

# GEANT4 Simulation for C-GeN

E12-11-009 Collaboration

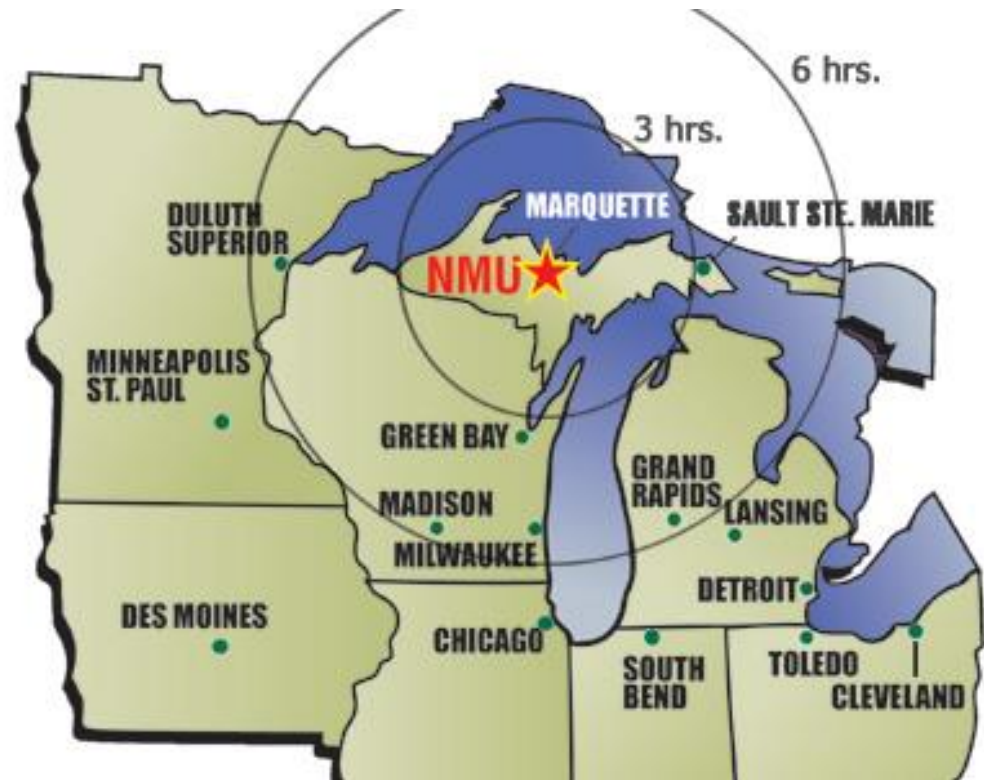
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NMU STUDENT



