

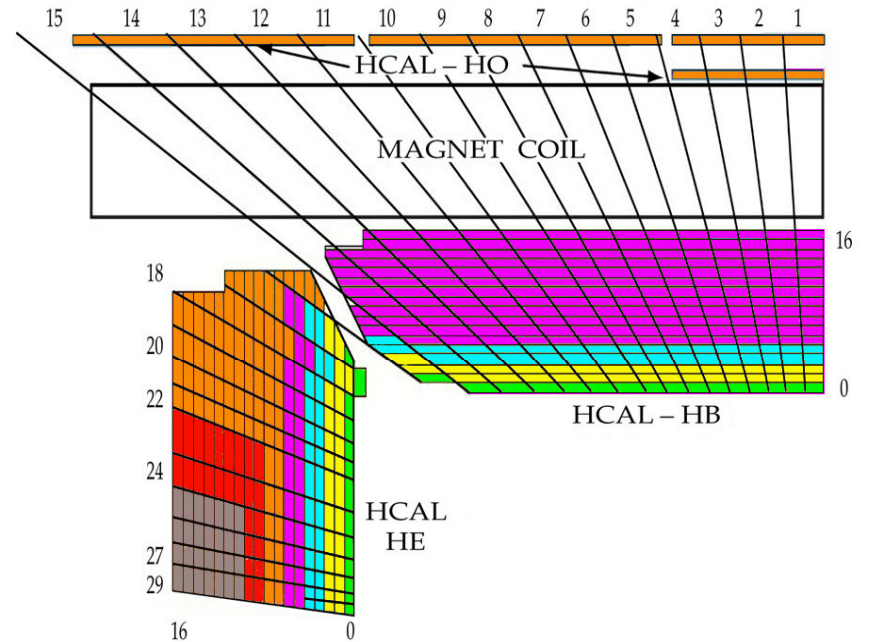
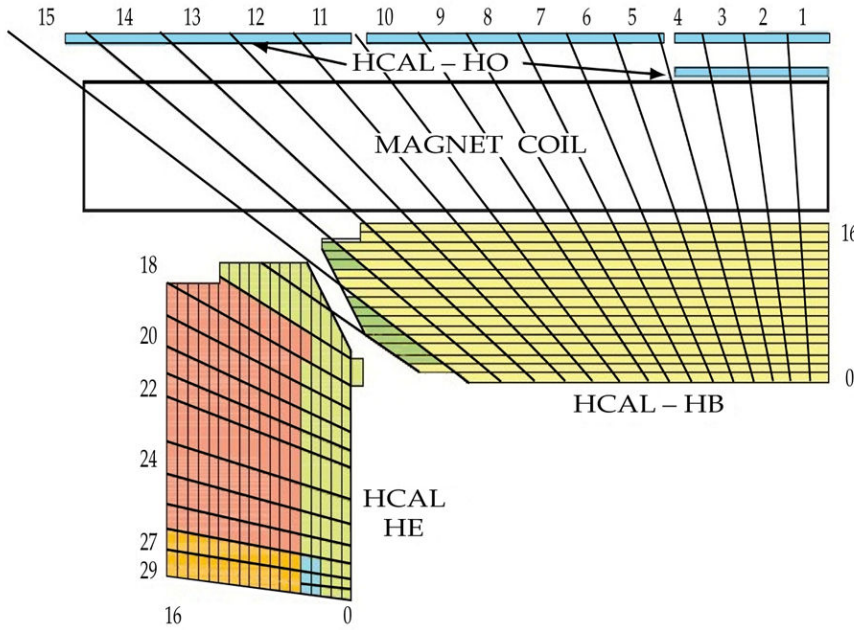
# HCAL @ Phase II

