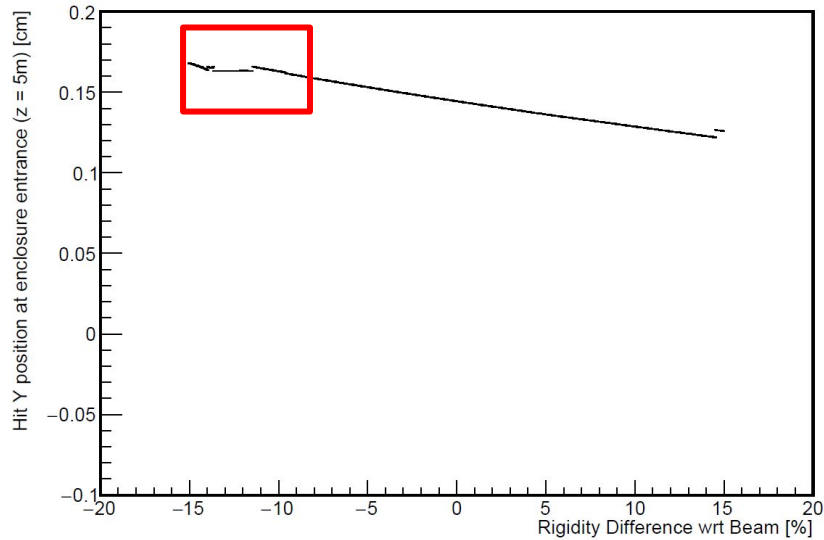
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Charles Hyde, Pawel Nadel-Turonski, Vasiliy Morozov