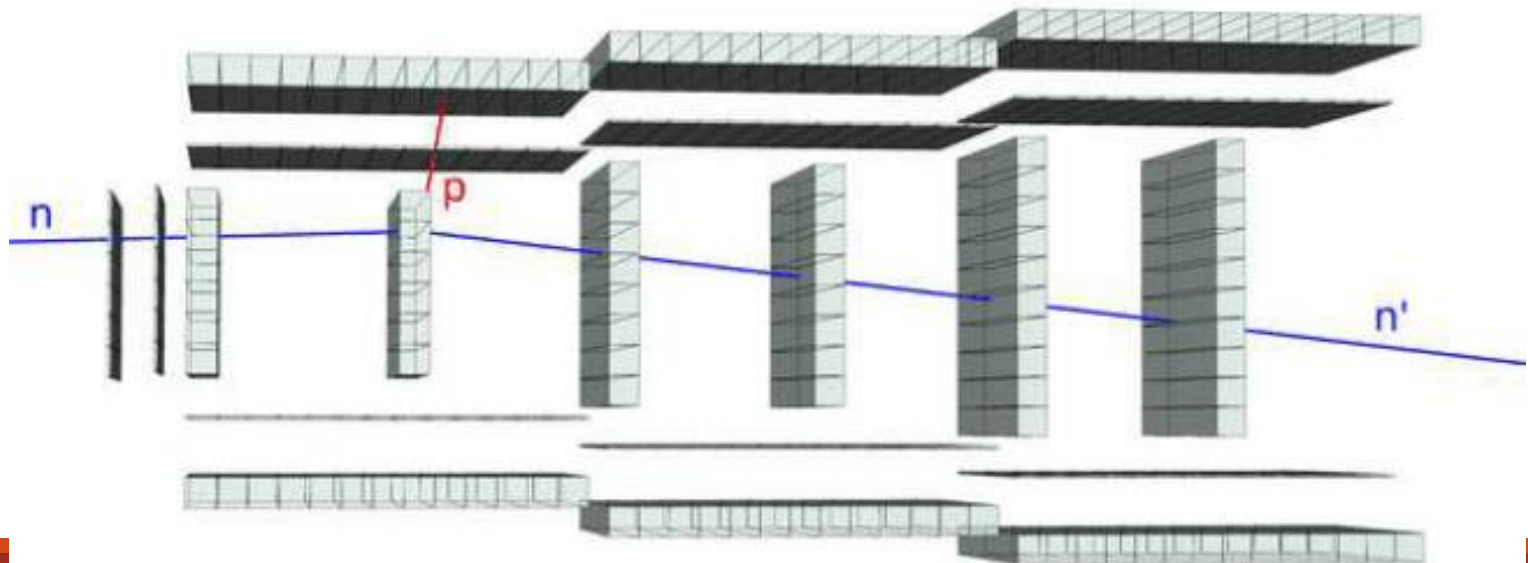
# Discussion Items

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- Hall C GeN overview
- Need for a G4 Simulation
- Basics of the C-GeN G4 code
- Future plans

# C-GeN Overview – First design

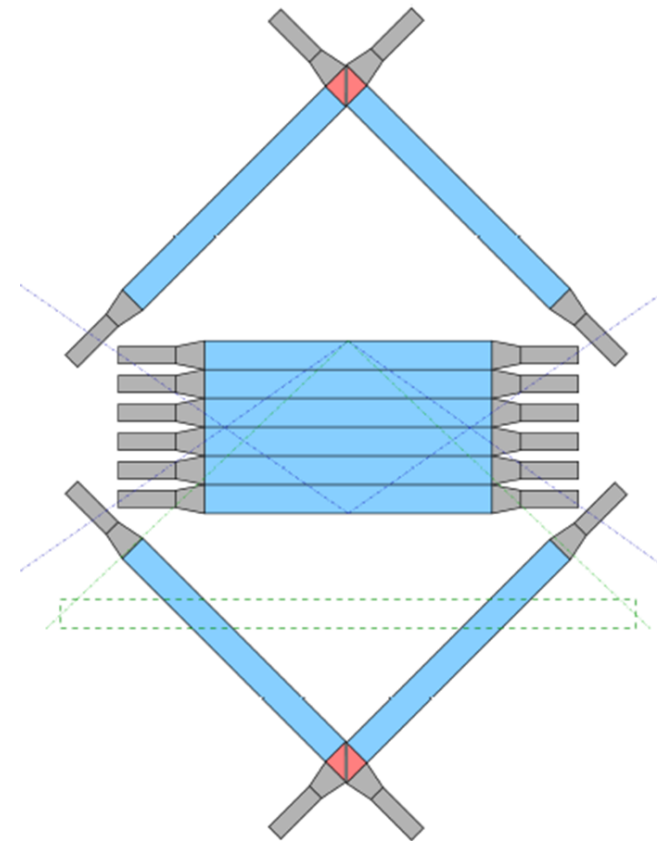
- Measure Neutron Electric form Factor to  $Q^2 = 6.88 (GeV/c)^2$  using  ${}^2H(\vec{e}, e'\vec{n}) {}^1H$
- Measure neutron polarization with proton recoil reaction in polarimeter