R. Ruchti, Notre Dame

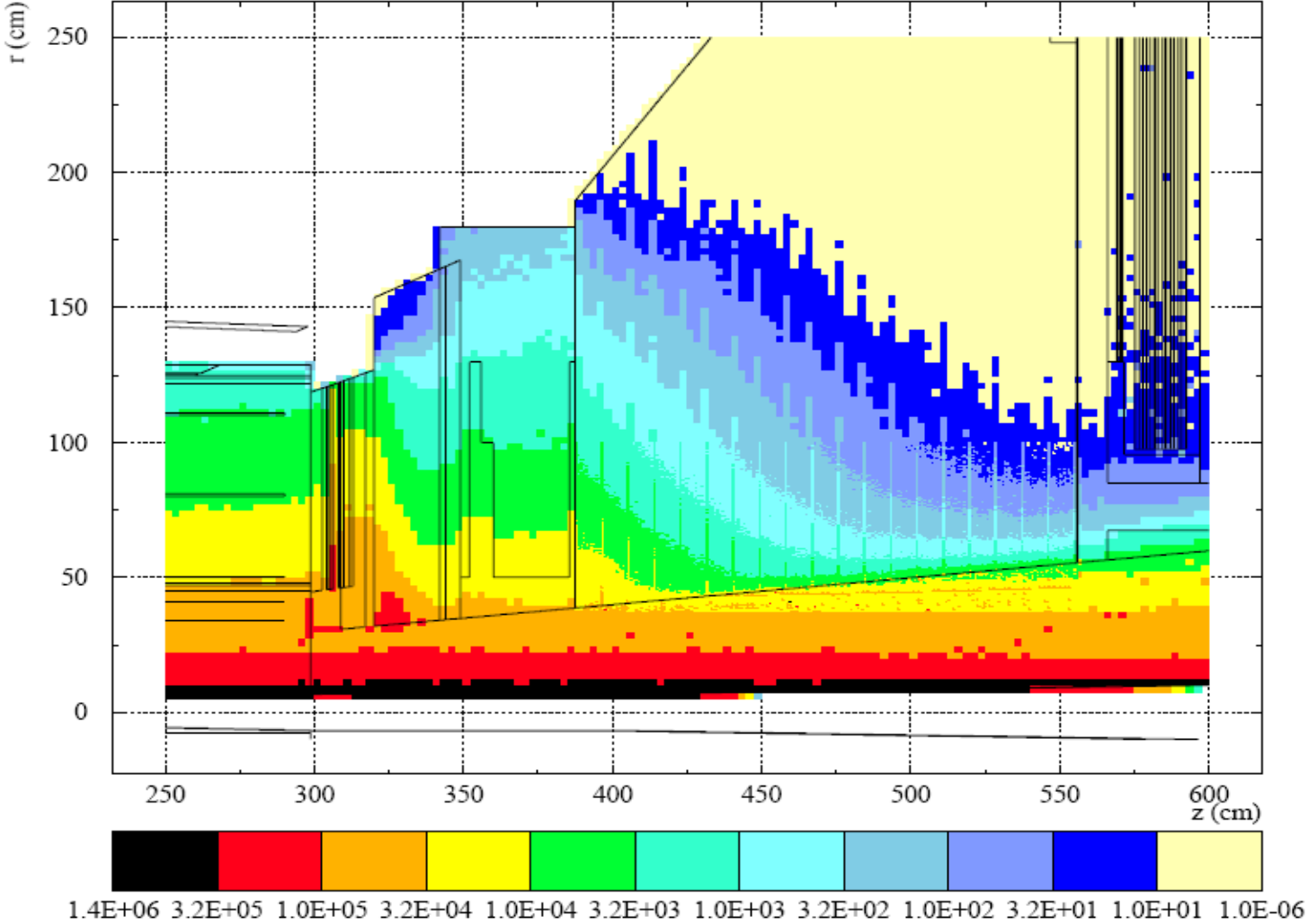
# Current subdetector Elements

- HE
  - Brass absorber
  - Plastic scintillator and fiber waveshifter
  - HPD readout ( -> SiPM readout...)
  - Depth segmentation in regions of elevated radiation exposure
- HF
  - Steel absorber
  - QP fiber
  - PMT readout
  - Both EM and Hadron sampling

