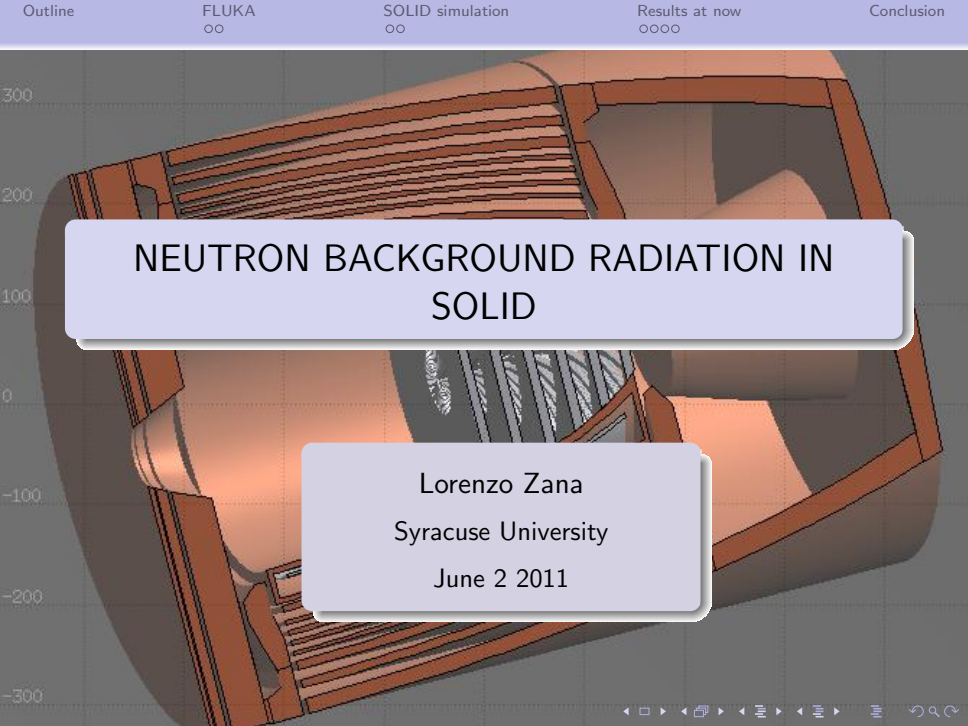


A 3D CAD model of a complex, cylindrical detector component, possibly a calorimeter or tracker. The model is shown in a cutaway view, revealing internal structures like a central core and surrounding layers. The color scheme is primarily orange and brown. A coordinate system is visible on the left side of the image, with labels ranging from -300 to 300.

NEUTRON BACKGROUND RADIATION IN SOLID

Lorenzo Zana

Syracuse University

June 2 2011

- 1 FLUKA
 - Introduction
- 2 SOLID simulation
 - Overview
- 3 Results at now
 - No shielding
 - Comparison with small Shielding
- 4 Conclusion

FLUKA

Fluka is a

“general purpose tool for calculations of particle transport and interactions with matter”

FLUKA interactions

With other interactions it calculates:

Photon

- Photoelectric
- Compton
- Rayleigh
- Pair production
- Photonuclear
- Photomuon production

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Ionization E-loss

- Continuous
- Delta-ray production

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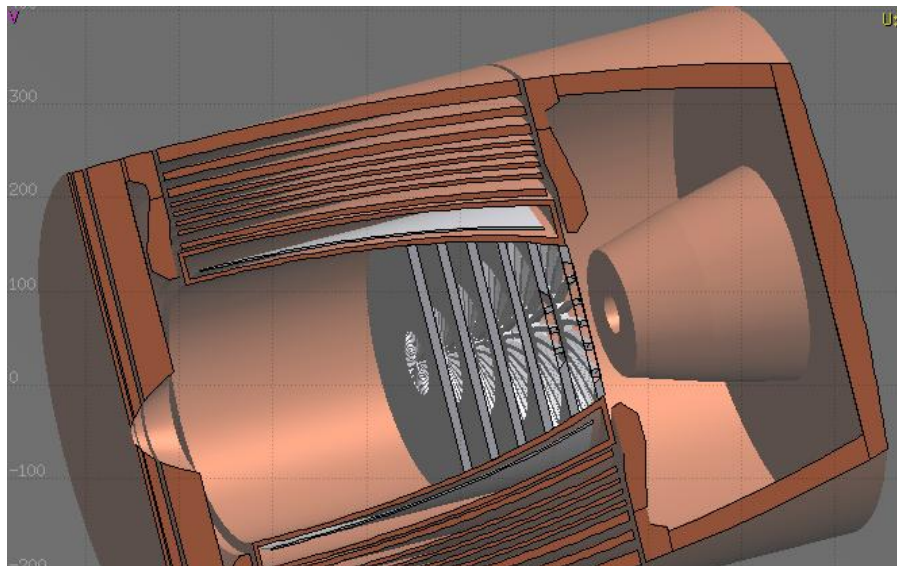
Ionization E-loss

