

Summary of key points related to Task 11 from the FCC Meeting in Rome

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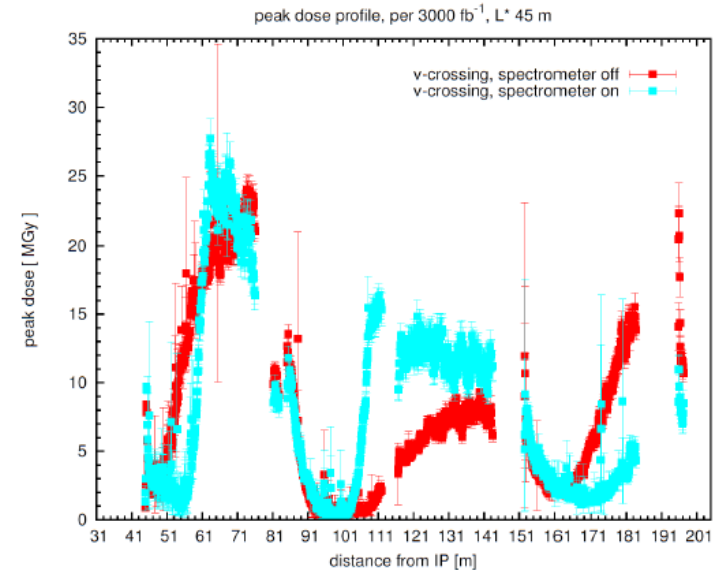
Outline

- Most Task 11-relevant talks were in the technology section
 - Radiation levels:
 - Radiation levels near interaction points (“controlled” source term)
 - Absorbers for beam dumping
 - RP studies
 - Micro-electronic technology:
 - SC switches for kicker system based on SiC MOSFETs

Collision debris on the triplet quadrupoles

F Cerutti et al

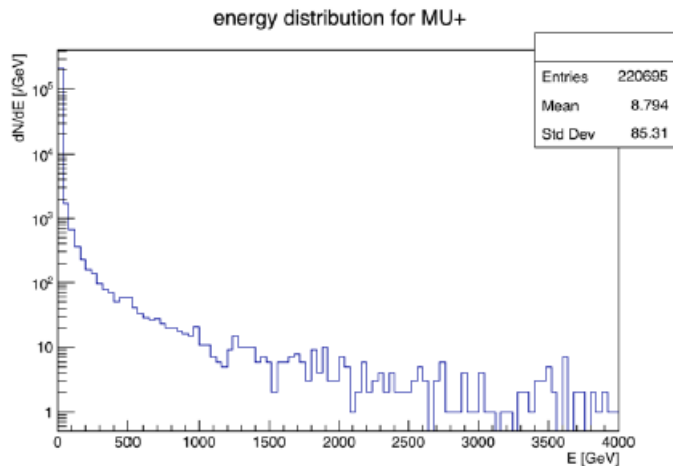
- Main challenges for magnets are related to lifetime (cumulated dose) rather than operation (power density)
- Calculations only available in coils, to be extended for R2E purposes (i.e. under the magnets, in the nearby alcoves...)
- <https://indico.cern.ch/event/438866/contributions/1085138/attachments/1256246/1854584/EnDep.pdf>



Cross-talk between experiments and LSS losses at FCC-hh

R Appleby

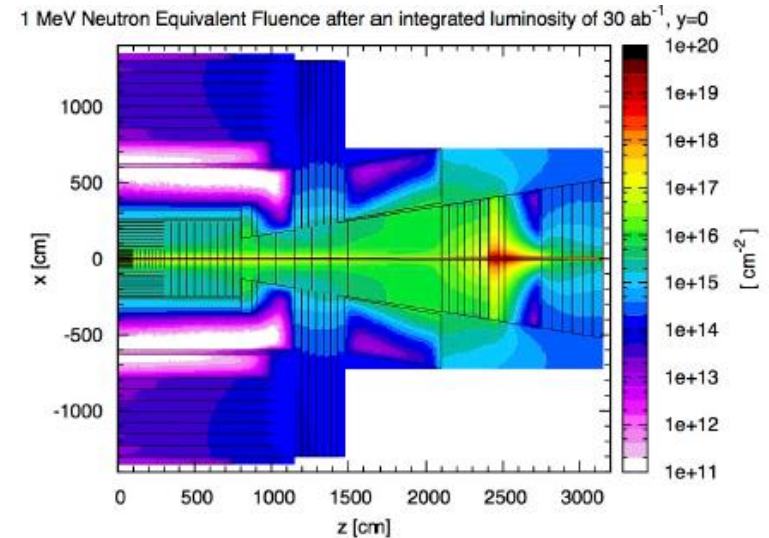
- Elastic and inelastic protons through beam-pipe (optics) and muons through rock
- Implications for experiments and collimator structure in the LSS and DS
- https://indico.cern.ch/event/438866/contributions/1085025/attachments/1256442/1855518/Appleyby_FCC-hh_crosstalklssloss.pdf



