LHC MACHINE CONDITIONS

Francesco Cerutti & Marta Sabaté Gilarte [§]

[§] *and University of Sevilla*

Forward Spectrometer meeting vidyo Apr 16th, 2020

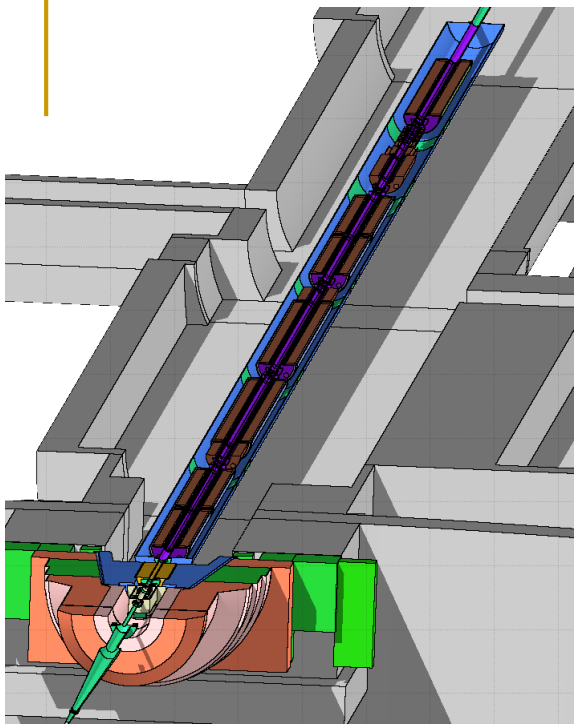
OUTLINE

- The HL layout, as modeled in FLUKA
- Proton-proton collision debris figures and benchmarked impact
- Radiation levels across the Long Straight Section
- The TAXN region and its particle field
- The D1 side and the effect of a magnetized iron toroid

HL IR5

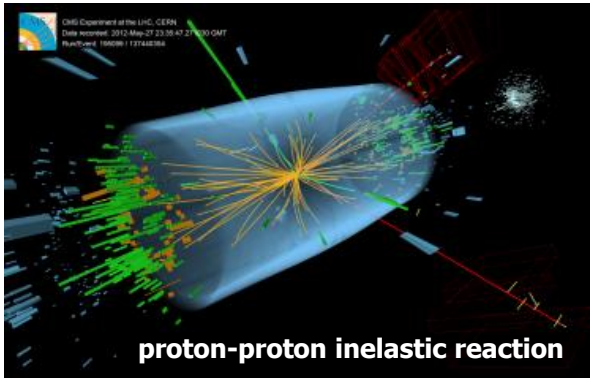
7 TeV proton beams

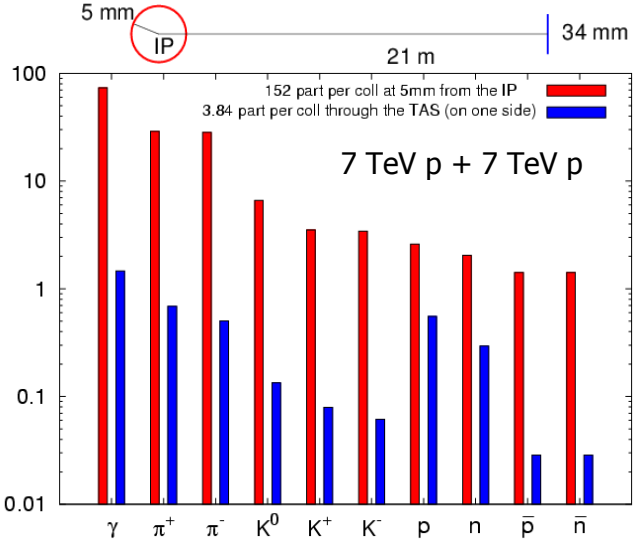
250 urad half crossing angle in the vertical plane



Experimental cavern

THE COLLISION DEBRIS





by DPMJET (in FLUKA)
A. Fedynitch, PhD Thesis,
cds.cern.ch/record/2231593

@ 10^{34} cm^{-2} s^{-1} , i.e. 8.*5* 10^{8} s^{-1} inelastic collision rate

950 W towards each (L&R) side

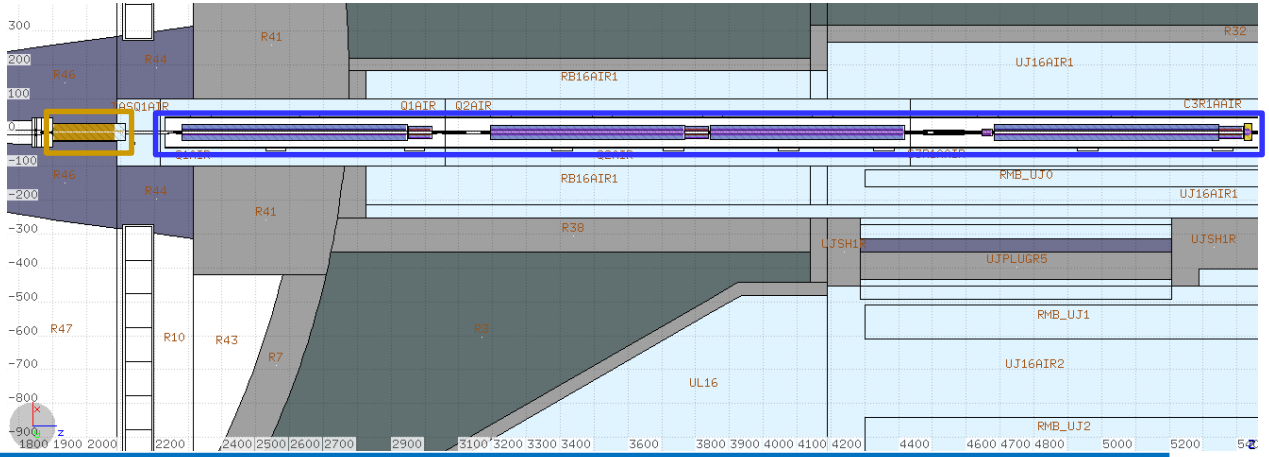
150 W absorbed in the TAS absorber

650 W going through the TAS

of which

150 W absorbed in the triplet

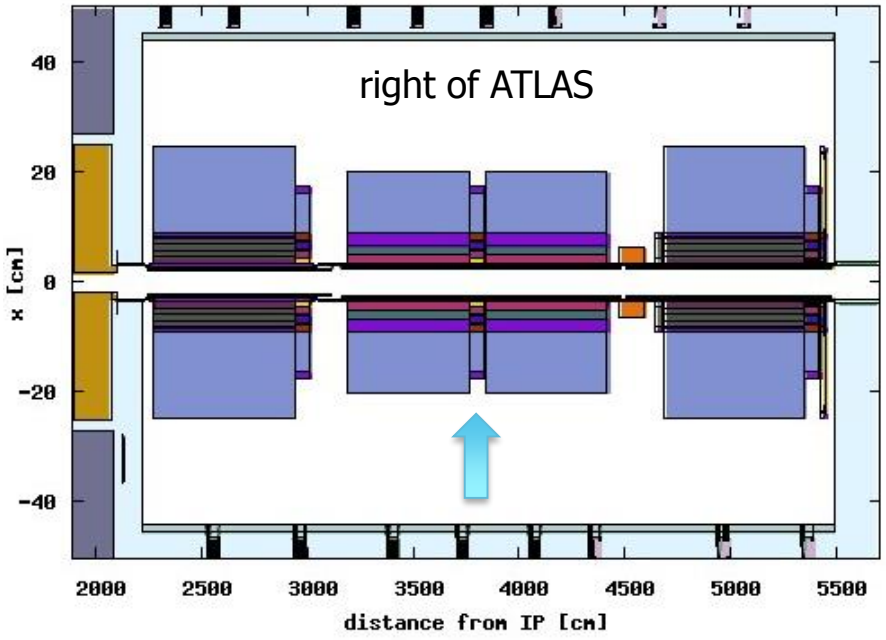
cold magnets

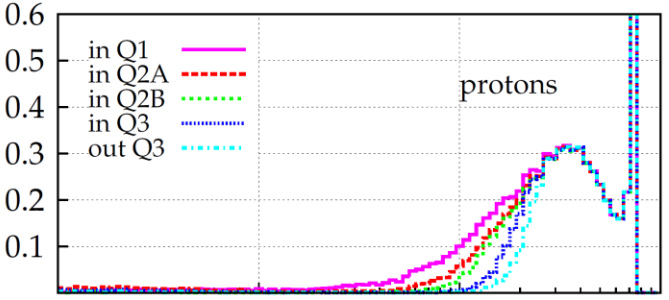


with 6.5 TeV beams (80mb) ~125 W (magnet end uncertainties) prediction at 10^{34} cm^{-2} s^{-1}

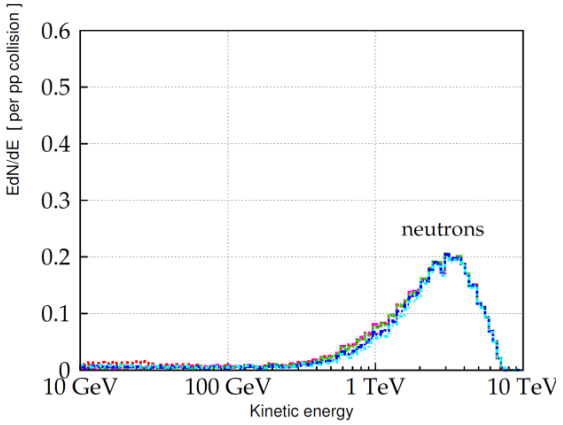
vs 115-135 W measurements (TE-CRG-OP) in the triplet cold mass