- Continuous
- Delta-ray production

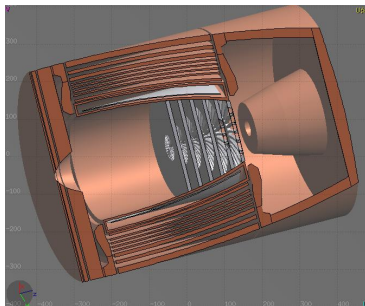
Transport

- Multiple scattering
- Single scattering

Status

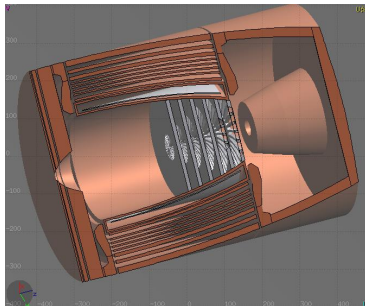


Status



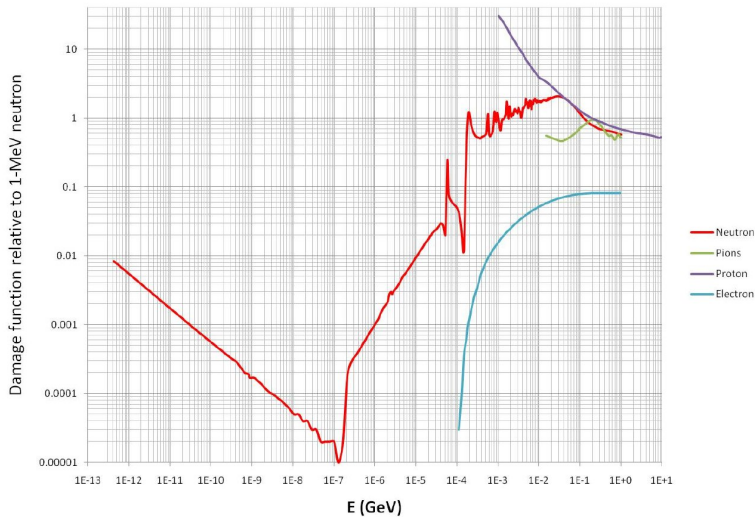
- Babar Solenoid design
- Baffles design
- Target

To Do yet



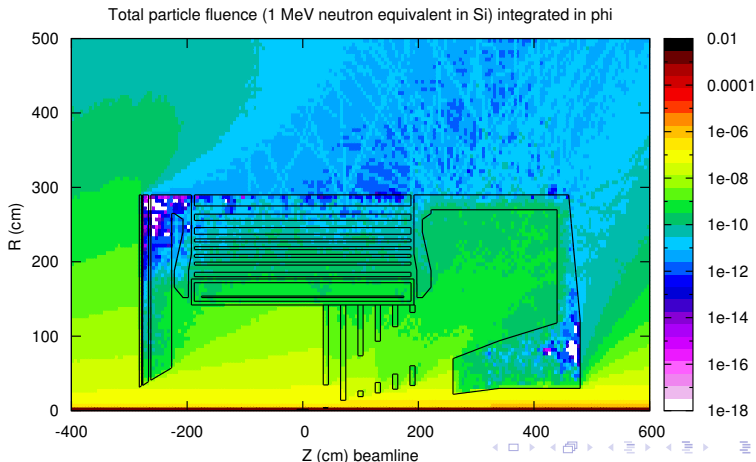
- Other detectors
- Beam pipe
- Target for SIDIS
- Magnetic field
- Lighter design for baffles
- Better Shielding design