an overlooked problem: beamline distortion caused by the main solenoid

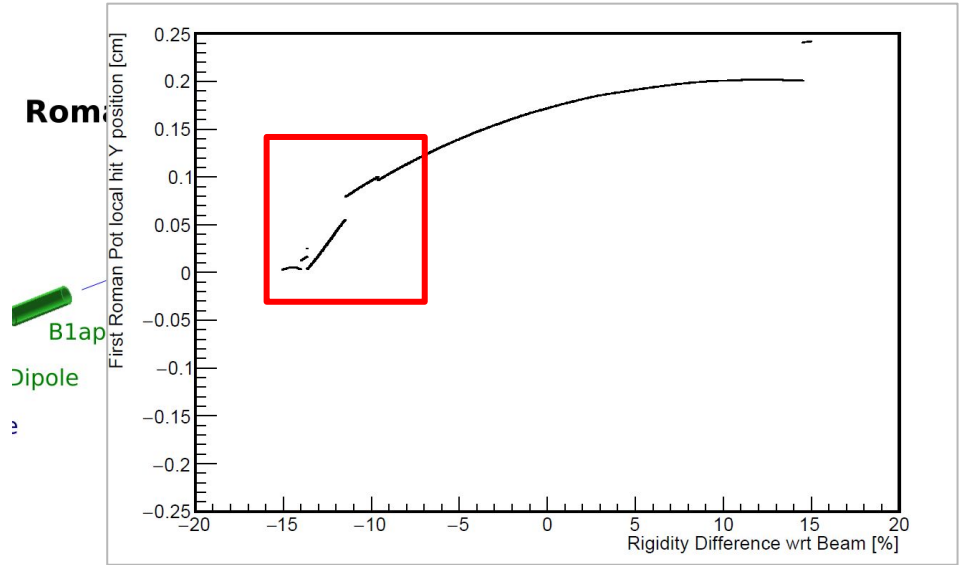
IP6 Far Forward Region

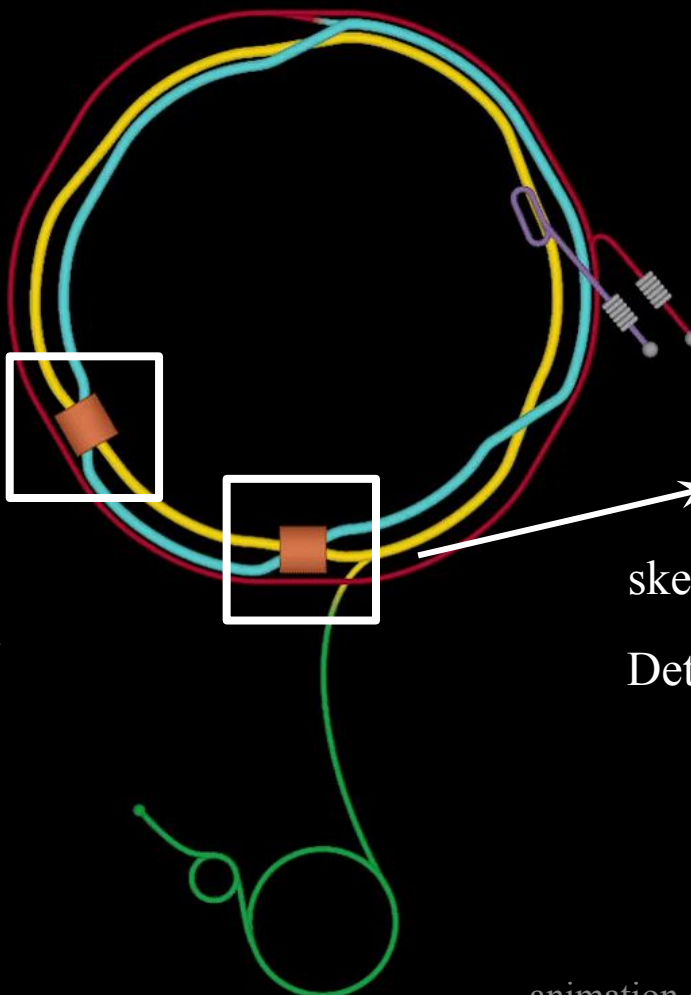