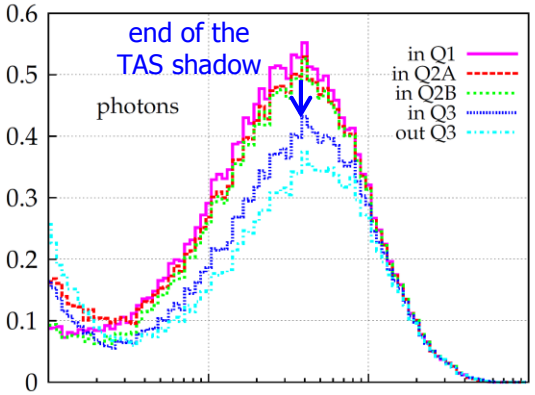
DEBRIS CAPTURE IN THE TRIPLET

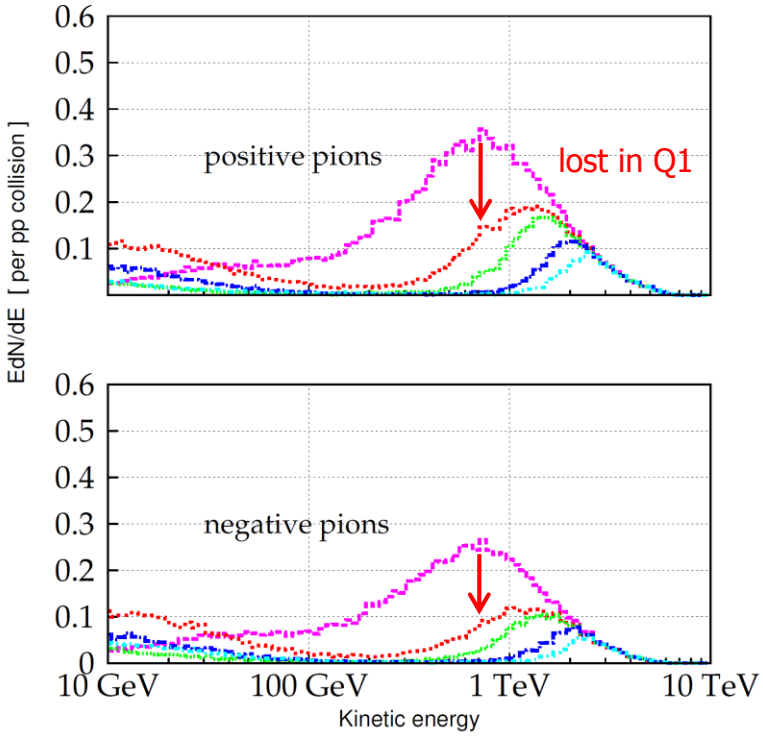




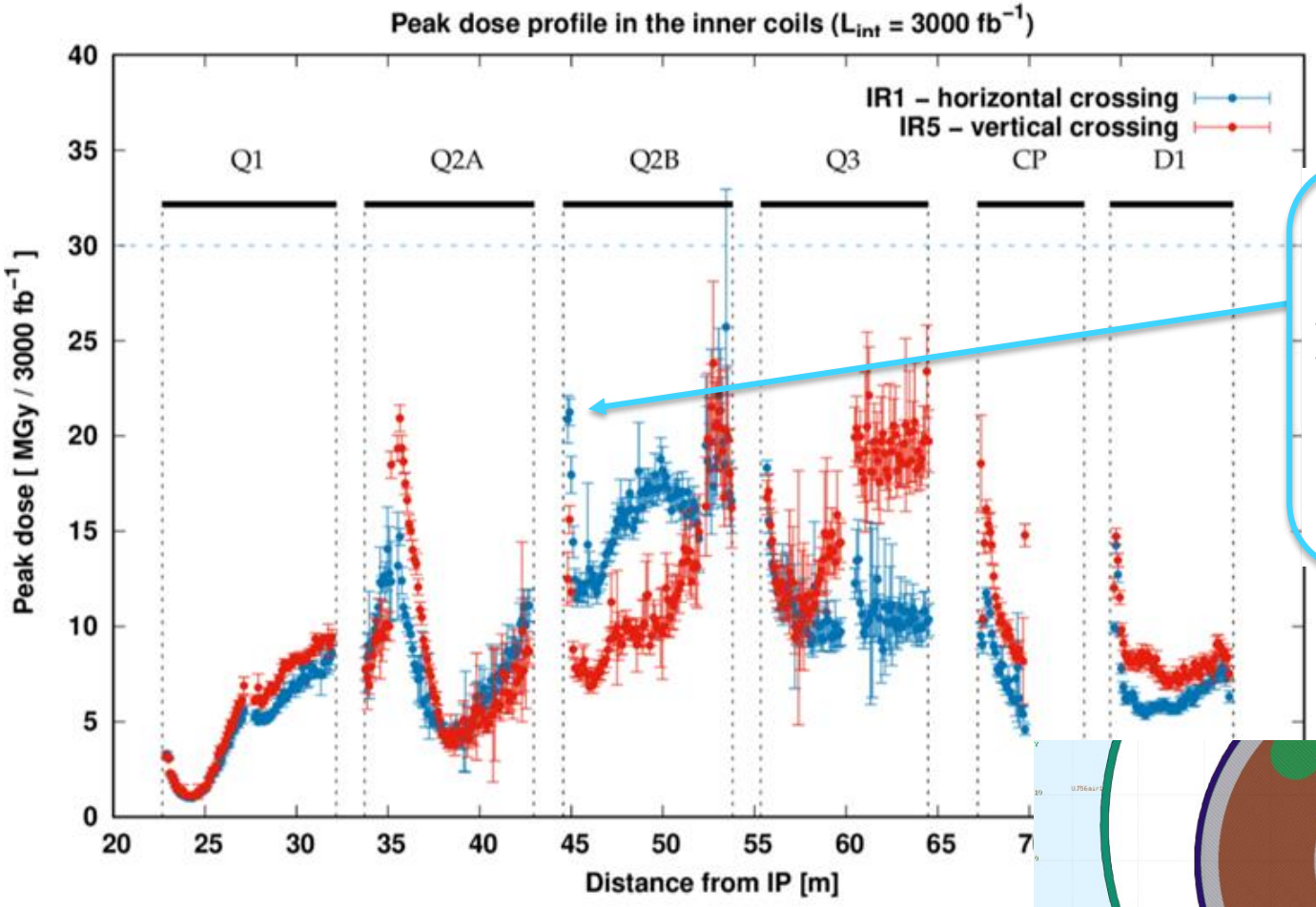
high energy spectra are depopulated by *charge particle (especially pion)* interception in the successive quadrupoles due to magnetic field bending