Fluence No shielding 11 GeV e- beam



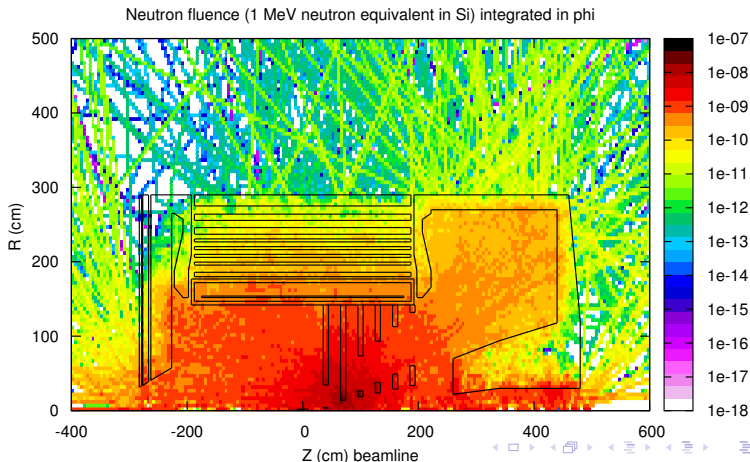
Fluence No shielding 11 GeV e- beam

Total Fluence = Flux (cm^{-2}) per incident electron



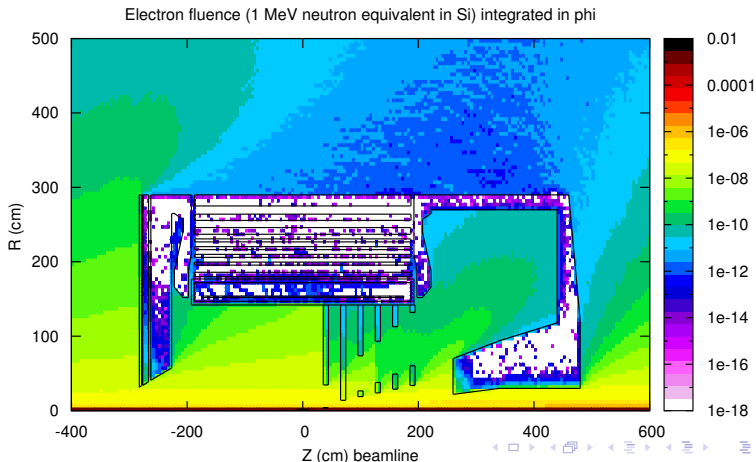
Fluence No shielding 11 GeV e- beam

Neutron Fluence = Flux (cm^{-2}) per incident electron



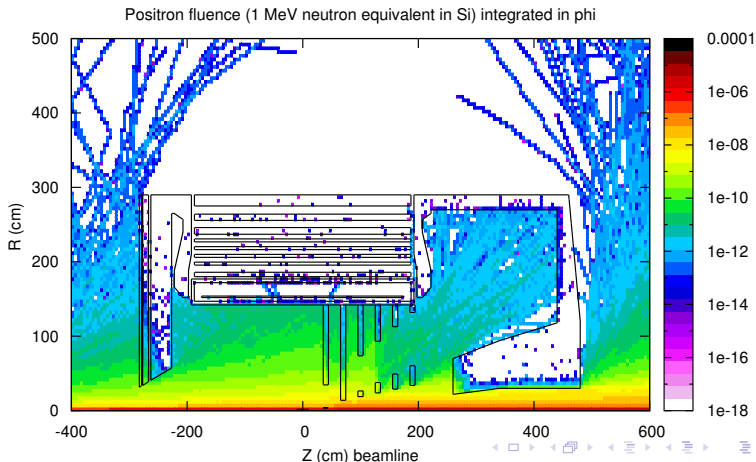
Fluence No shielding 11 GeV e- beam

Electron Fluence = Flux (cm^{-2}) per incident electron



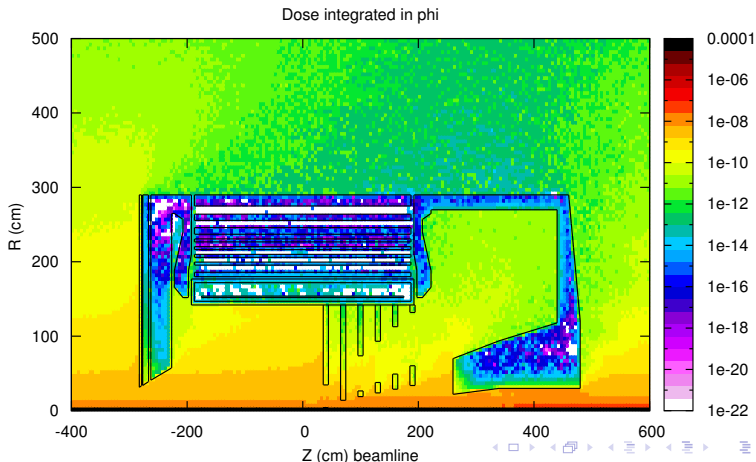
Fluence No shielding 11 GeV e- beam