proton beam y positions vs. relative rigidity at low energies (41 GeV)



main detector





IP8

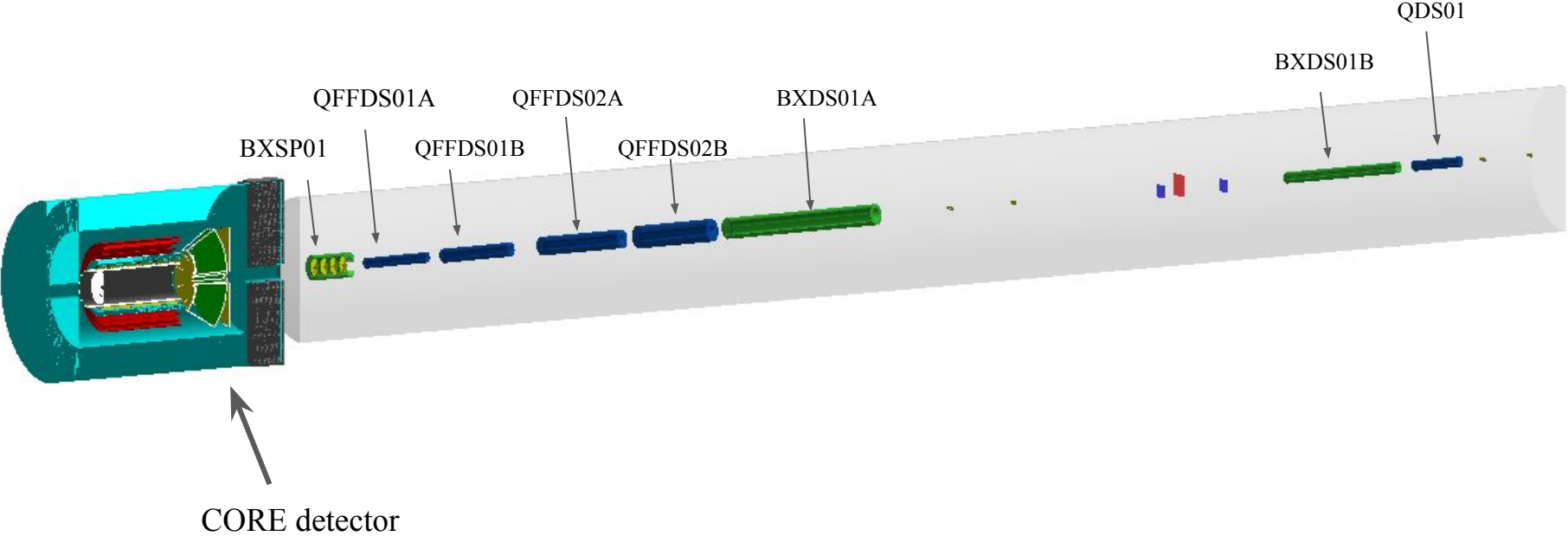
~~skewed quadrupoles~~
correcting coils
("anti-solenoid")