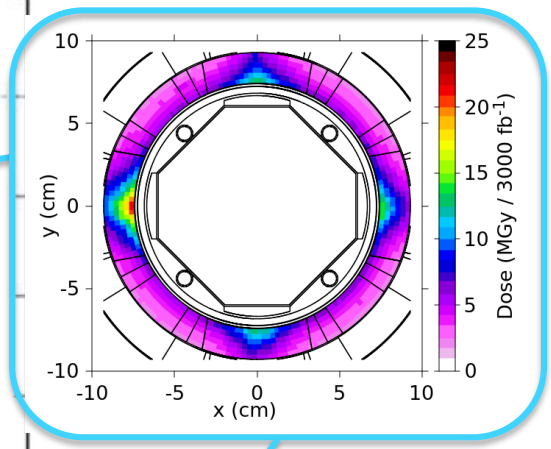


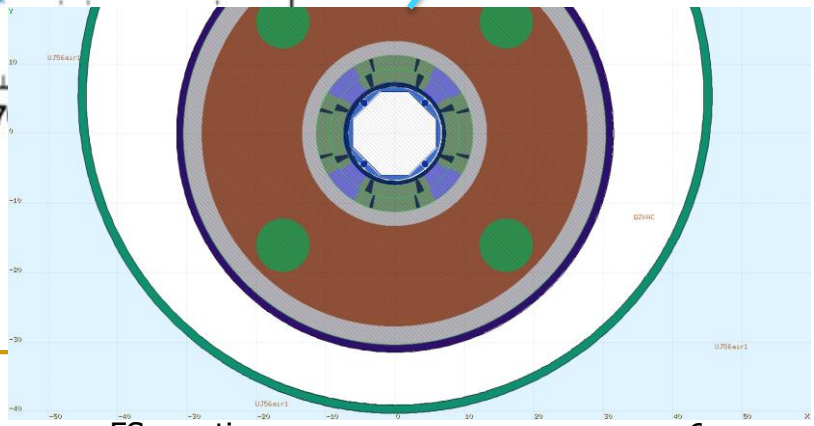




MAGNET LIFETIME

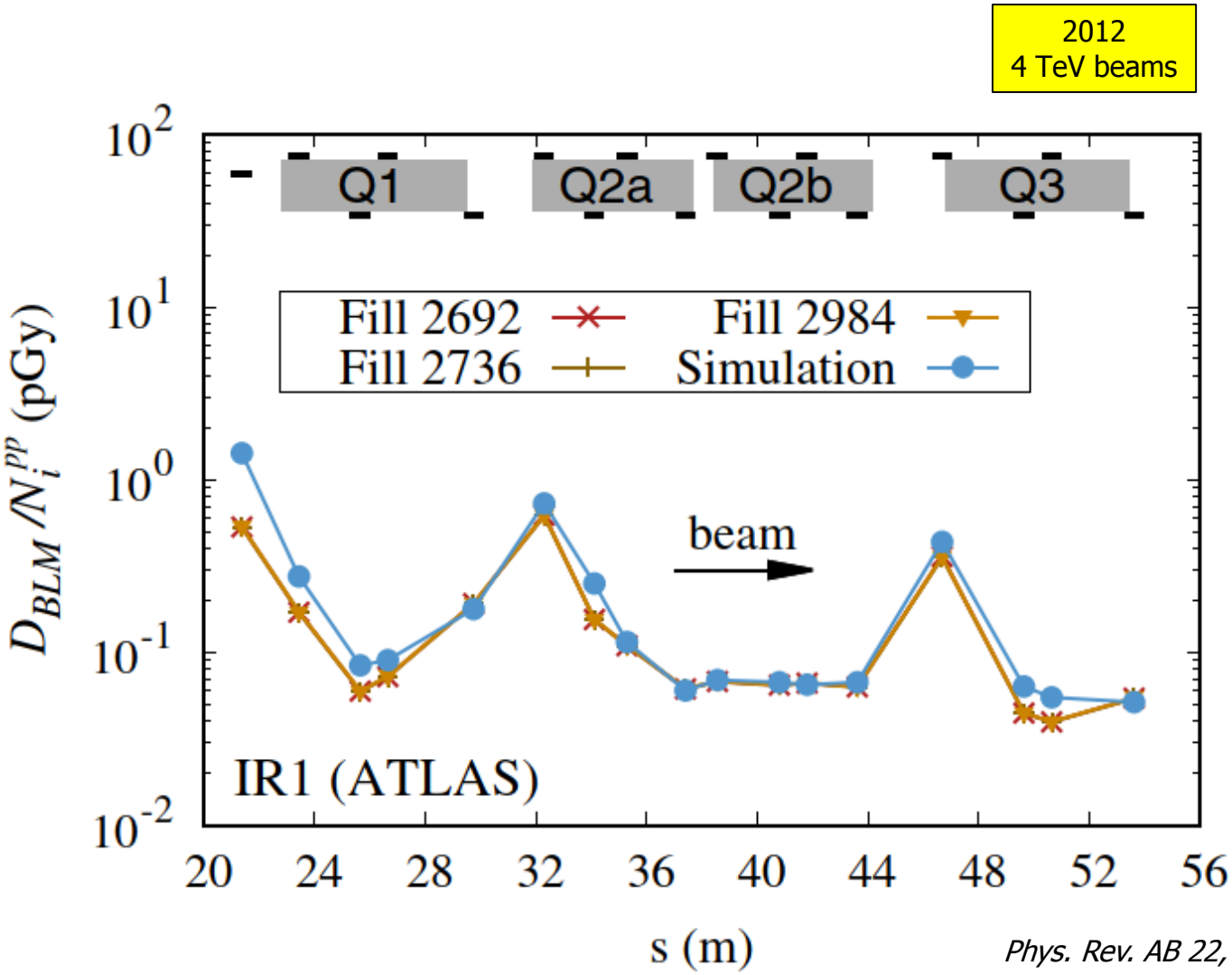






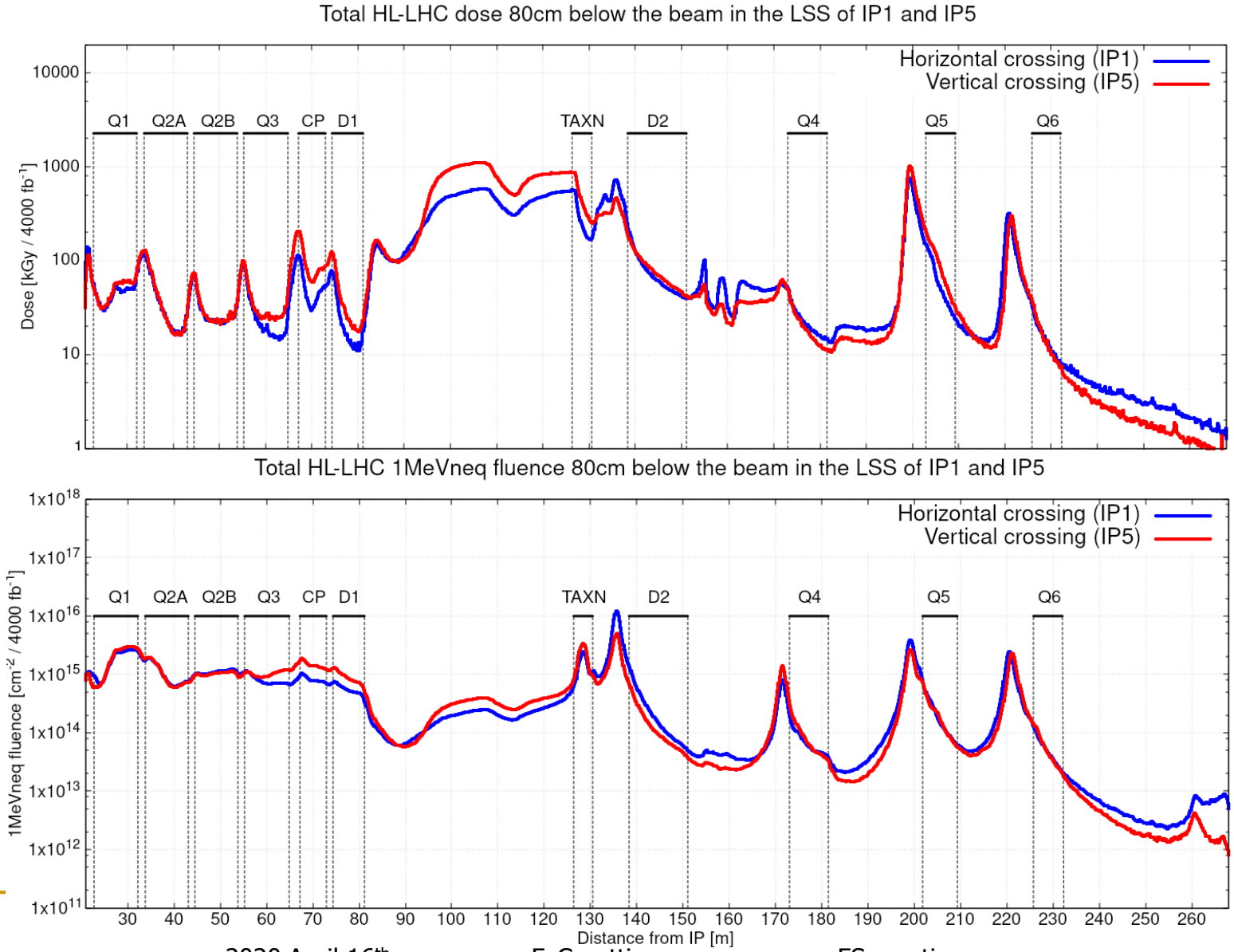
different behavior reflecting the crossing plane variation for the same magnetic configuration of the triplet (FDF in the horizontal plane for positively charged particles coming from the IP)

TRIPLET: BLM BENCHMARKING



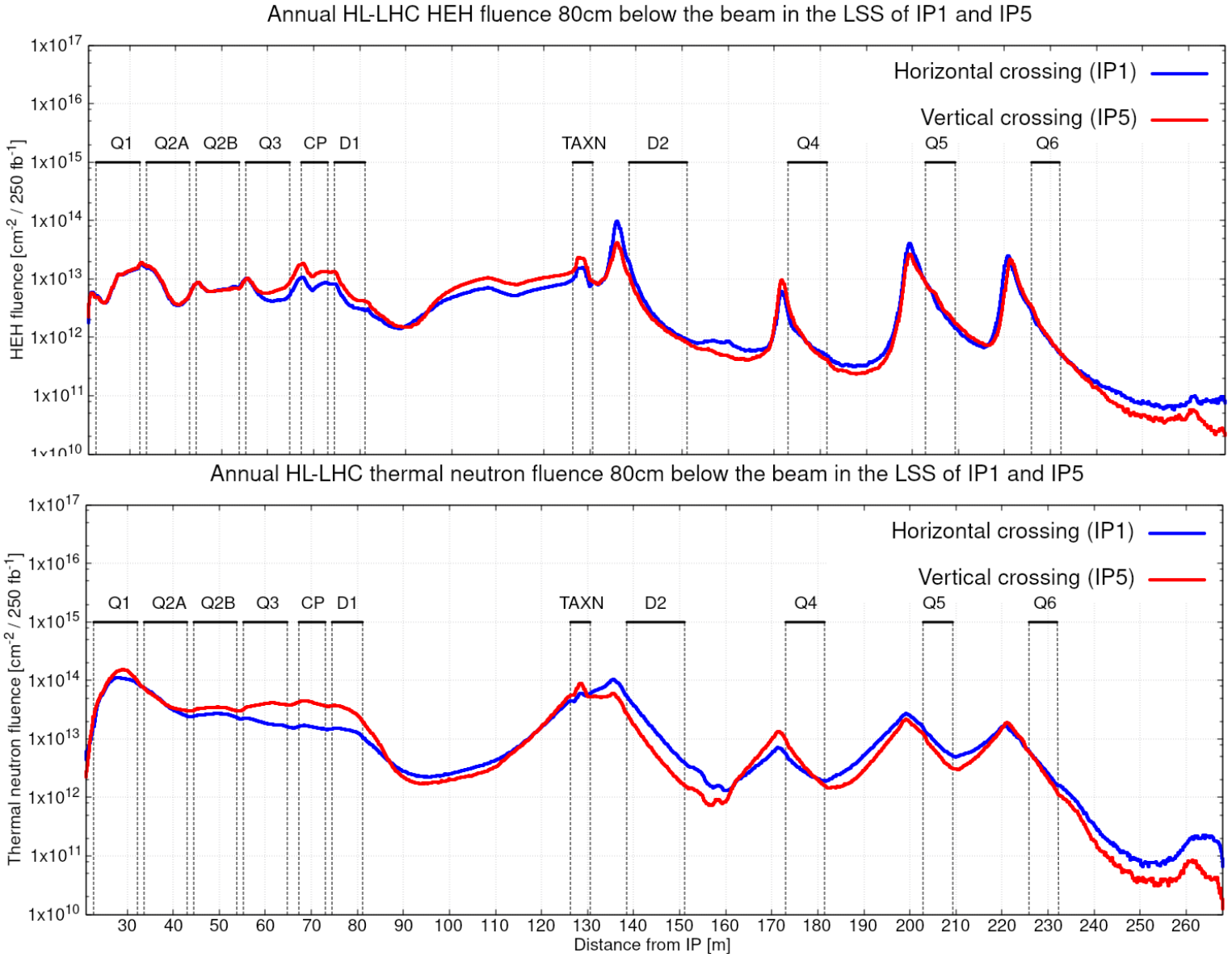
Phys. Rev. AB 22, 071003 (2019)