# Modification to Increase Acceptance

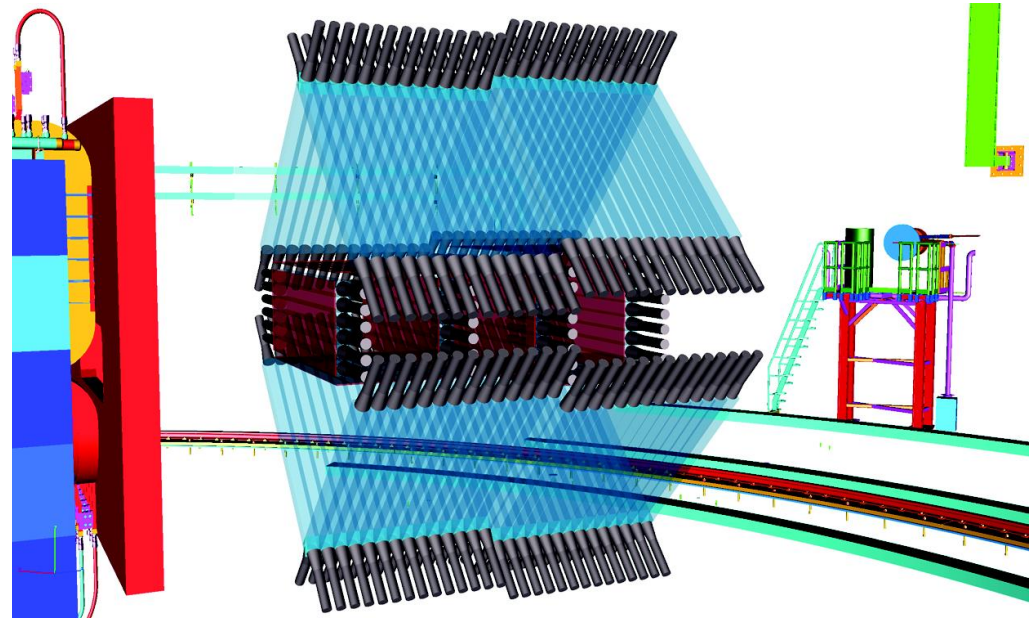
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- Last 2 planes of analyzers represent more than 1/3 of detectors; remove
- Replace top/bottom detectors with 160 cm long @ 90°
- Requires a 90° reflector at one end to accommodate PMT
- Tested at NMU; Better than 400 ps intrinsic resolution



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# Need for a G4 Simulation

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- Study background rates and shielding
- Estimate accidental rates
- Comparison with Fluka simulation