Detector 2 proposal: CORE
CORE length: 8 m

IP6

skewed quadrupoles
Detector 1 length: 10 m

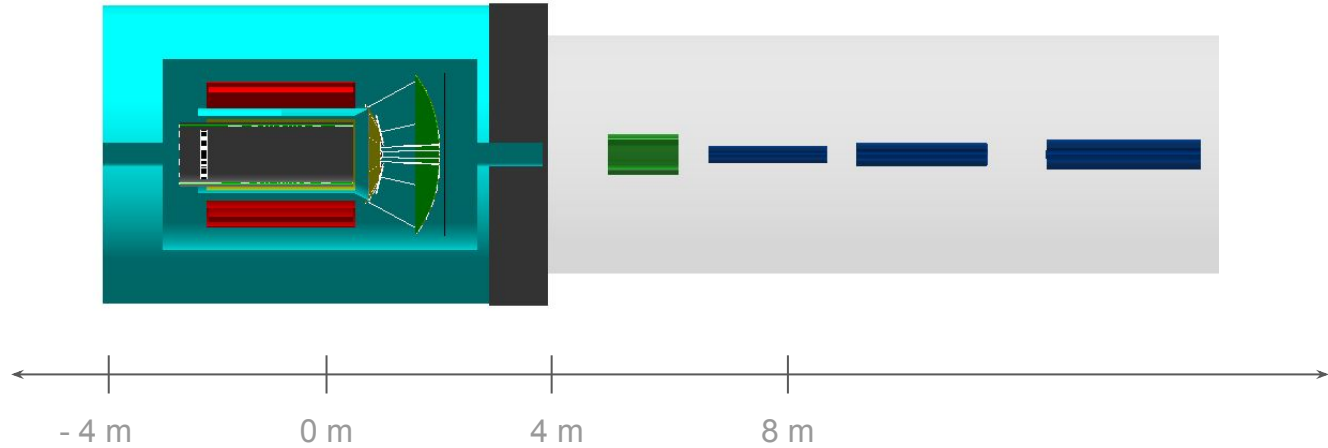
Detector Proposal for IP8: CORE



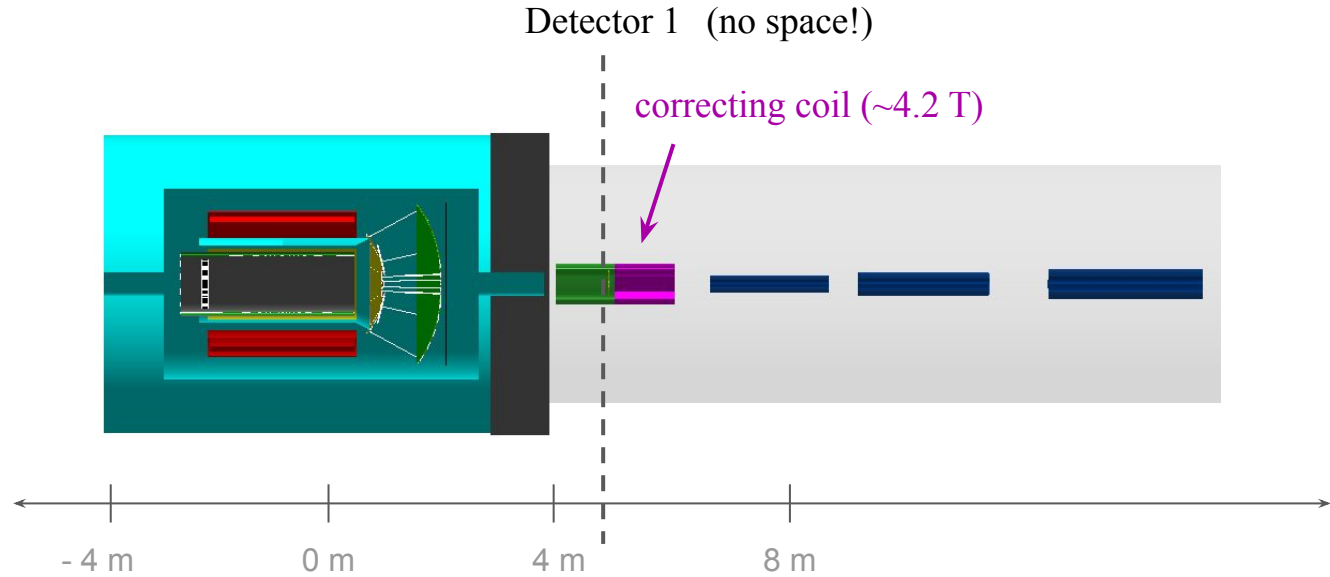
