T1 radiation environment

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For consistency all results are scaled to:

\[ 1 \text{ s at luminosity } 10^{34} \]

\[ = 10 \text{ nb}^{-1} = 8 \times 10^8 \text{ pp-collisions} \]

(After all – these are CMS radiation simulations)
Describing the environment

For radiation effects we (normally*) need 3 quantities:

1) Hadron fluence \((n+ch)\) above 100 keV for Si bulk damage
2) Hadron fluence above 20 MeV for SEU
3) Absorbed dose for surface damage (esp CMOS devices)

And I guess for occupancy studies the charged flux might be of interest

*I do not really know about damage in the GEMs
Polyethylene (reduces flux, but not there with T1 !)
>20 MeV neutrons
Ch. Hadron fluxes
Charged flux (\(e^{+}chh\))
Dose on UXC (Gy/s)
Sure, luminosity is low and T2 is worse...

...but do not forget the beam-pipe (once L of order 1E33)

Assume 10% of these values after first year at 1E33

T1 extraction in this region (in space and time)
Conclusions

Fluxes comparable to CMS Tracker

But of course the lower luminosity (how much lower?) helps

Same technology as CMS EMU CSC...

But 2-3 order of magnitude more radiation!

Beware of SEU:s and other rate-related effects

once $L \geq 10^{32}$