# Basics of the C-GeN Code

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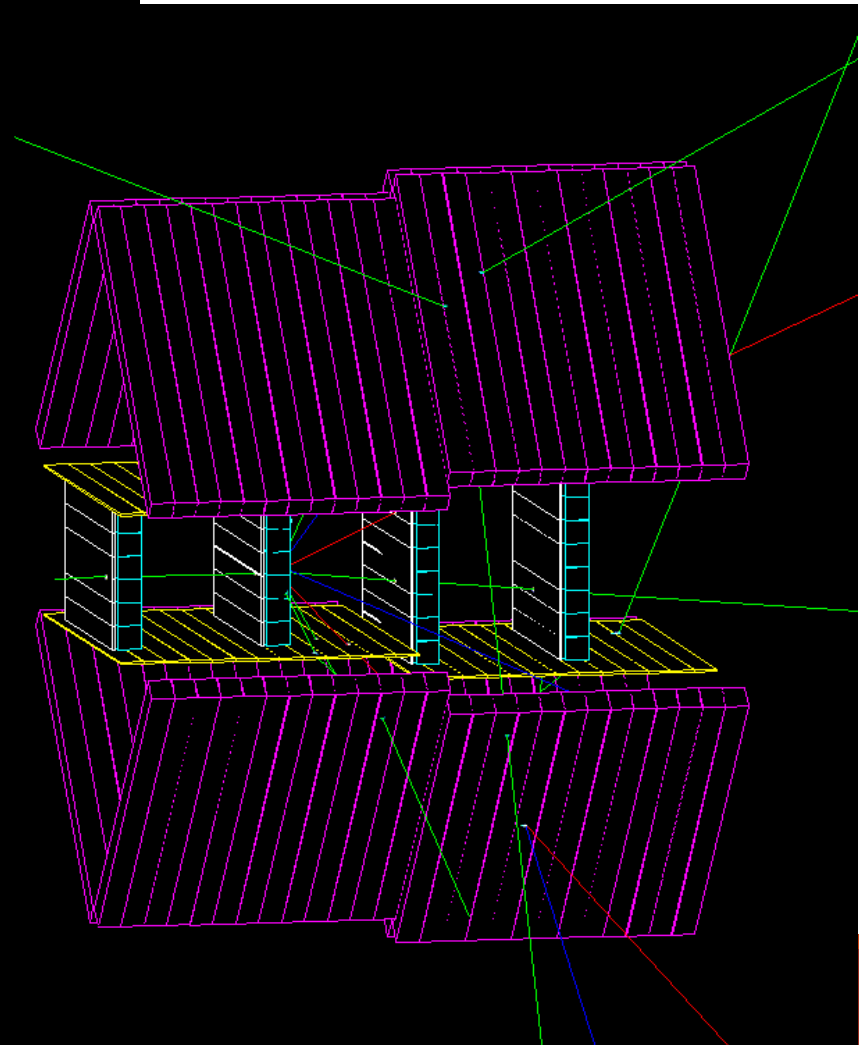
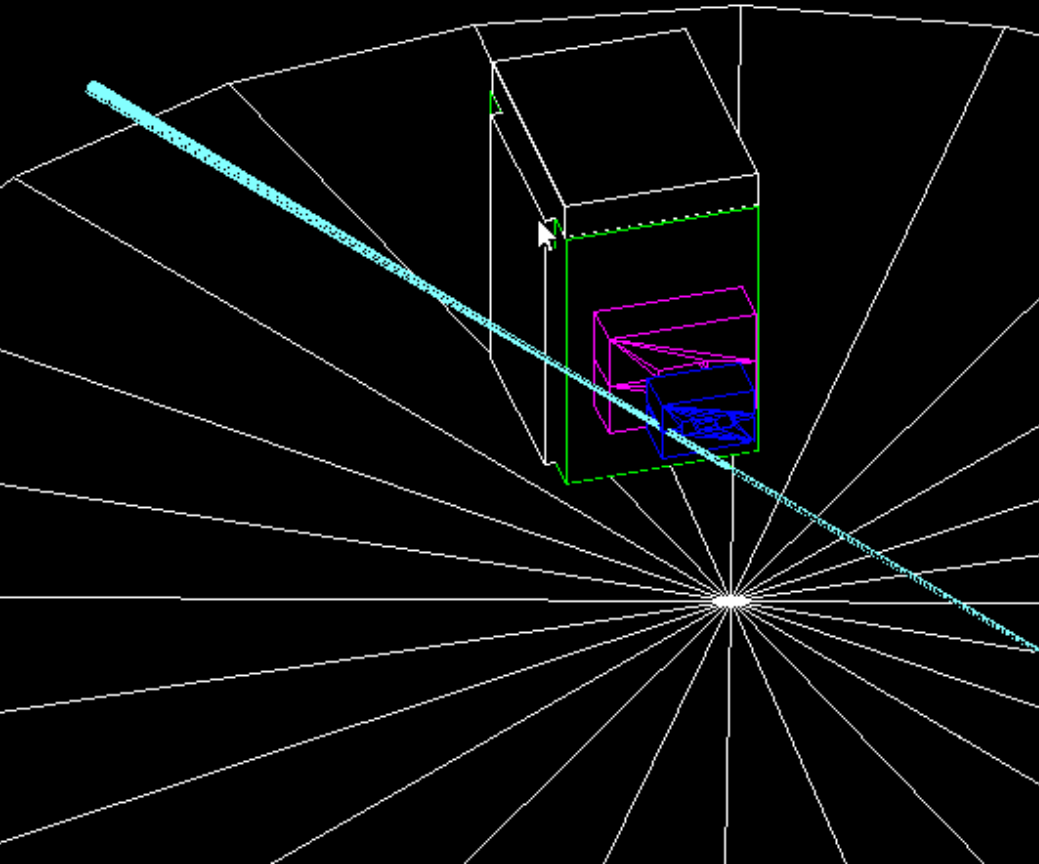
- Easy modification is the guiding principle
- Currently experimental components written in abstract classes; easy to turn 'on' and 'off'
- Separate methods used to constructed the subparts of each experimental component
- Allows for easy changes to components
- Switching to XML files for most components

# Basics of the C-GeN Code

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- Use ROOT analysis in G4 code for histograms – move to separate ROOT code later as complexity increases
- Plan to use stepping action to make decisions/pass information to event action
- Analysis is being worked on now