LSS RADIATION LEVEL PROFILES [I]



G. Lerner

LSS RADIATION LEVEL PROFILES [II]

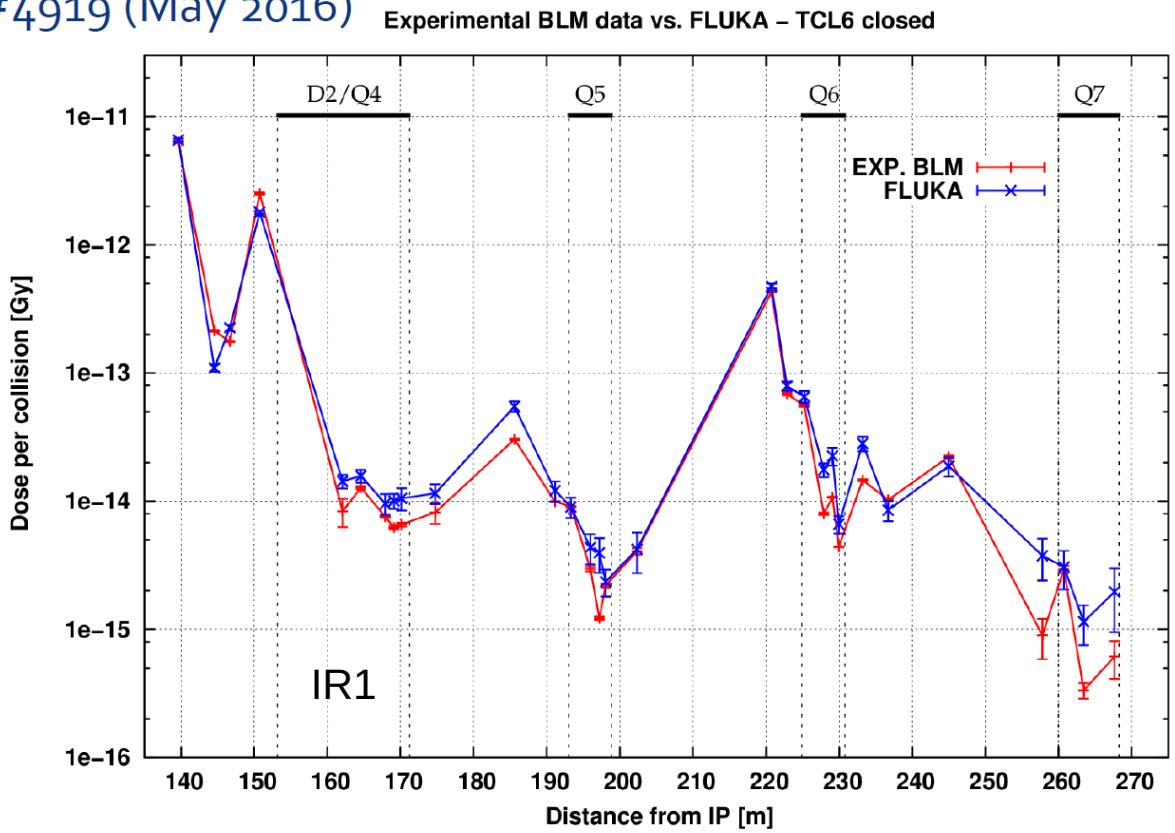


G. Lerner

MATCHING SECTION: BLM BENCHMARKING

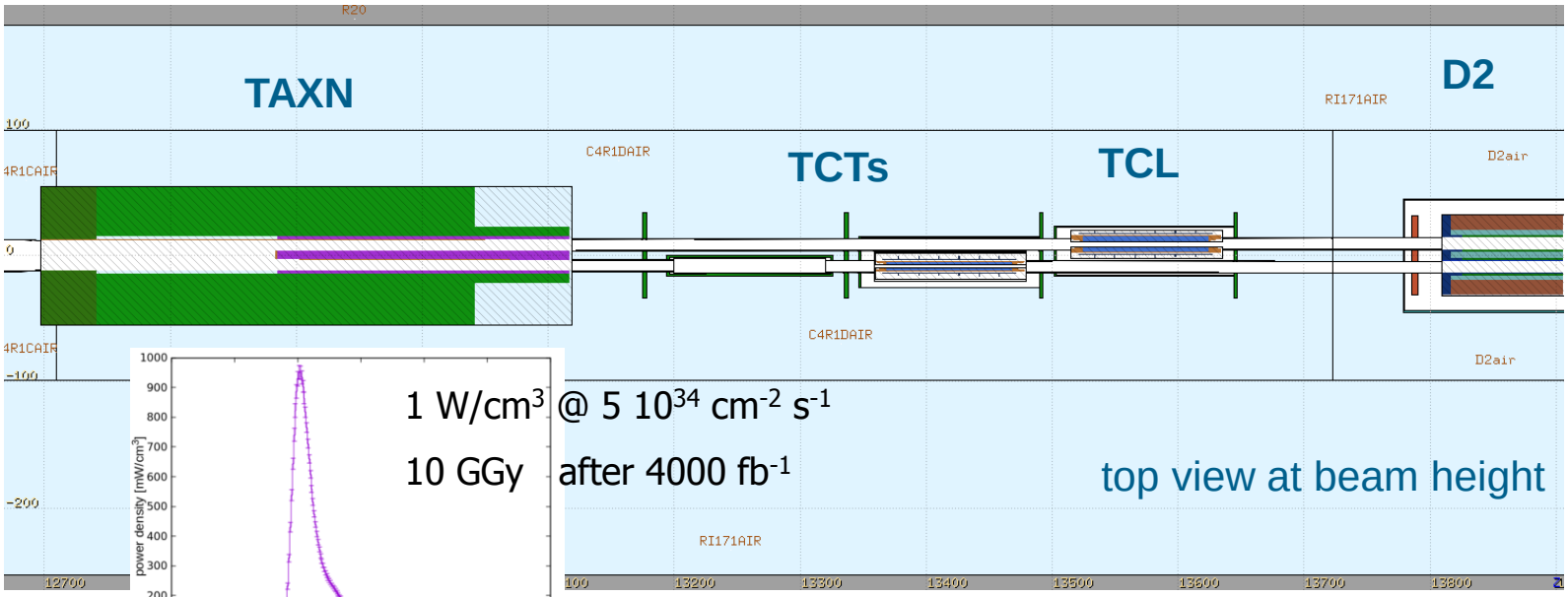
- Fill #4919 (May 2016)