Detector Proposal for IP8: CORE



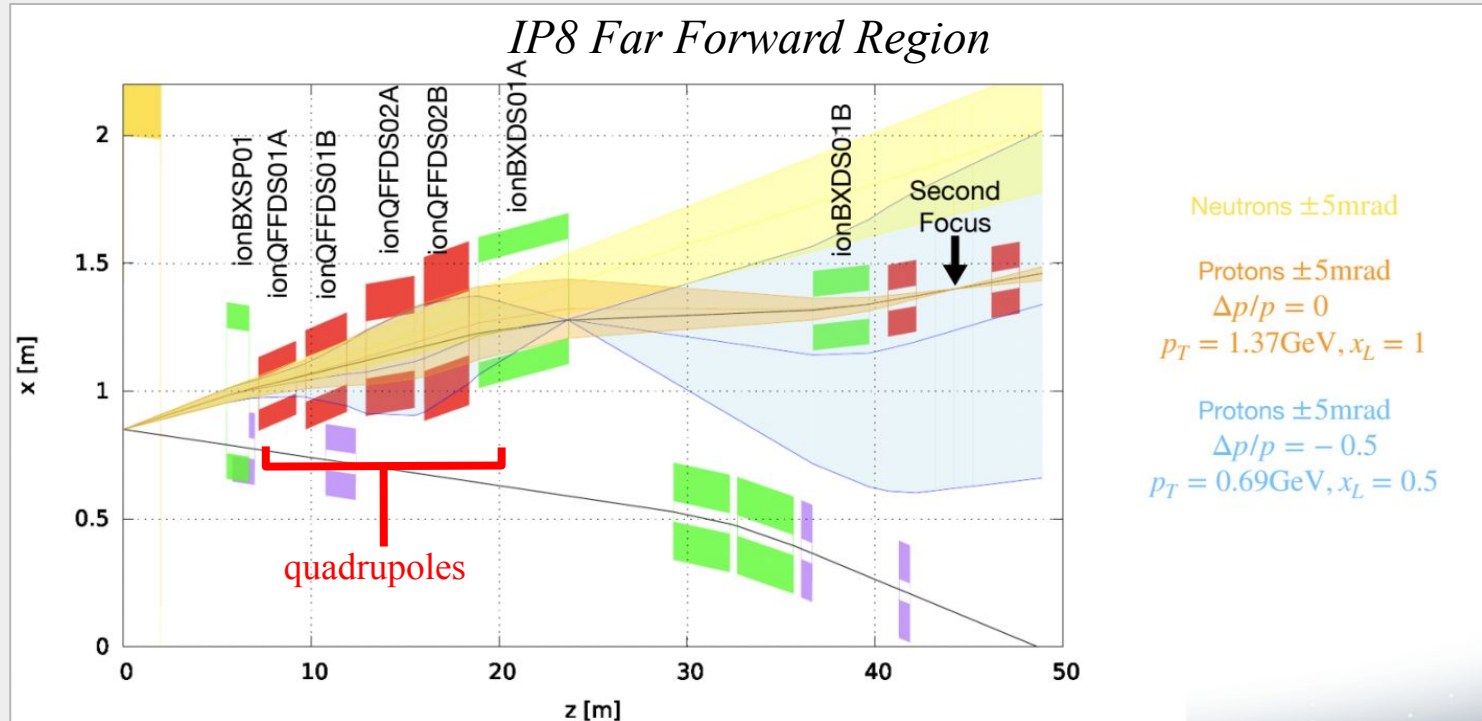
Baseline Configuration



Correcting Coil Configuration

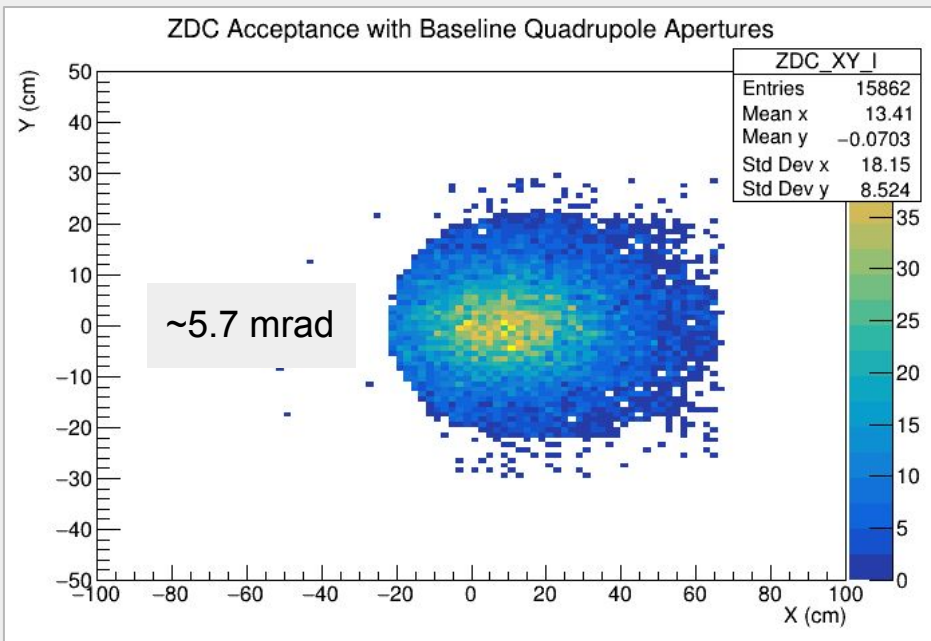