Detector Radiation Studies

M I Besana et al

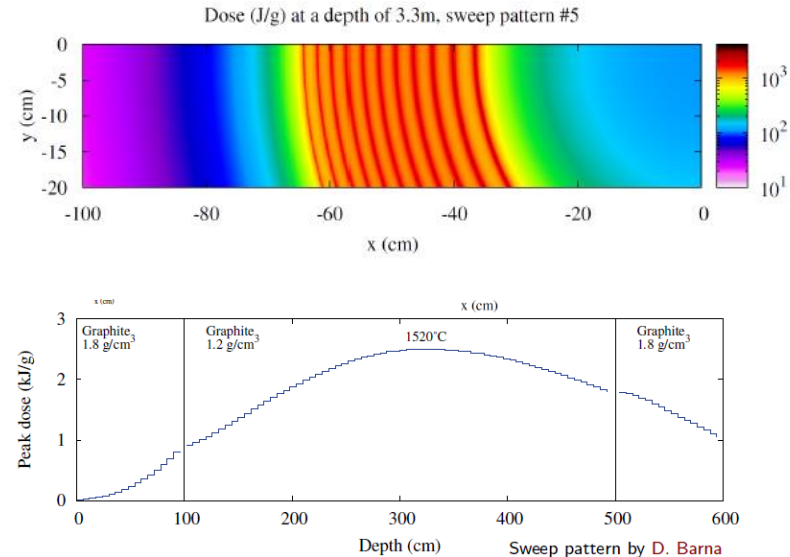
- Shielding around the forward calorimeter to reduce the fluence in the gap region where read-out electronics is expected to be located
- Long-term damage: 1 MeV n_{eq} fluence up to $\sim 3 \cdot 10^{15} \text{ cm}^{-2}$ and dose up to 0.4 MGy for end-cap muon chamber
- https://indico.cern.ch/event/438866/contributions/1085183/attachments/1257001/1856058/FCCh_Detector.pdf



Absorbers for beam dumping

A Lechner et al

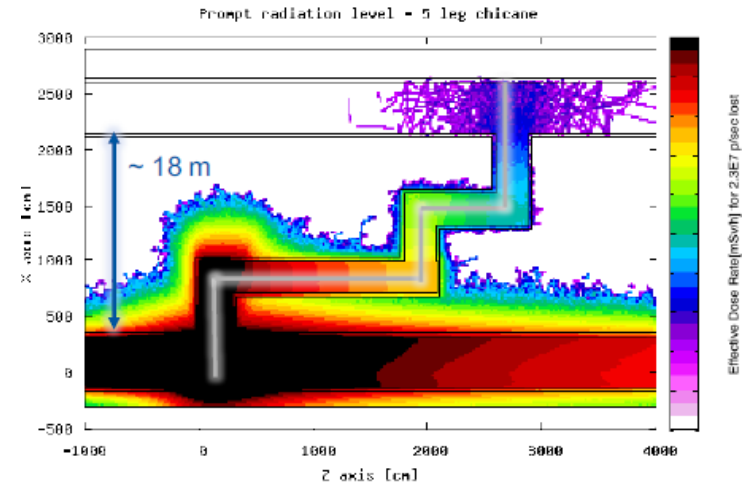
- Mainly related to asynchronous dumps, therefore not so relevant for electronics
- However, configuration could still impact the average radiation levels near the dump (though expected dominating contribution is momentum collimation of second beam)
- https://indico.cern.ch/event/438866/contributions/1085114/attachments/1256914/1855880/2016_13_04_exterprotan_ddump.pdf



Radiation Protection at the FCC-hh: status update

M Widorski et al

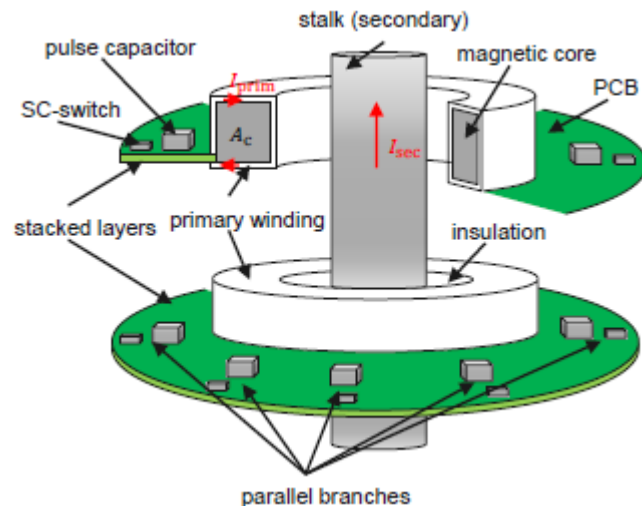
- Double tunnel mandatory for high activation regions (collimation, focusing...)
- Installation of radiation sensitive equipment possible in chicane or service tunnel
- Maximum loss scenario analysis
- https://indico.cern.ch/event/438866/contributions/1085083/attachments/1257208/1857113/2016-04-14_FCCweek2016_RadProt.pdf



FCC-hh Injection and Extraction Kicker Topologies and Solid State Generators

T Kramer

- SiC MOSFETs are used to discharge the capacitors in the inductive adder (SC switch)
- Several commercial SiC MOSFETs identified (mainly ABB) but very uncertain response to radiation
- https://indico.cern.ch/event/438866/contributions/1085005/attachments/1256955/1855976/Kicker_systems_FCC_week_2016.pdf



Controls architecture challenges for beam dump kickers

P Van Trappen et al

- Depending on the layout it is possible that the generator and controls are placed closed to the circulating beam, i.e. in the presence of high radiation fields
- Will profit from component and testing knowledge in R2E (EN/STI, EN/EPC...)
- Levels near the dump are expected to be dominated by momentum collimation and as no details of the respective optics are available, simulations will need to wait (probably not available in 2016)
- https://indico.cern.ch/event/438866/contributions/1085008/attachments/1257849/1858059/FCCW16_dump-kickers-controls_final.pdf



Conclusions

- Main feedback related to Task 11:
 - Need of FLUKA simulations for estimation of radiation levels, which in turn need to be iterated with civil engineering, beam optics, etc.
 - Need for a better understanding and eventual testing of emerging technology components (e.g. SiC, SRAM-based FPGAs...)