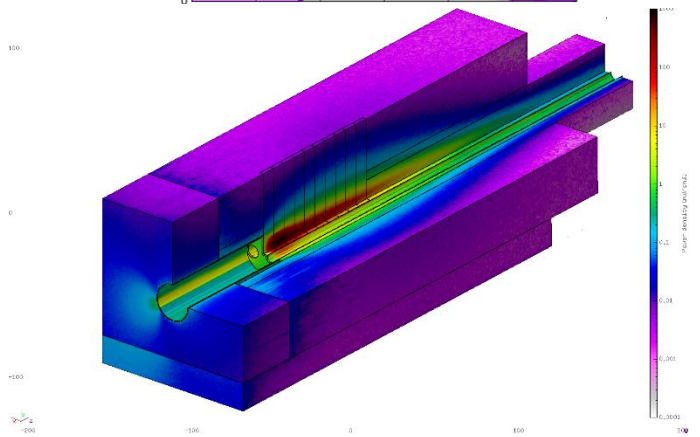
6.5 TeV beams

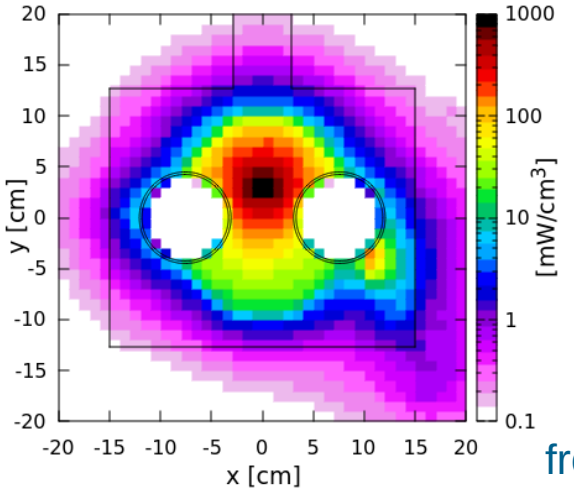


A. Tsinganis

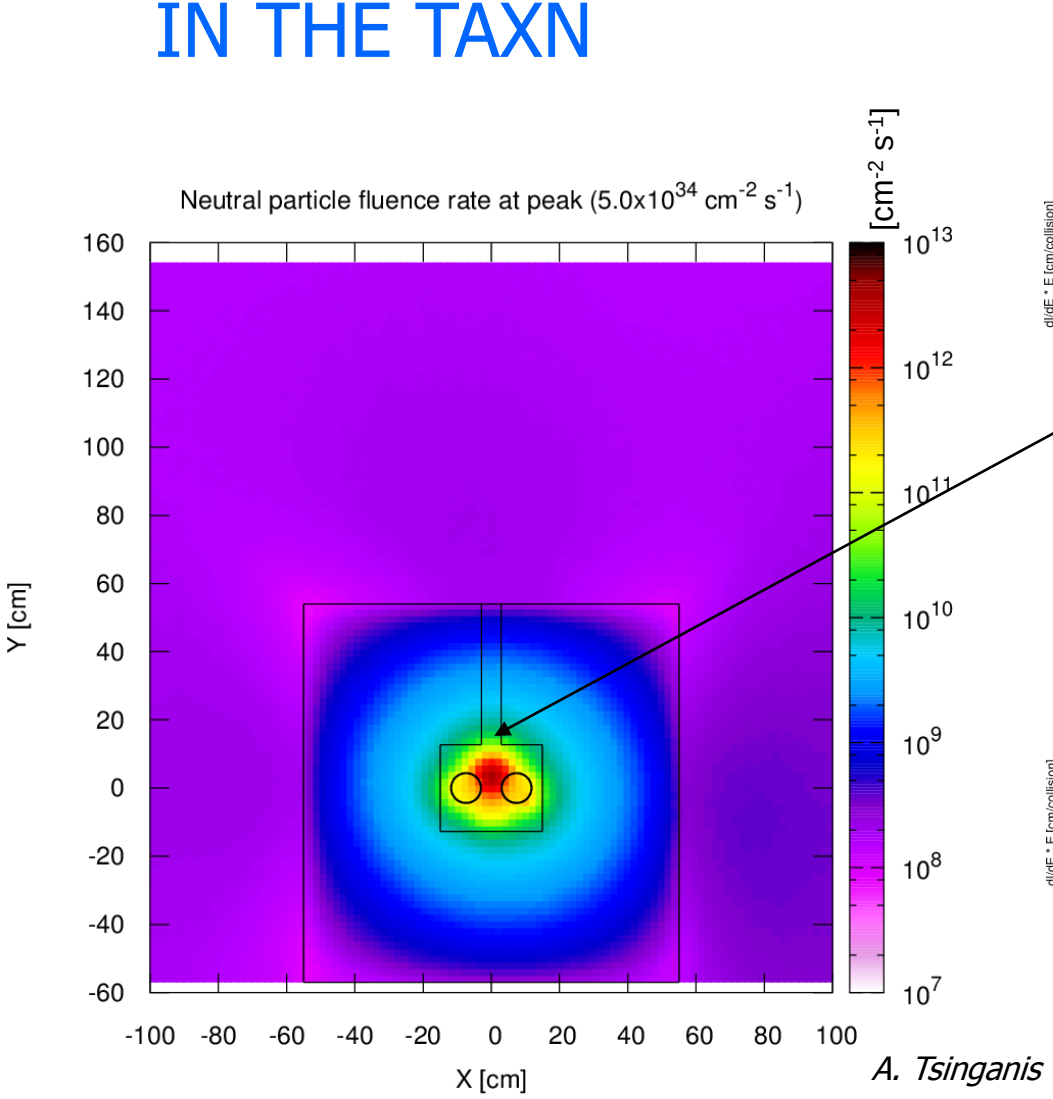
BEAM SEPARATION REGION

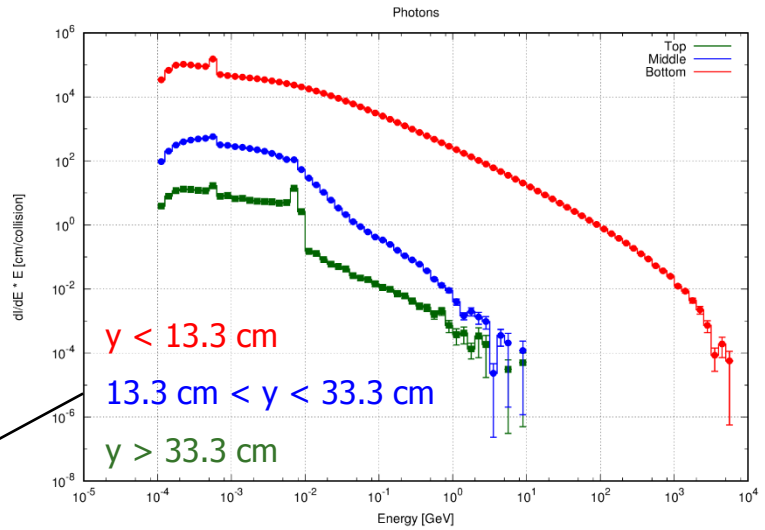


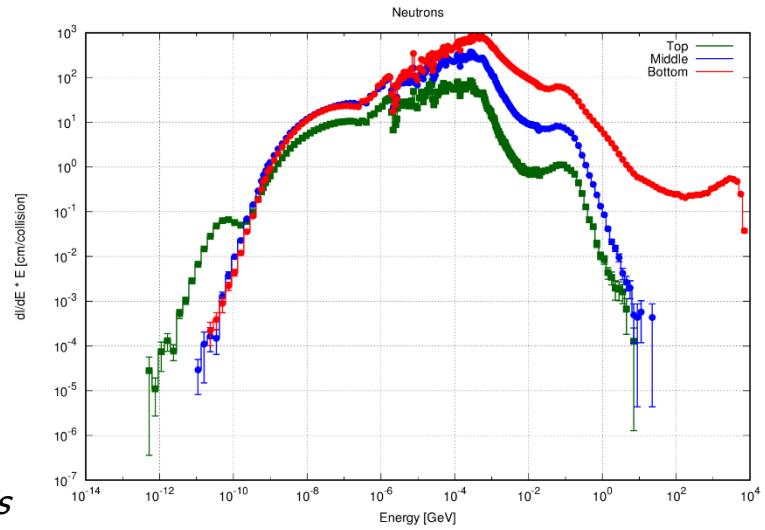




NEUTRAL PARTICLE FLUENCE RATE/SPECTRA IN THE TAXN

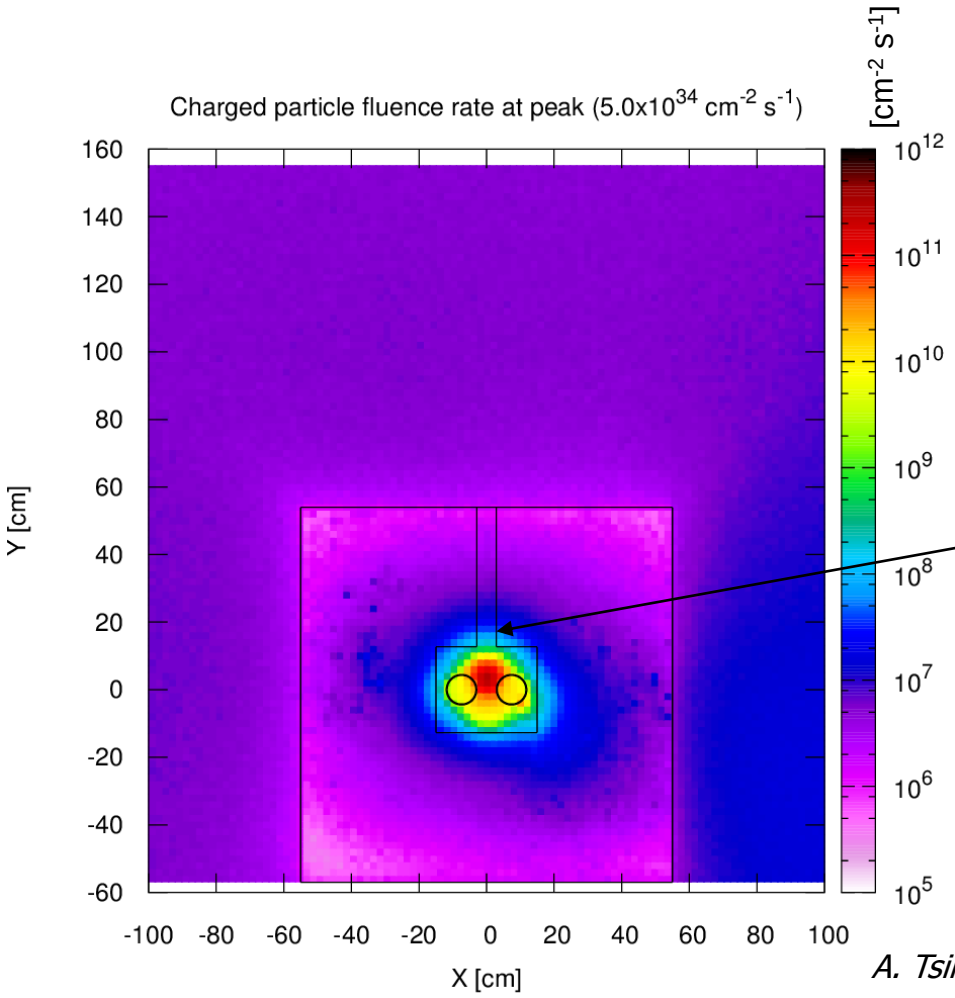