Possibility of Increasing Quadrupole Apertures

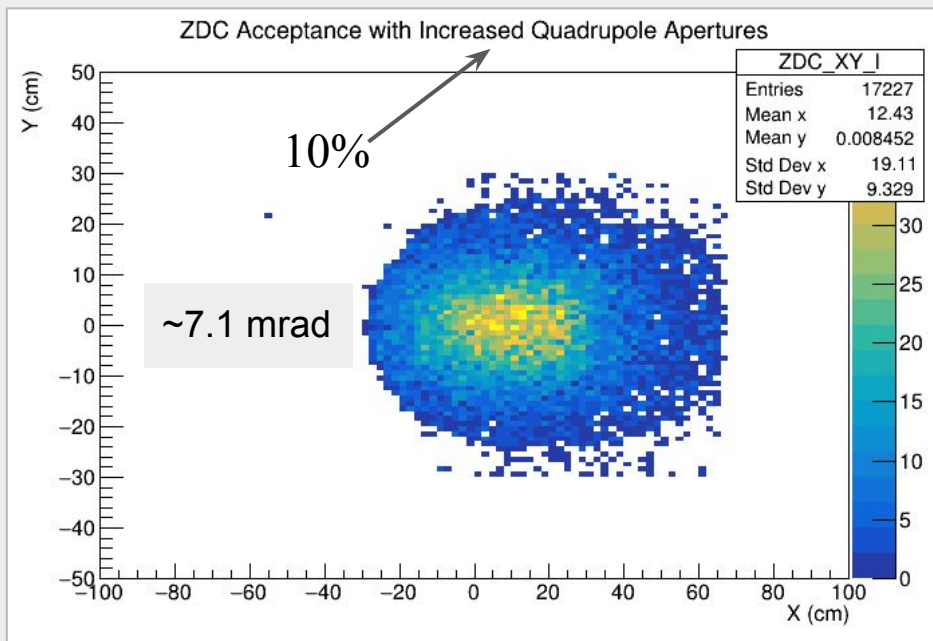


Increased Quadrupole Apertures → Increased Acceptance

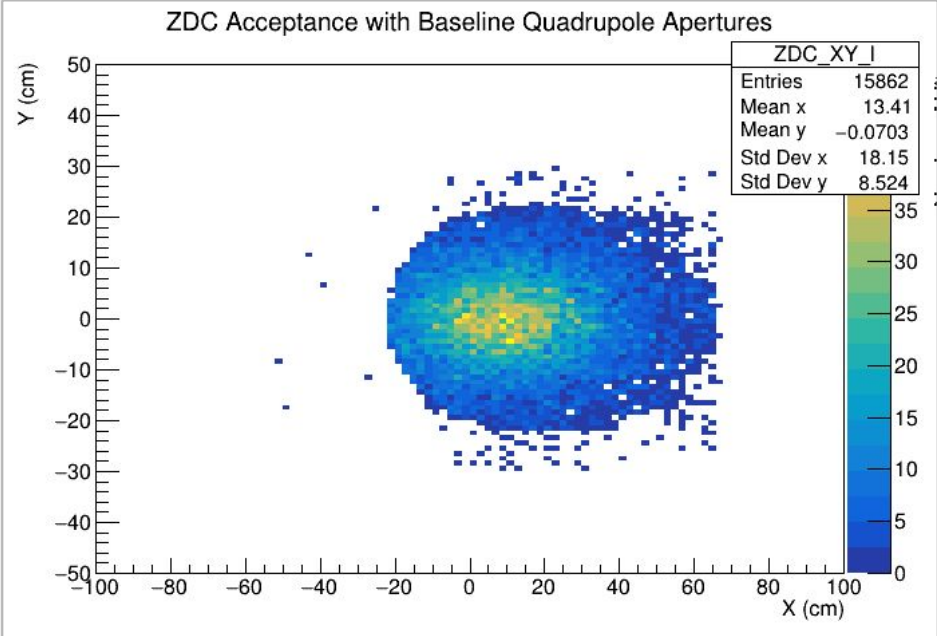