# HCAL within the magnet

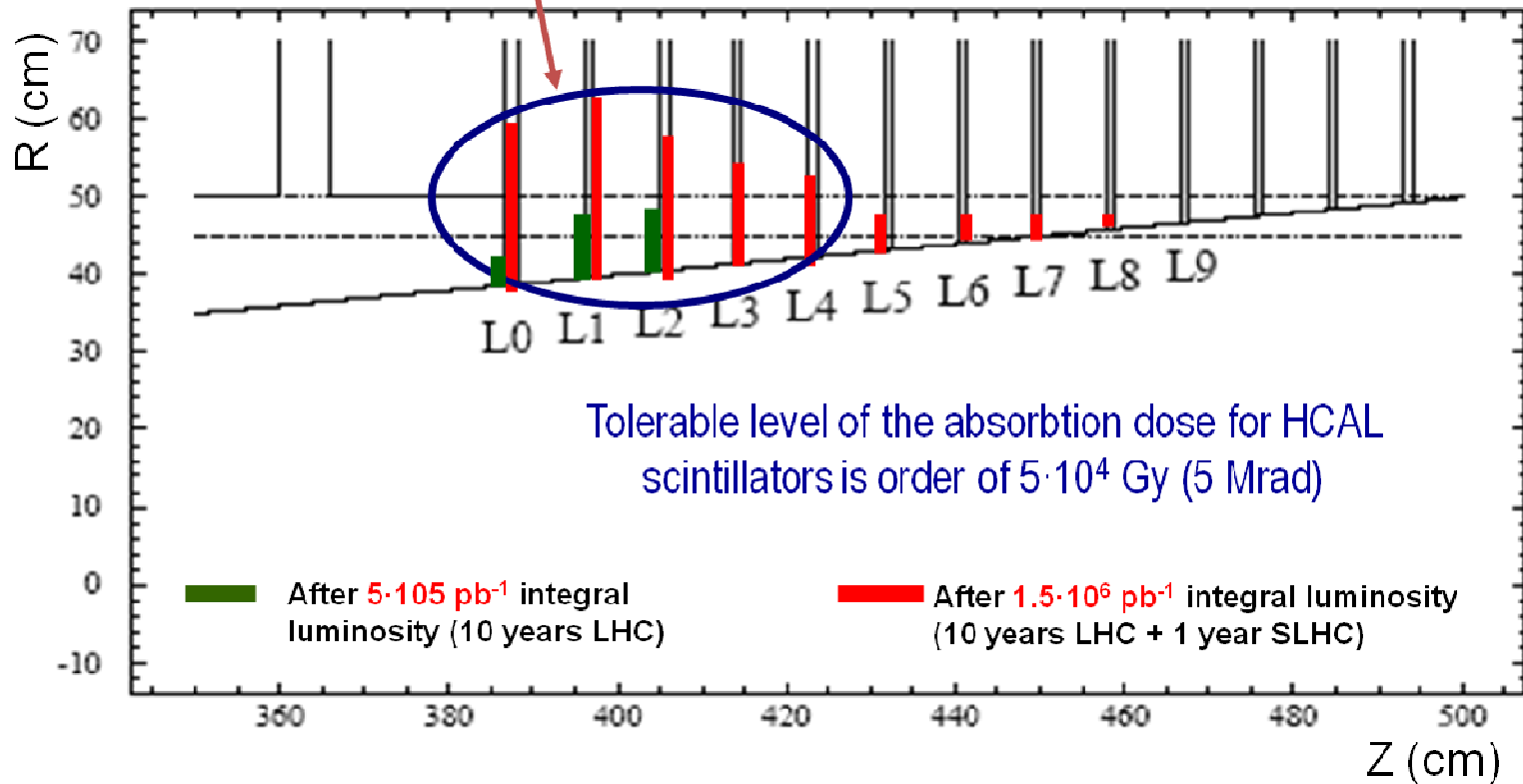


The radiation map of HE calorimeter, Huhtinen et al. (CMS IN 2001/050)  
10 years at  $L = 10^{34} \text{ cm}^{-2}\text{s}^{-1}$  luminosity is assumed, the units are Gy