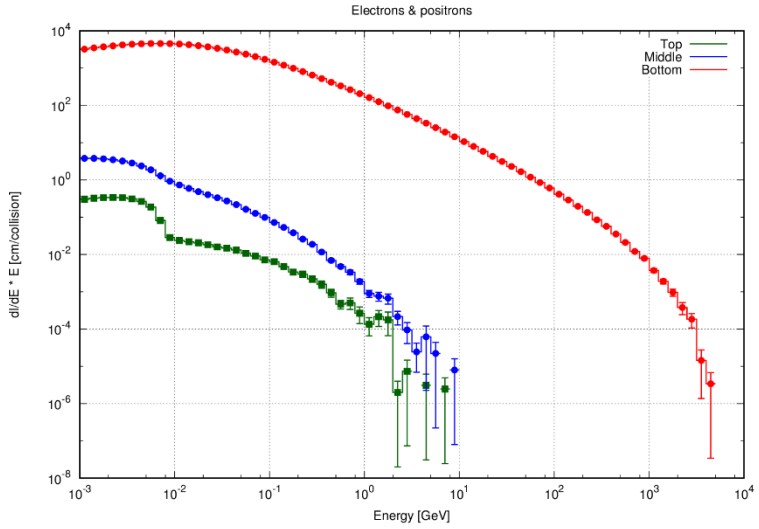


A. Tsinganis

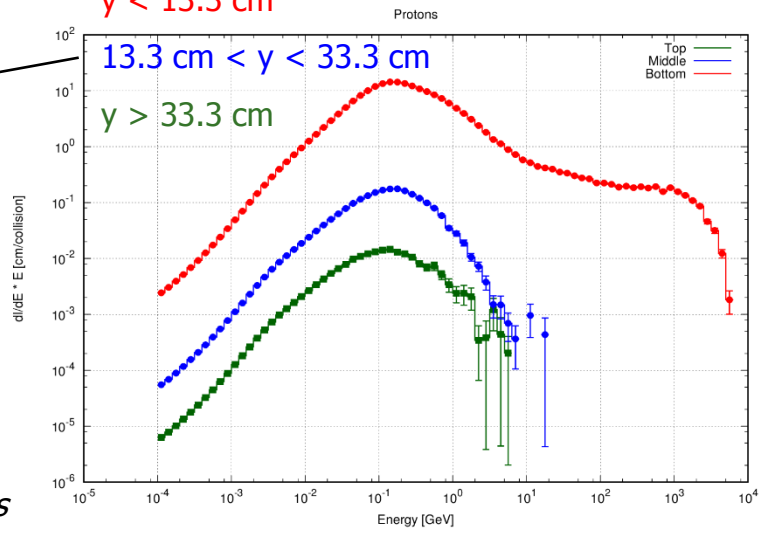
CHARGED PARTICLE FLUENCE RATE/SPECTRA IN THE TAXN



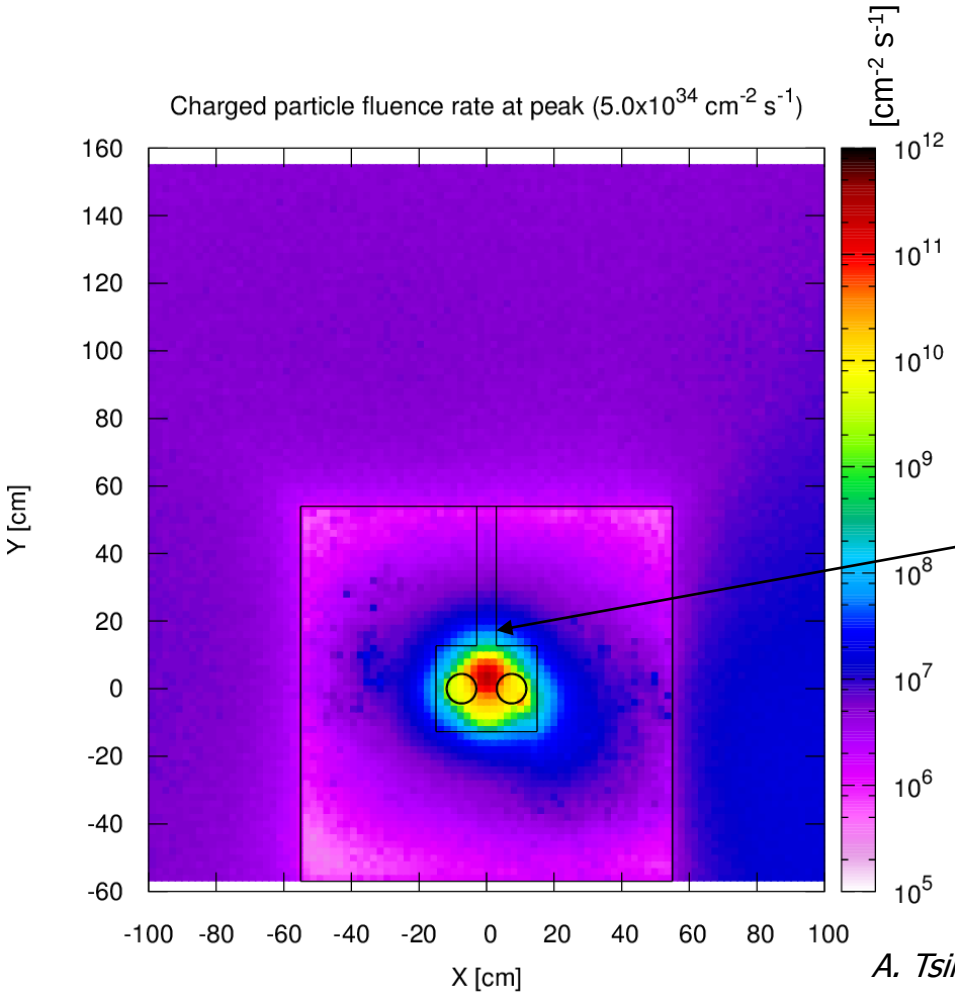
A. Tsinganis

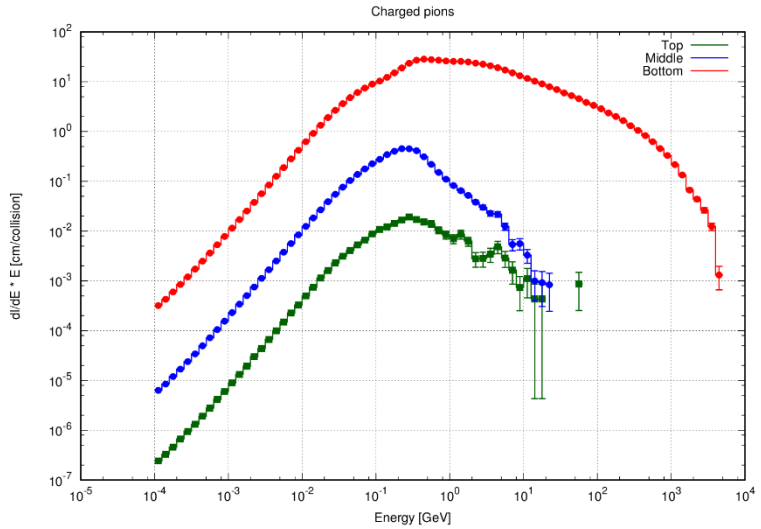


y < 13.3 cm

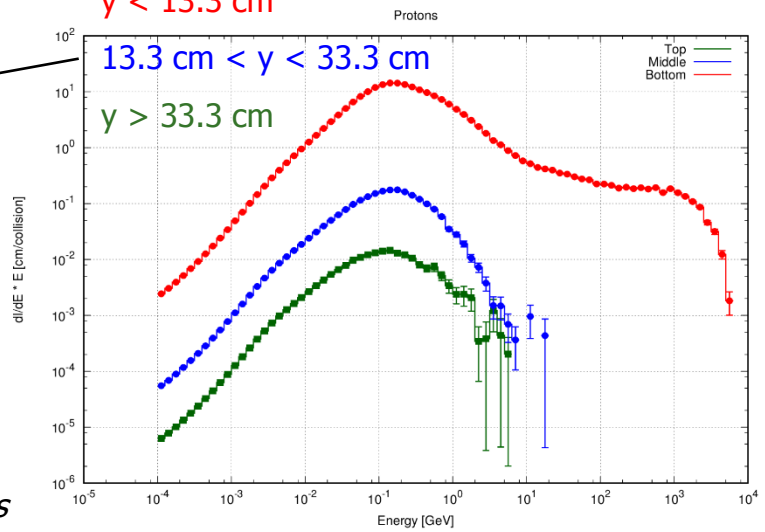