Hall shell, shield hut, basic NPOL magnets, beam line, target

# Future Plans for C-GeN Simulation

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- Write analysis portion for background and shielding studies
- Incorporate Hall C model to desired complexity – implement GDML/XML
- Should have first results by August 2015
- Attempt to implement multi-threading (g4-4.10+)

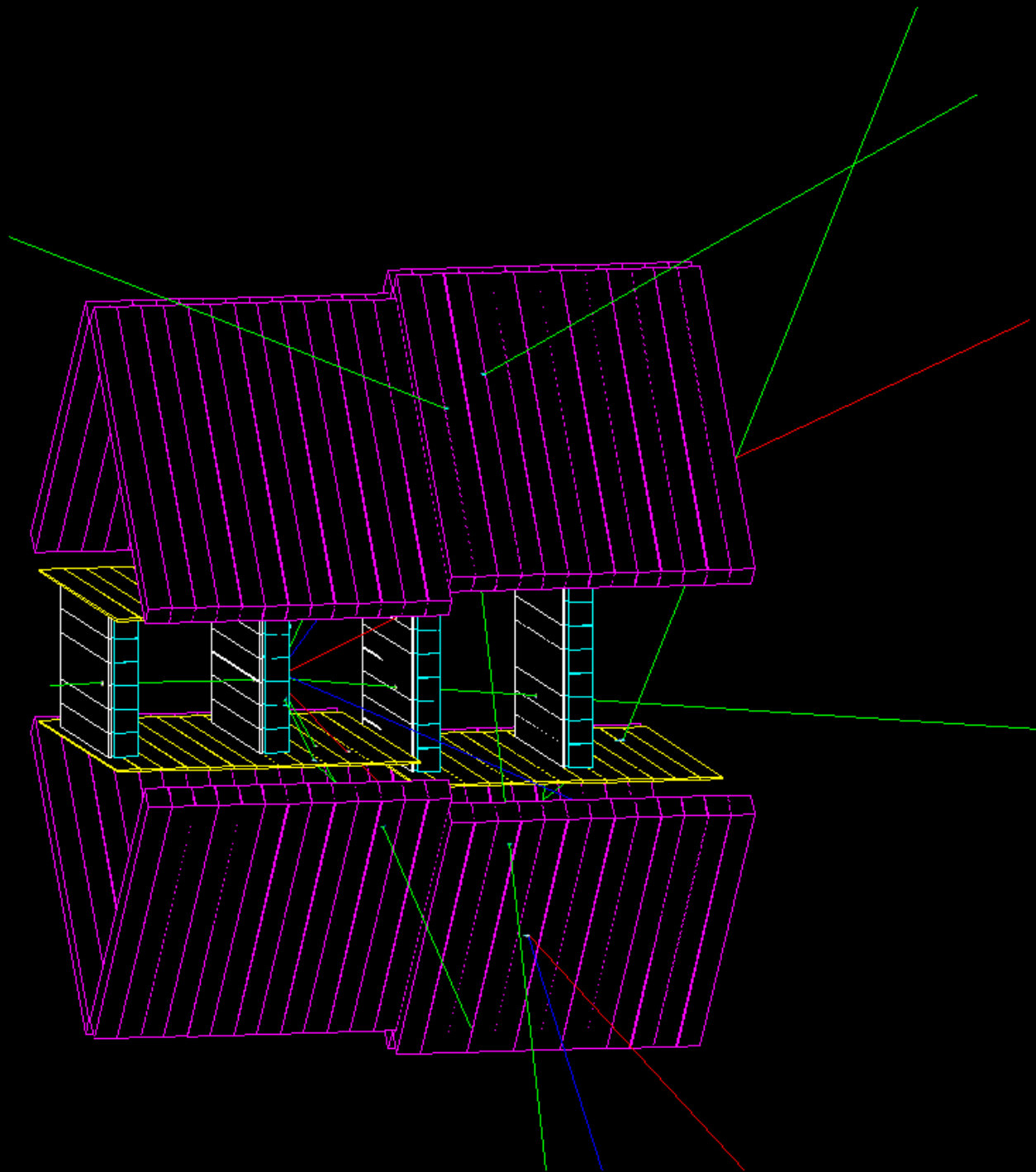