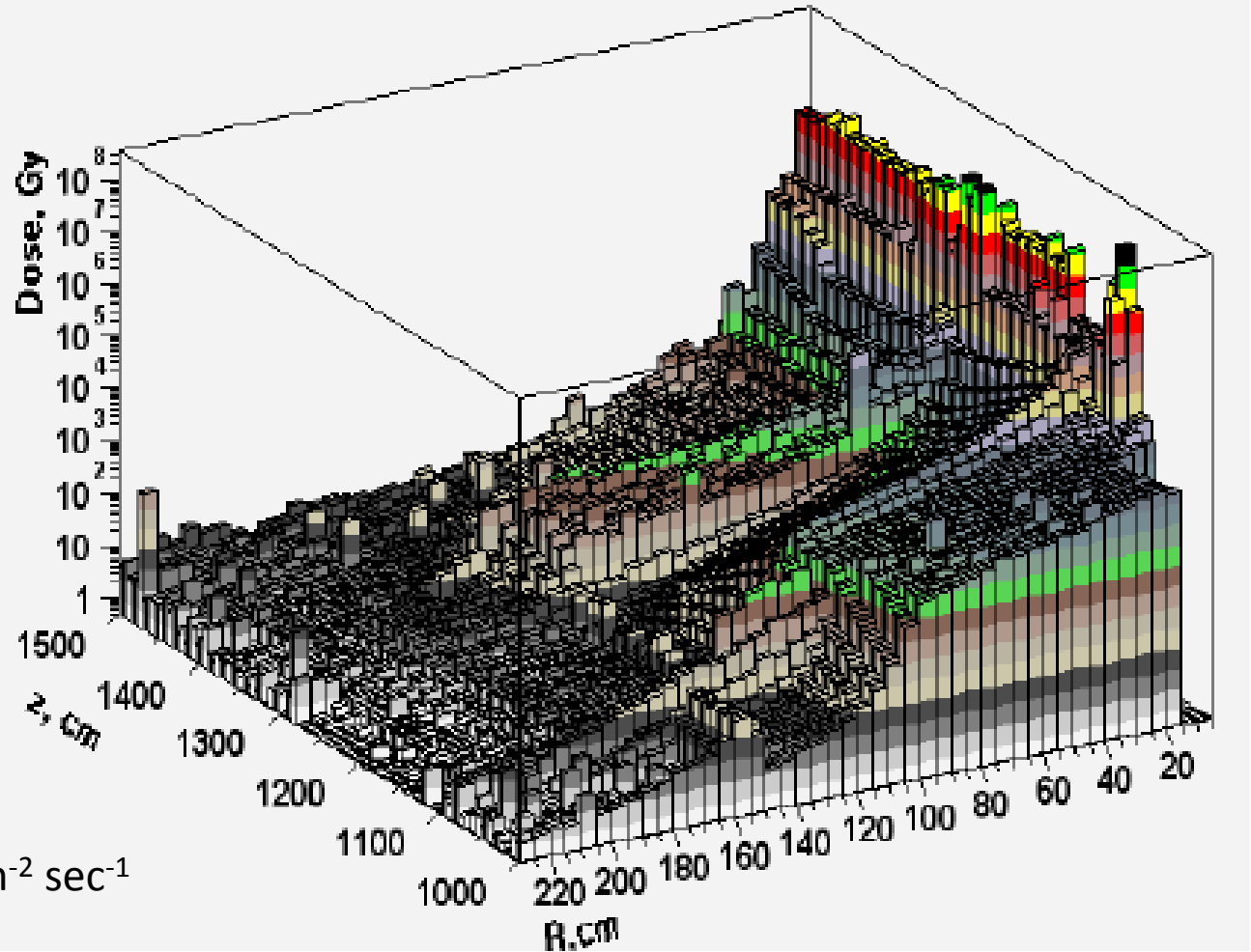
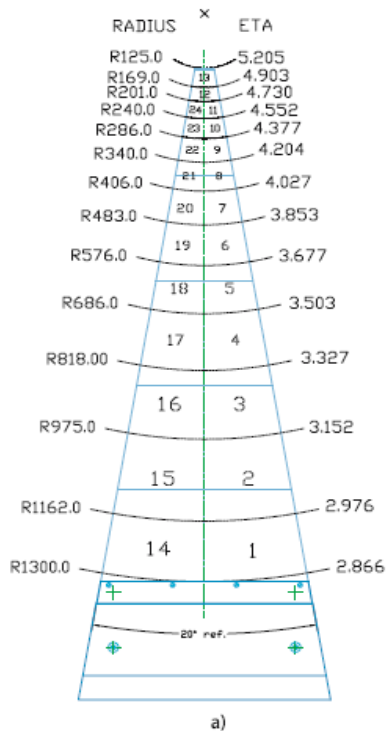
# The innermost region of HE...