Skewed Quadrupoles



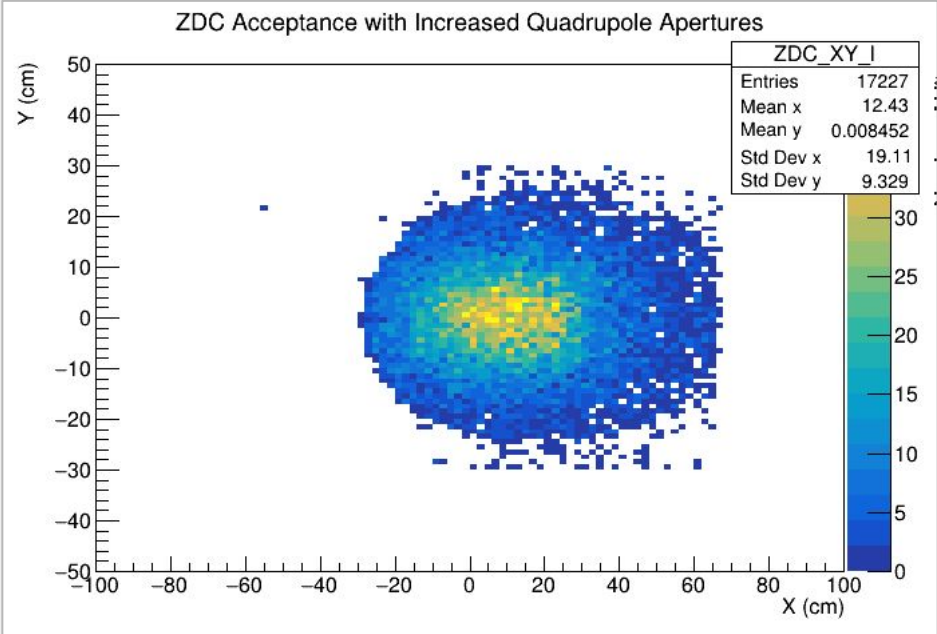
Quadrupoles with Increased Apertures



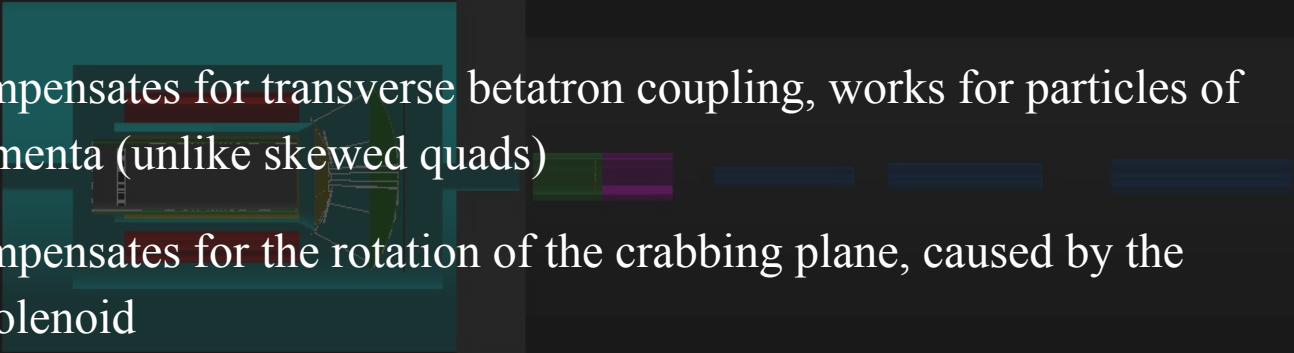
Increased Quadrupole Apertures → Increased Acceptance