CHARGED PARTICLE FLUENCE RATE/SPECTRA IN THE TAXN



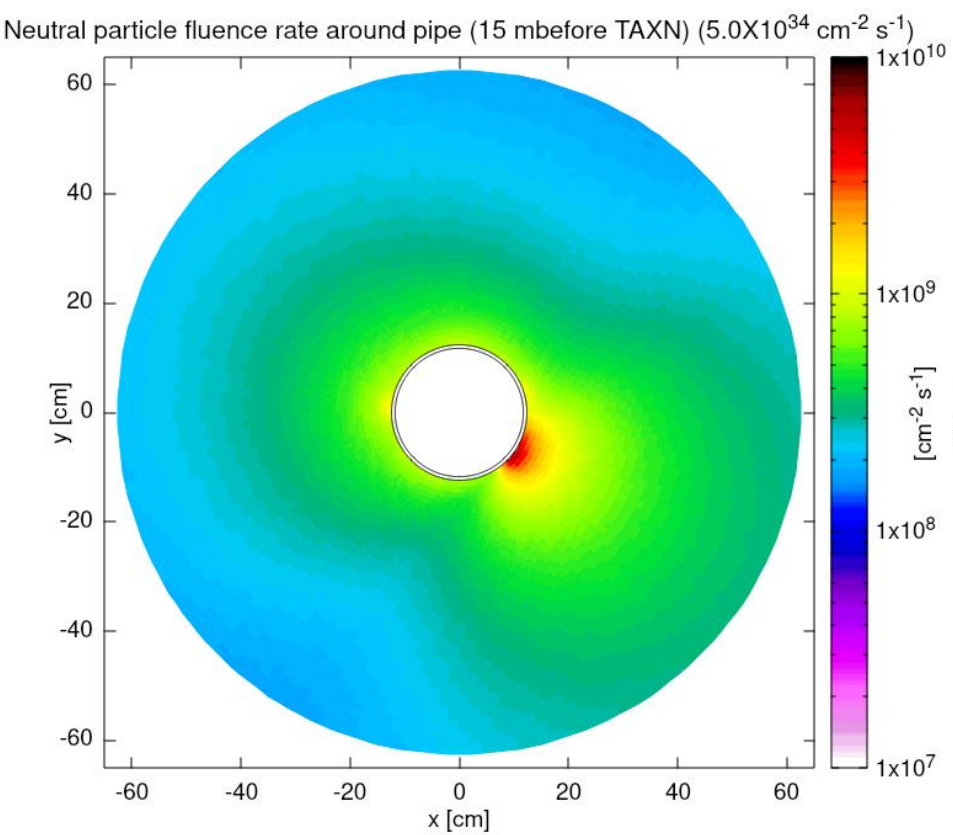


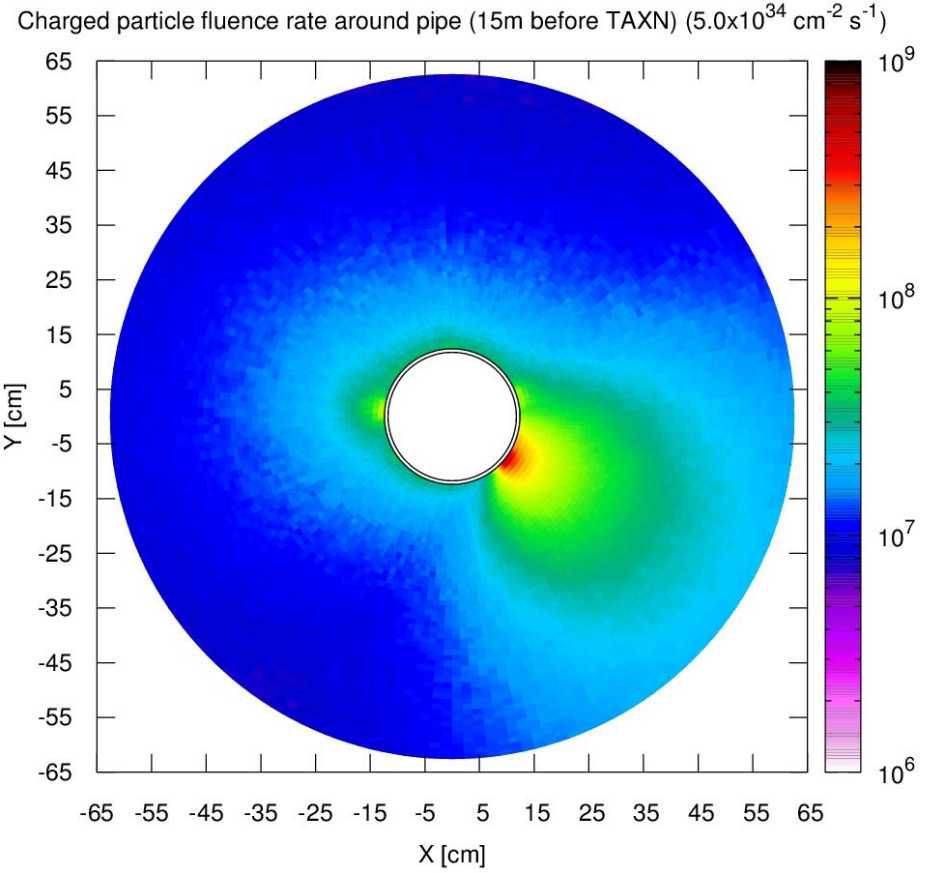
y < 13.3 cm



A. Tsinganis

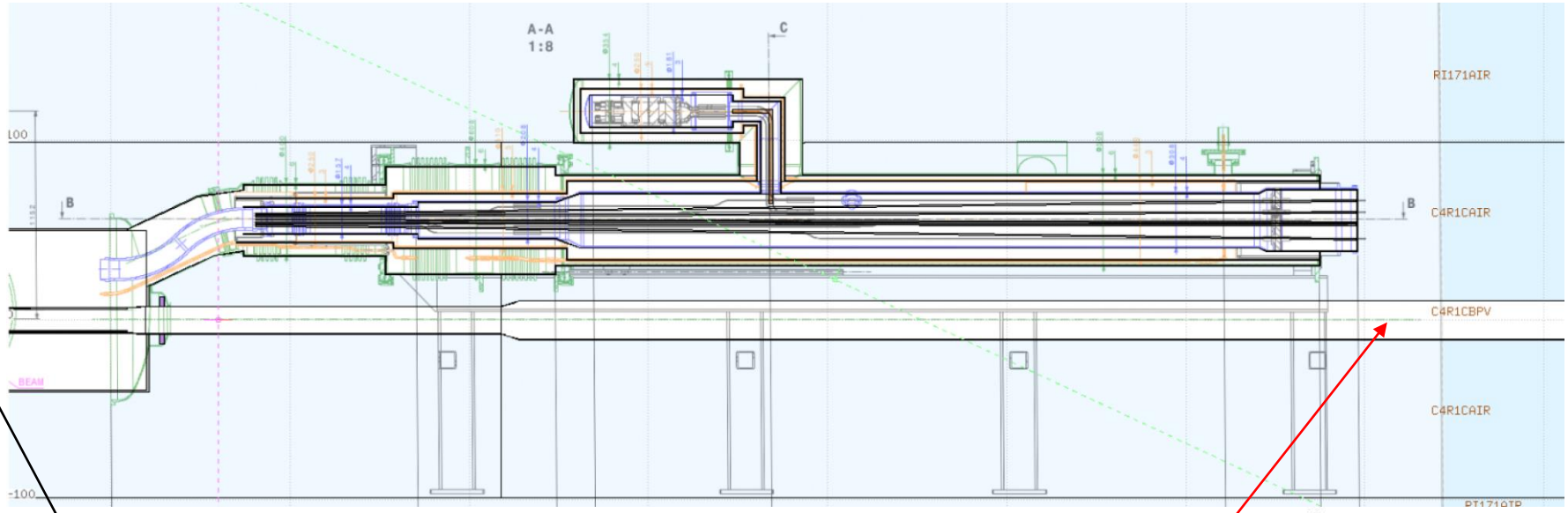
15 m UPSTREAM i.e. 110 m FROM IP5



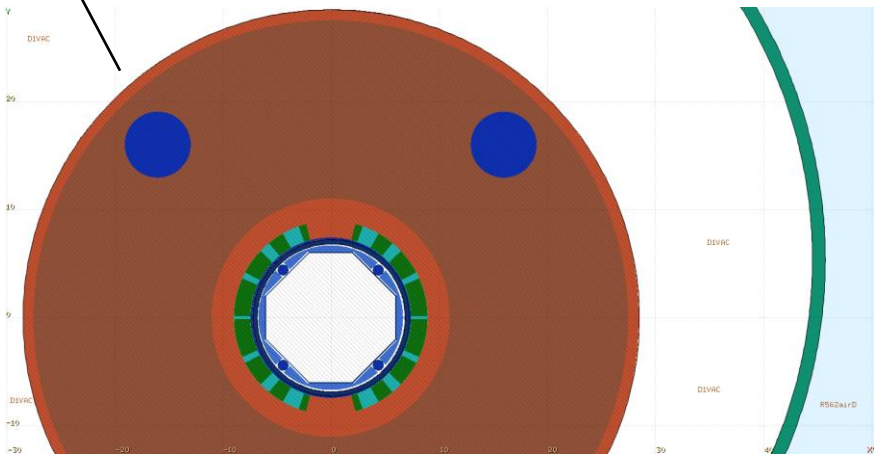


A. Tsinganis

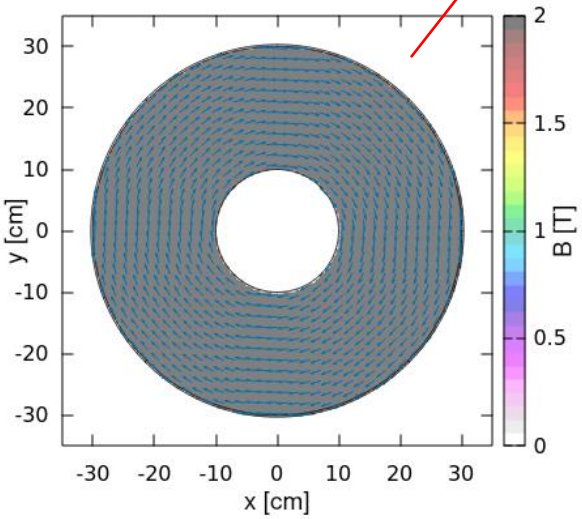
COLD DIODE AND DFX