Positron Fluence = Flux (cm^{-2}) per incident electron



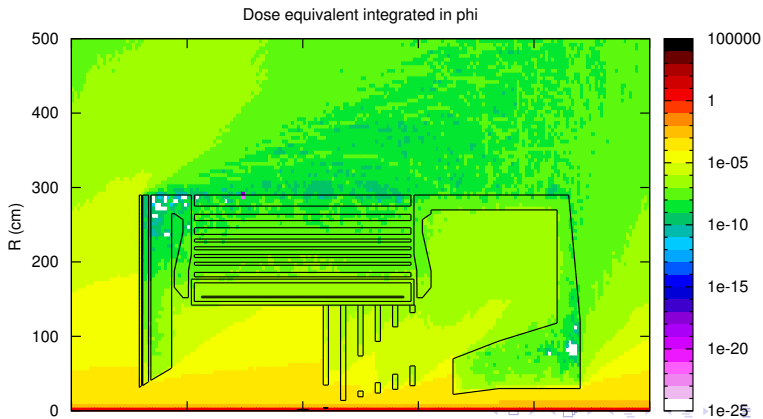
Dose No shielding 11 GeV e⁻ beam

Dose (energy deposited per unit mass, GeV/g)



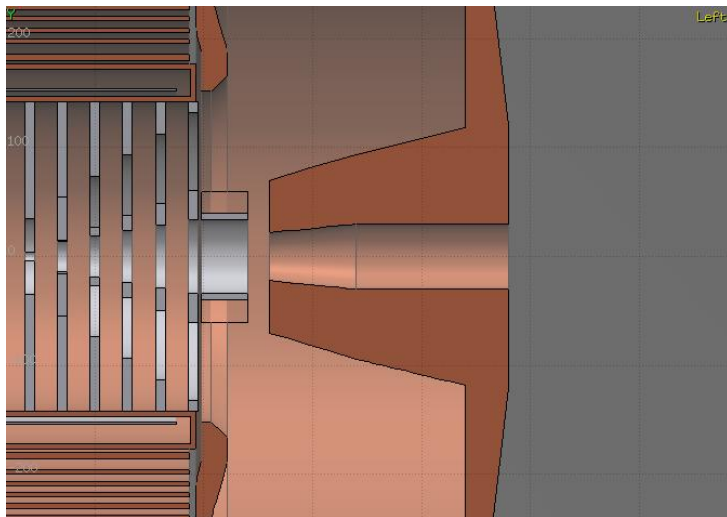
Dose No shielding 11 GeV e⁻ beam

Dose equivalent rate expressed in μSv ($1\text{Sv} = 100\text{ rem}$) per electron



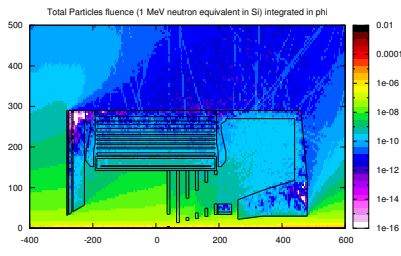
Comparison Fluence with shielding 11 GeV e⁻ beam

- One internal tube of Lead with thickness 6.5cm
- One external tube of polyethylene with thickness of 20cm