Increased Quadrupole Apertures → Increased Acceptance

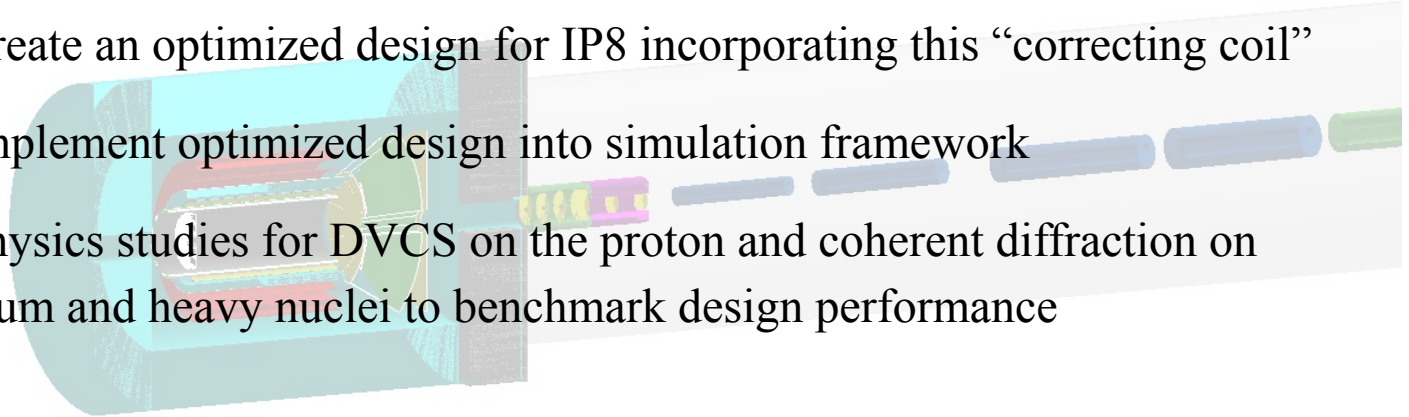


Other Benefits of the Correcting Coils

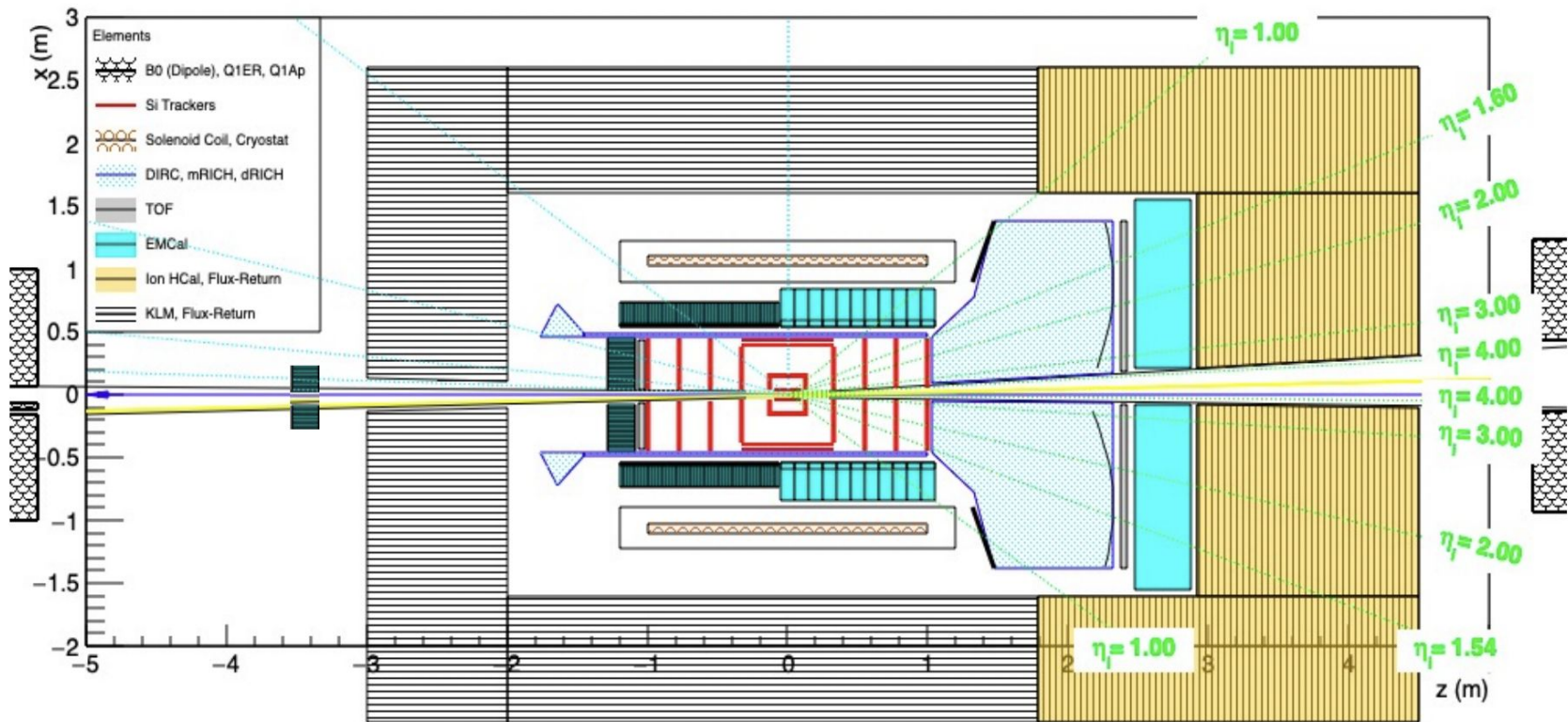
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- Compensates for transverse betatron coupling, works for particles of all momenta (unlike skewed quads)
 - Compensates for the rotation of the crabbing plane, caused by the main solenoid
 - Corrects for electron spin polarization, caused by the main solenoid

Final Remarks, Future Outlook

- Create an optimized design for IP8 incorporating this “correcting coil”
- Implement optimized design into simulation framework
- Physics studies for DVCS on the proton and coherent diffraction on medium and heavy nuclei to benchmark design performance



COmpact detectoR for Eic (CORE)



IP8 Far Forward Region

