Update of dose estimates at the level of the cold diode for the 11T magnets

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Carried out withing HL-LHC WP5

HL TCC

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Introduction

Underlying issue:

- RHIC reported a shorted quench protection diode
- The dose measured in a nearby monitor was $\sim$0.1 kGy[a]
- What long term dose to quench diodes in 11T magnets do we expect due to showers from DS collimator?

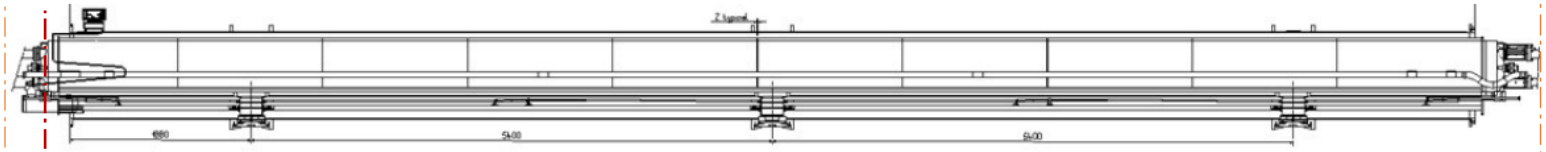
Relevant locations/relevant source terms for long term effects:

- DS L/R of IR7: mainly SD protons from TCPs
- DS L/R of IR2: BFPP (EMD) ions $\rightarrow$ 11T no longer baseline

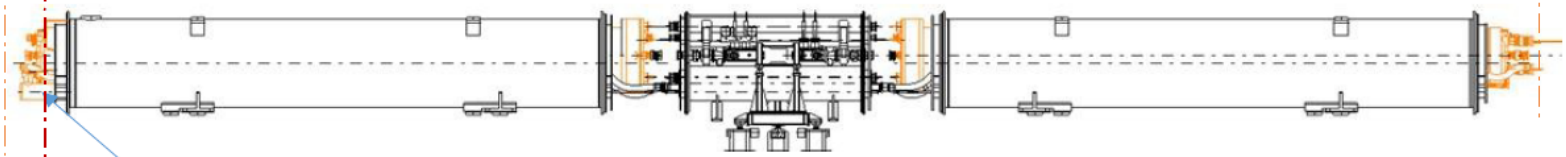
[a] I have no further information how far the monitor is placed from the diode $\rightarrow$ radial dose gradients can be steep.

Diode position (F. Rodriguez Mateos, H. Prin)

Present LHC main dipole MB



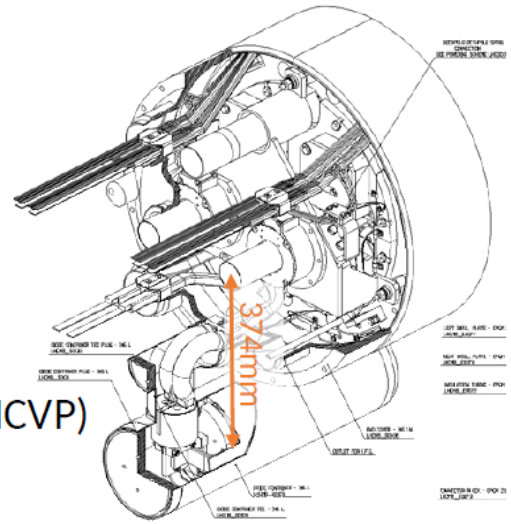
Collimator installed between 2 MBH 11T dipoles



