### Remoll Dose simulations for Shower-max

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ee distribution on ring 5 (rate\*Asym weighted)

Generated 1M events from each generator: Moller, ep, inep

> Radial ee distributions shown for plane 28 (ring 5) and plane 70 (SM).

Only electrons with E >= 1 GeV are shown; used Chandan's geometry from recent envelop study

## SM Dose Study using remoll

Shower-max ring: Looking downstream

> C – Closed O – Open T – Transition





Made each quartz layer sensitive for individual Open, Closed, and Transition detectors located at these specific positions

## SM Closed region Dose over entire experiment

double mipF = 2.4; // MeV/(g/cm2) https://github.com/Jeffe double PACdays = 235 + 95 + 14;double  $h_{2s} = 3600;$ shield-design/analysis/n double hIn1day = 24;double area = 0.5\*0.5; //cm2 double MeV2rad = 100/6.24e9; //100rad = 1 Gy = 6.24 10^12 MeV/kg double doseScale = mipF \* PACdays \* hIn1day \* h2s / area \* MeV2rad / 1e6; // [Mrad]

Use same above calculation numbers, except mipF is replaced with actual edep

3500 <sup>2</sup> Hits/2x2mm<sup>2</sup>

2500

2000

1500

1000

500

-x[mm]

Also, no particle type or energy cuts of any kind for this analysis.









[L150

100

50

-50

-100





dose in close SM quartz4 -ee,ep gen







dose in close SM quartz3 -ee,ep gen



euep in close owi qualizz -ee,ep gen





dose in close SM quartz2 -ee,ep gen

Lifetime total dose = 68.17 GRad

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10001020104010601080110011201140116011801200

[150 آریساً

100

-50

-100

-150

0.3 <sup>2</sup>mu<sub>2</sub>2 0.25 0.25

0.2

0.15

0.1

0.05

-x[mm]



dose in close SM quartz1 -ee,ep gen





### hits in open SM quartz3 -ee,ep gen



#### hits in open SM quartz4 -ee,ep gen



### SM Open region Dose over entire experiment





dose in open SM quartz4 -ee,ep gen







dose in open SM quartz3 -ee,ep gen



#### edep in open SM quartz2 -ee,ep gen

mW/5x5mm

GRad/5x5mm<sup>2</sup>

0.8

0.6

0.4

0.2

-1000

x[mm]

-1050

-1100



dose in open SM quartz2 -ee,ep gen

Lifetime total dose = 283.60 GRad

E150

100

50

-50

-100

-150 -1200

-1150



100



dose in open SM quartz1 -ee,ep gen



### SM Transition region Dose over entire experiment



hits in trans SM quartz1 -ee,ep gen



hits in trans SM quartz2 -ee,ep gen



hits in trans SM quartz3 -ee,ep gen



hits in trans SM quartz4 -ee,ep gen





dose in trans SM quartz4 -ee,ep gen Lifetime total dose = 29.07 GRad 1200 ⊑\_\_\_\_\_ 1180 0.18 E E 1160 0.16 1140-0.14 1120-0.12 1100 1080-0.08 1060-0.06 1040 0.04 1020 0.02 1000 -150 -100 100 -50 0 50 150 x[mm]



dose in trans SM quartz3 -ee,ep gen Lifetime total dose = 56.95 GRad





dose in trans SM quartz2 -ee,ep gen Lifetime total dose = 79.99 GRad







# Summary

- 2<sup>nd</sup> tile has greatest dose; 4<sup>th</sup> tile has lowest dose.
- Peak dose per  $5x5 \text{ mm}^2$  is in Open tile#2 and is at least ~500 Mrad
- Runs with greater statistics for the backgrounds are underway—to remove any possible large stat fluctuations in our results.
- We irradiated one of our Heraeus samples to > 500 Mrad (per 5x5 mm2) and it still transmitted light well for 400nm and up. We're working to quantify it.