5 layers of HCAL megatiles will be affected severely



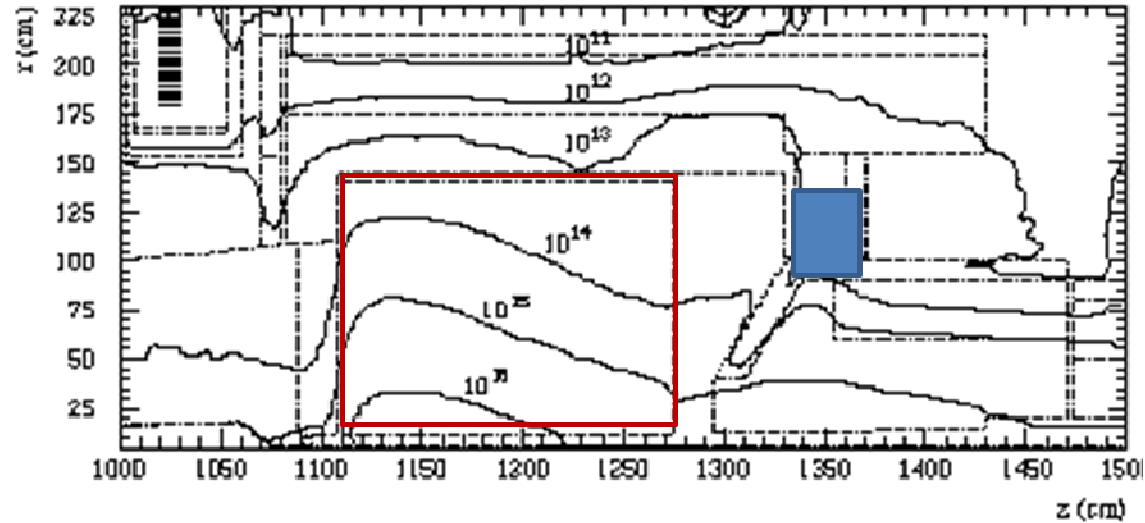
# Meanwhile what is cooking at HF...

HF area 10-year total dose(TDR)

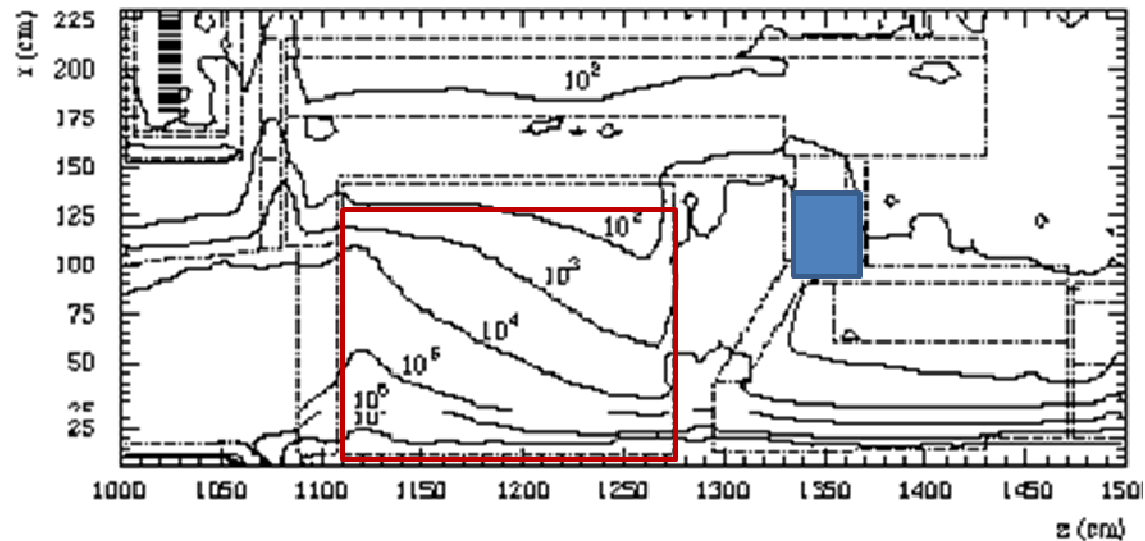


10 years at  $L = 10^{34} \text{ cm}^{-2} \text{ sec}^{-1}$

# HF Environs – charged particles



10 years at  
 $L = 10^{34} \text{ cm}^{-2} \text{ sec}^{-1}$



# Fluence at front end locations

Location	Total Neutron Flux	Charged Hadron Flux	Dose
HB RBX	$3.2 \times 10^{11}$	$6 \times 10^8$	170 rad
HE RBX	$2.5 \times 10^{10}$	$2.9 \times 10^7$	9 rad
HF PMT location	$2.6 \times 10^{12}$	$2.7 \times 10^{10}$	8300 rad

10 years at  $L = 10^{34} \text{ cm}^{-2} \text{ sec}^{-1}$



# Concerns and challenges

- Key physics drivers
- Performance degradation
- Pileup
- Activation
- A good development team and work plan
- Development of a robust, well integrated and functional replacement detector(s)
- Sensible cost