1 diode in parallel to the two MBH connected in series

~730mm

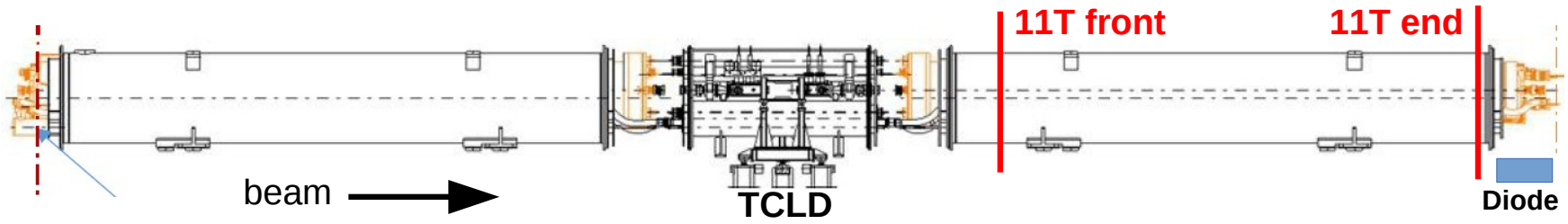
Identical longitudinal location



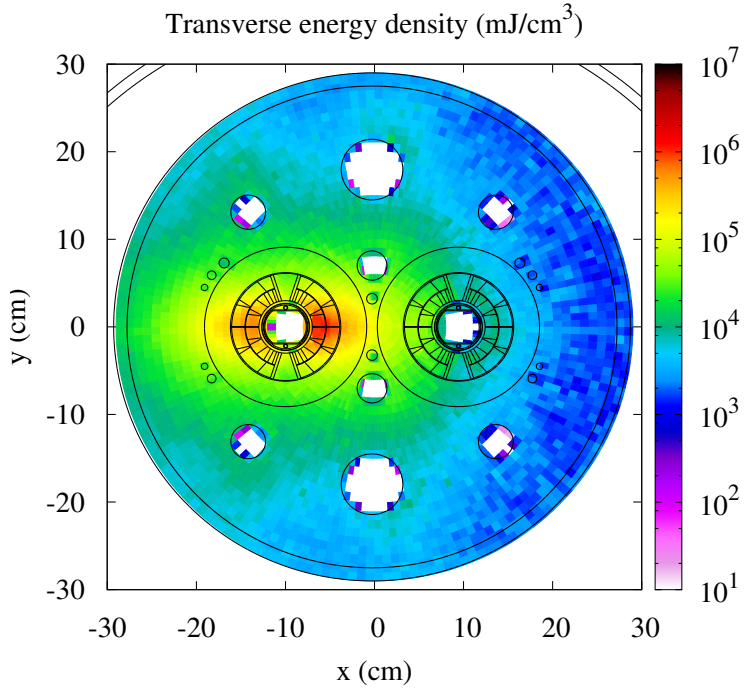
Longitudinal position: 730 from the interconnect virtual point (ICVP)
Vertical position: 374mm from the beam axis

- On both sides of the IP, the diode is located on the left side of the collimator
- Hence, in the DS left of the IP the diode is downstream of the collimator

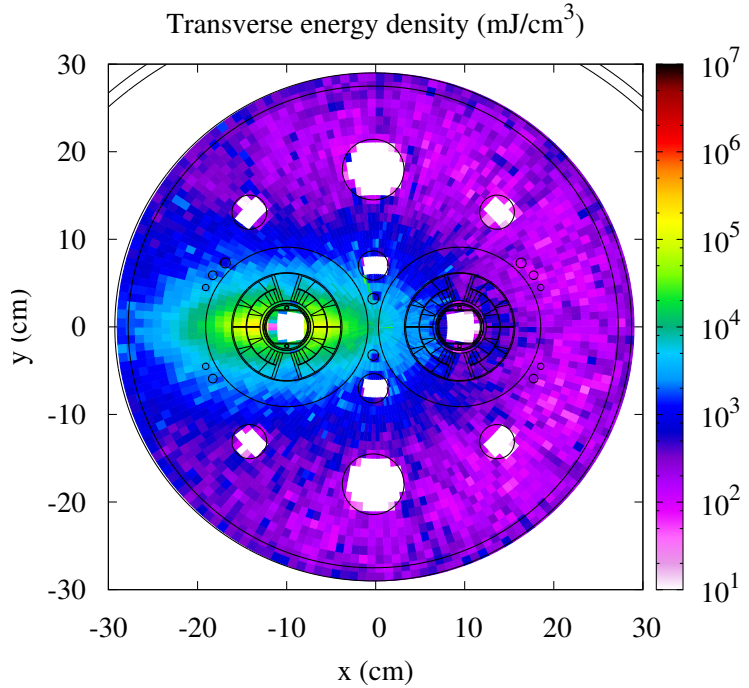
BFPP DS IR2: cumulative dose for $10\,\mathrm{nb}^{-1}$



11T magnet front:

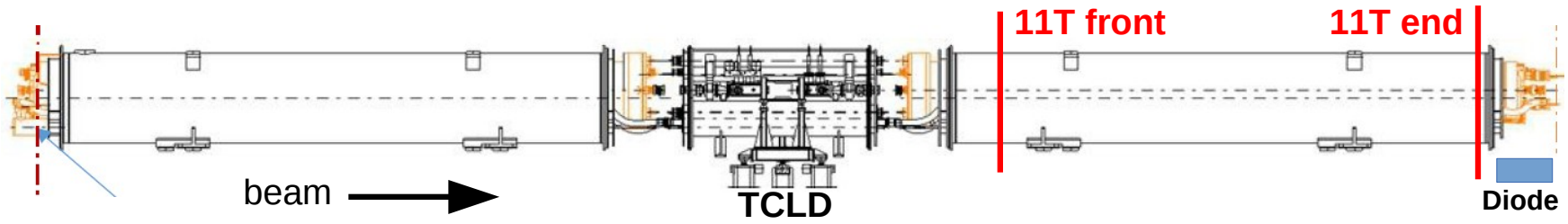


11T magnet end:

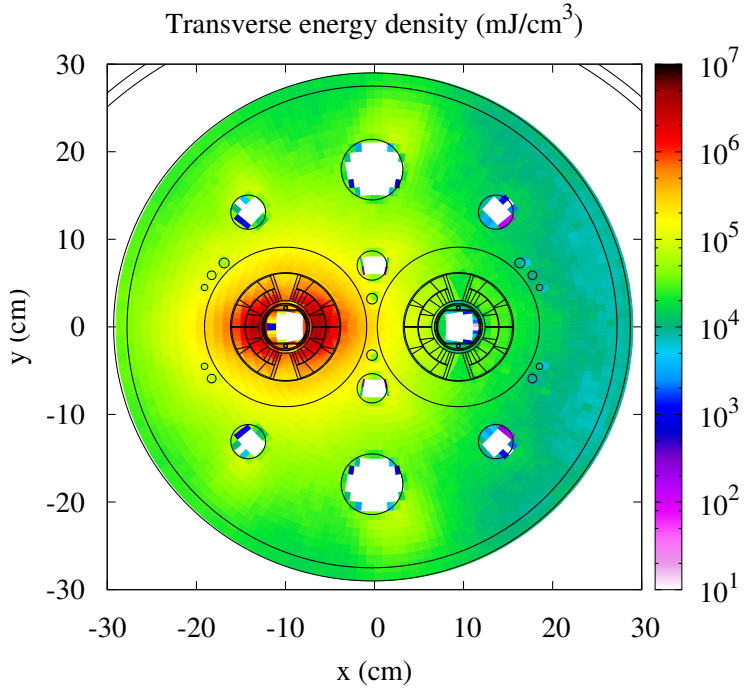


- Peak dose in coils ($10\,\mathrm{nb}^{-1}$): $<1\,\mathrm{MGy}$
- Dose at level of diode ($10\,\mathrm{nb}^{-1}$): $<1\,\mathrm{kGy}$ ($<10^{13}\mathrm{n/cm}^2$)

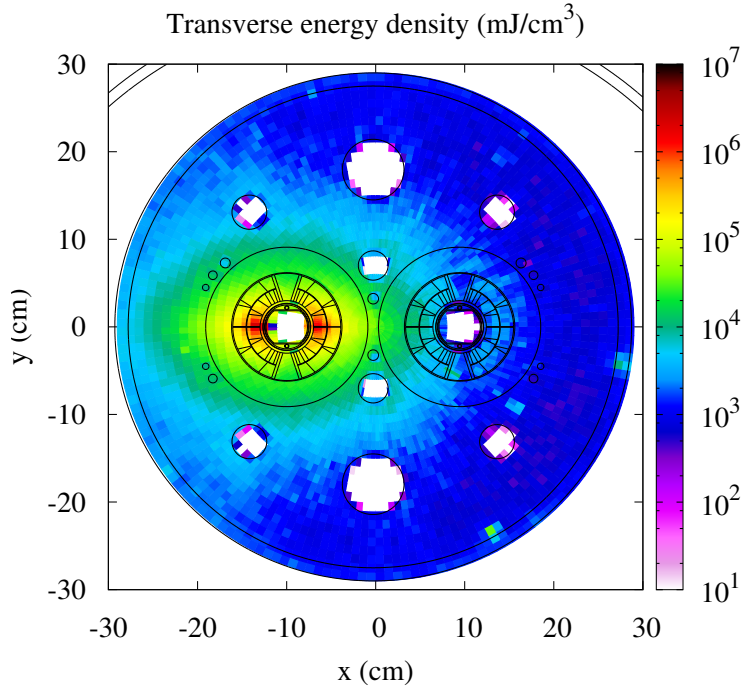
Protons DS IR7: cumulative dose for 10^{18}p lost



11T magnet front:



11T magnet end:



- Peak dose in coils (1.15×10^{18}p lost in IR7): <2 MGy
- Dose at level of diode (1.15×10^{18}p lost in IR7): few kGy