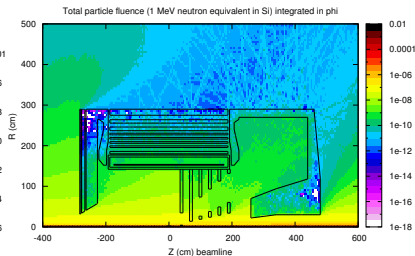


Comparison Fluence with shielding 11 GeV e⁻ beam

Total Fluence = Flux (cm^{-2}) per incident electron



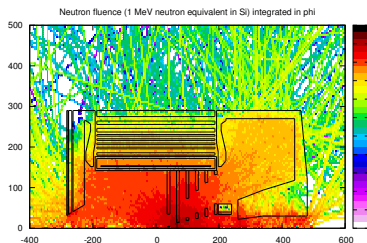
SHIELD



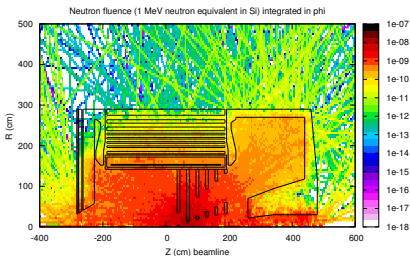
NO SHIELD

Comparison Fluence with shielding 11 GeV e⁻ beam

Neutron Fluence = Flux (cm^{-2}) per incident electron



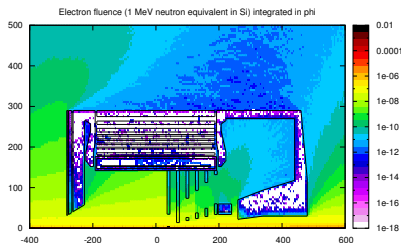
SHIELD



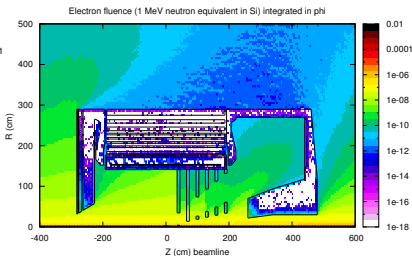
NO SHIELD

Comparison Fluence with shielding 11 GeV e⁻ beam

Electron Fluence = Flux (cm^{-2}) per incident electron



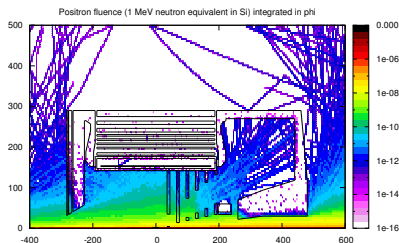
SHIELD



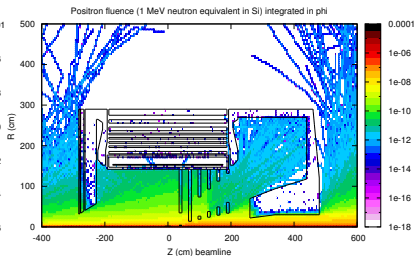
NO SHIELD

Comparison Fluence with shielding 11 GeV e⁻ beam

Positron Fluence = Flux (cm^{-2}) per incident electron



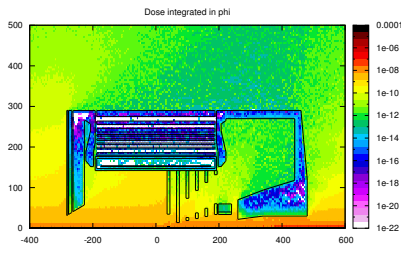
SHIELD



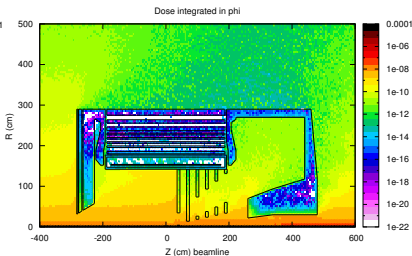
NO SHIELD

Comparison Dose with shielding 11 GeV e⁻ beam

Dose (energy deposited per unit mass, GeV/g)



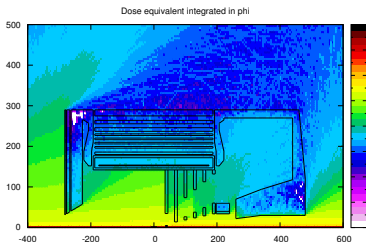
SHIELD



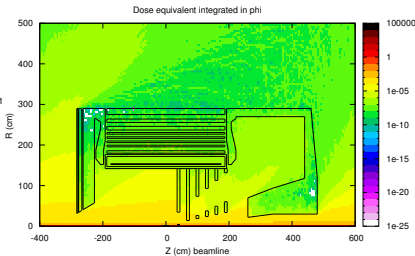
NO SHIELD

Comparison Dose with shielding 11 GeV e⁻ beam

Dose equivalent rate expressed in μSv ($1\text{Sv} = 100\text{ rem}$) per electron



SHIELD



NO SHIELD

Conclusions

- FLUKA has tools to directly measure radiation damage

To Do

Will be implemented:

- I magnetic field
- II lighter design for baffles
- III update the geometry with other detectors
- IV SIDIS geometry
- V Comparison with other magnets