# Discussion

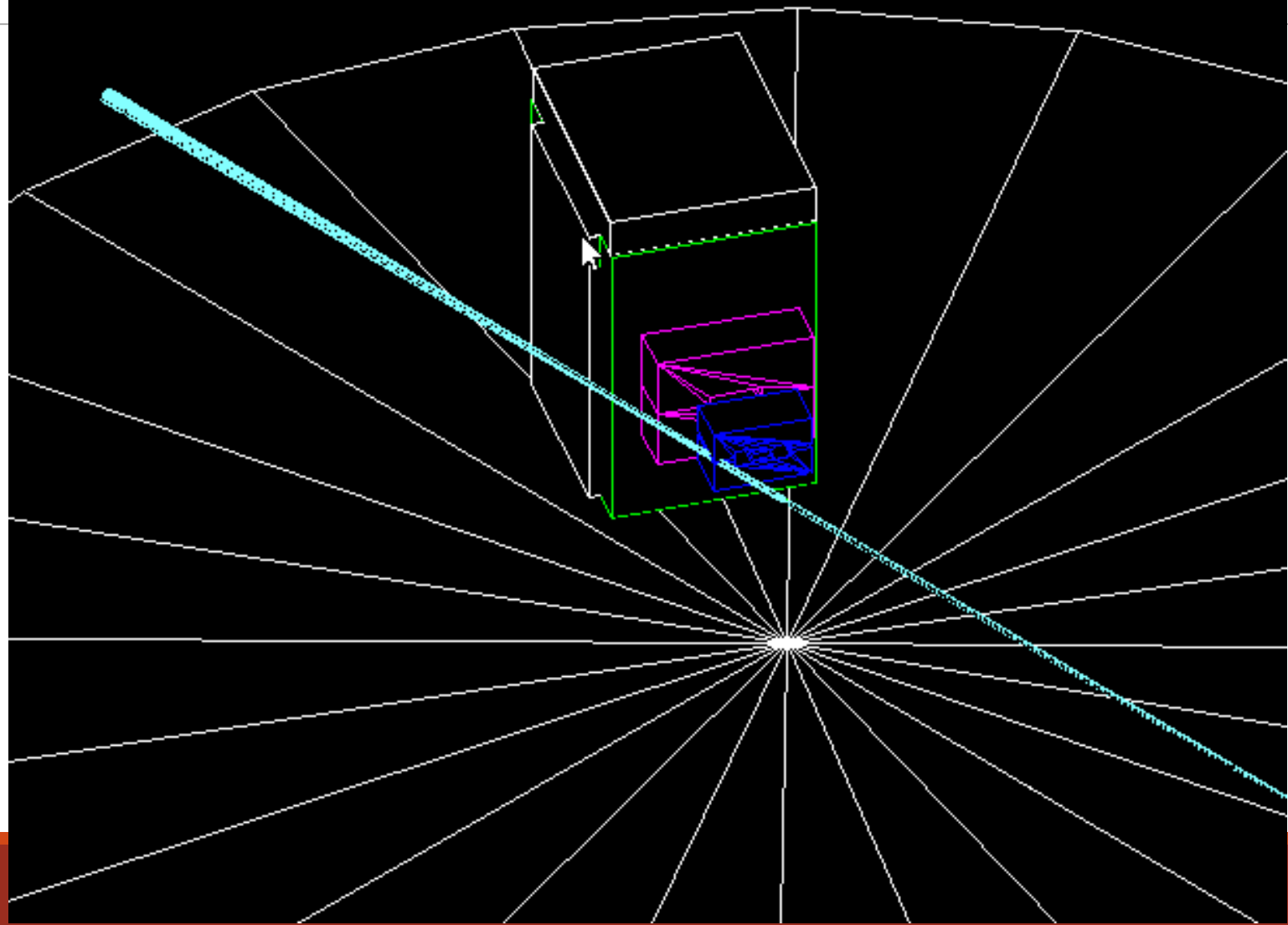
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- Looking for input on level of interest beyond C-GeN – particularly on level of complexity
- On Hall C Github under ‘nmu-npol’
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# Back up slides

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# C-GeN Overview

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