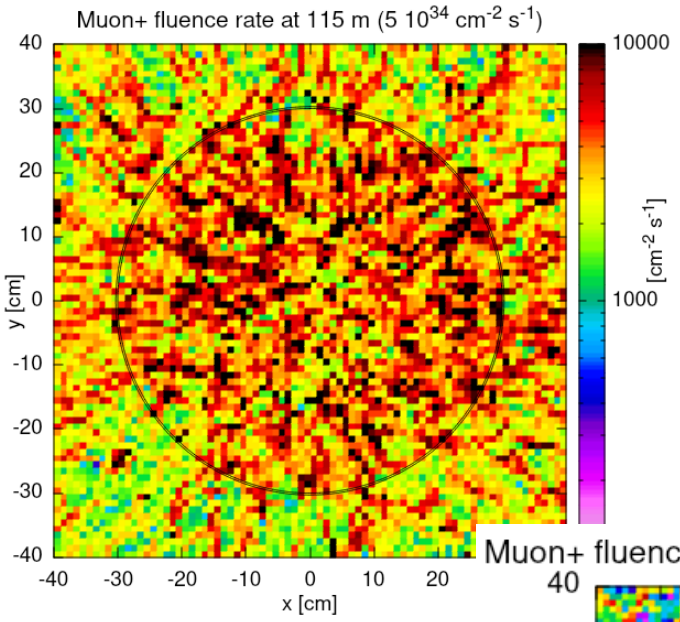
82 m

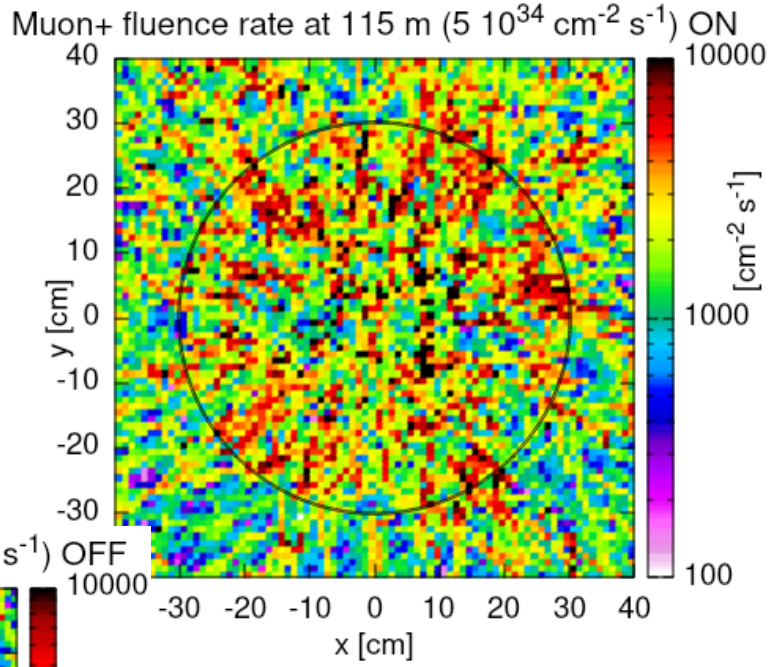


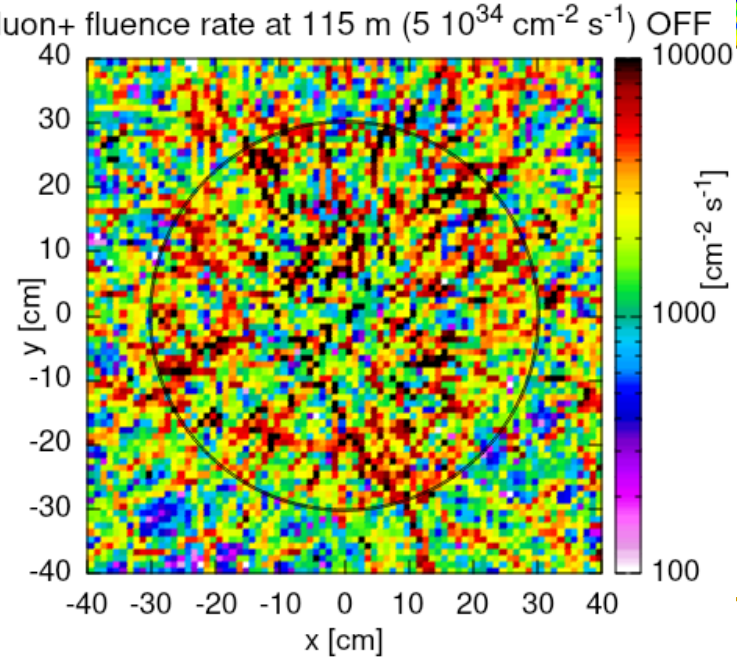
89 m



MUON FLUENCE RATE

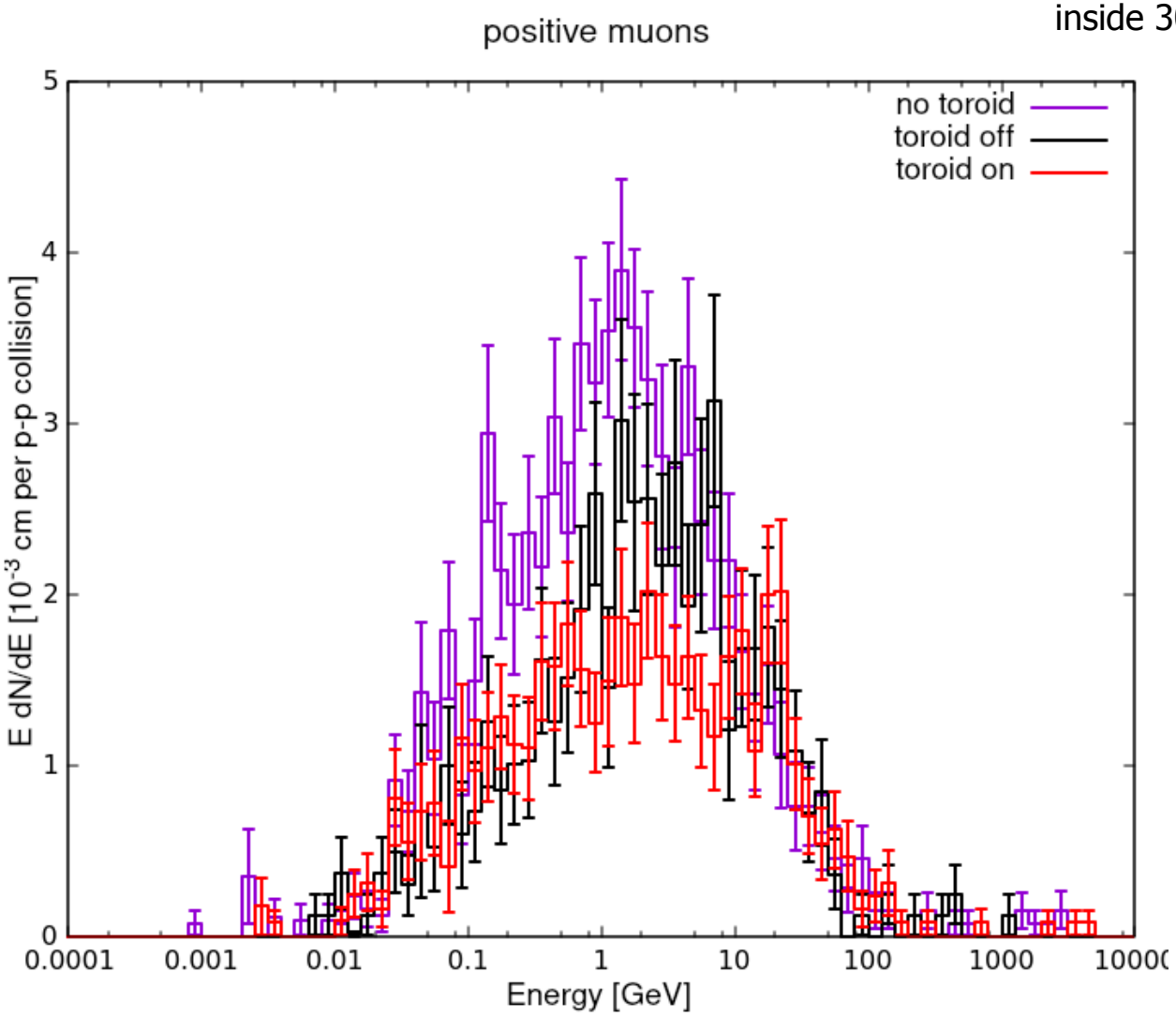






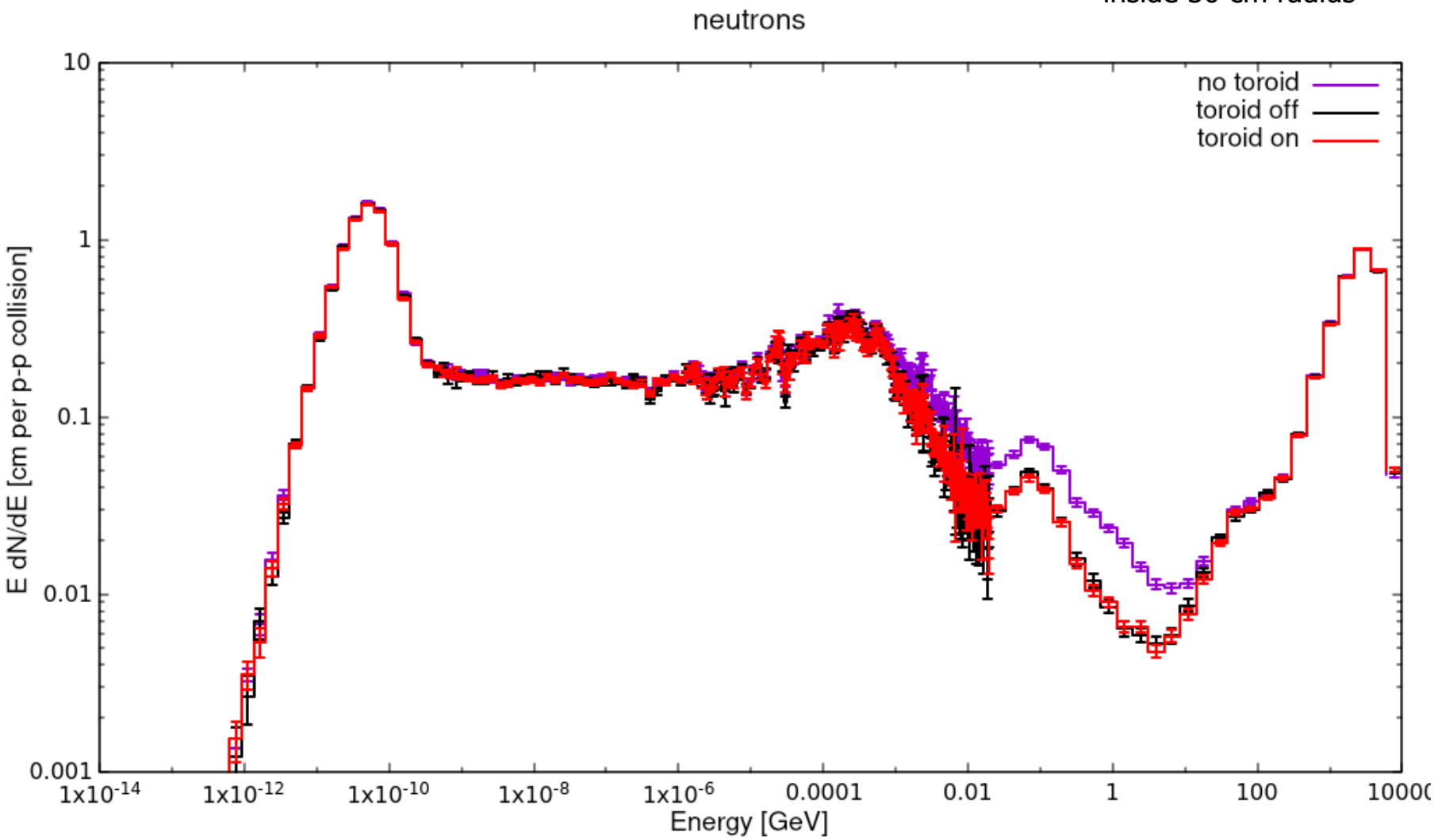
MUON SPECTRUM

inside 30 cm radius



NEUTRON SPECTRUM

inside 30 cm radius



MORE
IN MARTA's TALK
TOMORROW