

# EIC Meson Structure Working Group

## Status 041320

- External detector volume/sensor implemented as one large plane after final-focusing quads (see page 4-5) to map what is needed to capture charged-particle decay products
- Meson structure plug in and work flow with Jupyter notebook implemented to study Lambda and Sigma reconstruction, not checked missing mass yet.
- ZDC implemented with possibility for segmentation for granularity checks, to speed up GEANT any hadronic showering turned off.
- Bug (?) causes particles to acquire energies  $\gg$  proton/ion energies
  - Richard presented studies showing problem
  - Pointed to formulas at root of this
  - Culprit for lack of Lambda decay noticed last time (decay length 20-50 m rather than 5-10 m).
  - Similar, culprit for unexpected large neutron detection efficiency of near-100%.

## The charge from the Physics Working Group for the 20-22 May Pavia meeting:

- Break-down physics deliverables into “physics objects” (PO) [electron, hadron (ID/noID), muon, jet]; map out kinematics for each PO.
- Focus on fast simulations for the most demanding measurements first; determine the optimal/acceptable detector performance; confirm/check resulting impact on the rest of the measurements.

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  - Physics deliverables: pion/kaon structure function plots, pion form factor plot
  - Physics objects: scattered electron
    - measure pion and tagged neutron → pion form factor
    - measure “X” and tagged neutron → pion structure function
    - measure “X” and tagged Lambda/Sigma → kaon SF
  - Produce kinematics plots/coverages for each, at 2-3 beam energies
    - should pick energies where both e-p and e-d are doable (for FF, but also for SF) → 10x100? Maybe also 18x135?
- Focus on fast simulations for the most demanding measurements first; determine the optimal/acceptable detector performance; confirm/check resulting impact on the rest of the measurements.
  - Fast simulations ready with event generator (but bug)
  - optimal/acceptable detector performance: see next pages, this process (most?) demanding for detector after FFQs and ZDC? Plus angular resolution and hadronic calorimetry requirements (as for all physics at large-x)

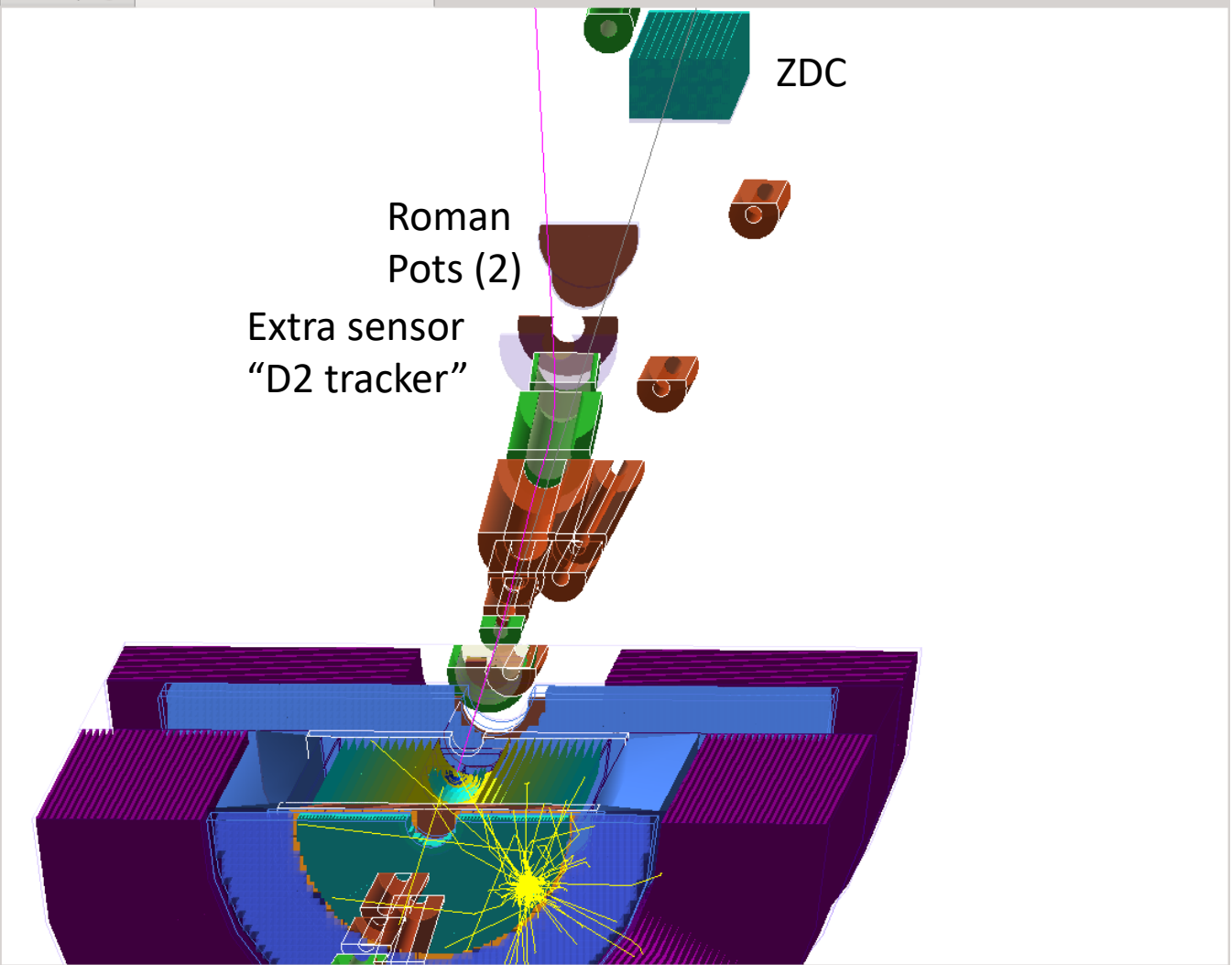
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## Action item list 041320

- Fix bug to prevent particles to acquire energies  $\gg$  proton/ion energies
- Then “ready” to do pion and kaon structure function projections a la HERA F2 plots, and redo pion form factor projections
- Produce tables/plots of neutron detection efficiency with ZDC for various beam-energy combinations.
- For ZDC apply smearing correction for energy and angular resolutions ( $\sim 50\%/vE$  and  $0.3 \text{ mr}/vE$ , respectively) to link with required missing mass and  $t$ -resolution (for EM can use smearing corrections for  $2 \times 2 \text{ cm}^2$  crystals).
- Produce plots illustrating neutron missing mass and missing momentum resolution.
- Produce plots illustrating Lambda and Sigma missing mass reconstruction.
- Produce tables/plots of Lambda and Sigma detection efficiency with single-layer detector sensor, and determine required size for our physics.
- Determine angular and energy resolution needs of single-detector sensor behind FFQs for identifying exclusive final state using missing mass (Lambda, Sigma).
- Granularity requirement of such detector plane for angular or  $t$  resolution.
- Find ways to parameterize hadronic calorimetry resolution and make plot that illustrates impact on  $x$ -resolution (relevant for large- $x$ )

Search :

- Command
- ▶ control
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  - ▶ gun
  - ▶ jleic
  - ▶ vis
  - ▶ gui
  - ▶ hits



Output

Threads: All

```

FAIModel : Emin= 0 ev Emax= 100 tev deltavi
G4SynchrotronRadiation::GetMeanFreePath for particle e-:
  MeanFreePath = 18.877622976355 cm
G4SynchrotronRadiation::GetRandomEnergySR :
  Ecr = 191.4 keV
  Emean = 58.93 keV

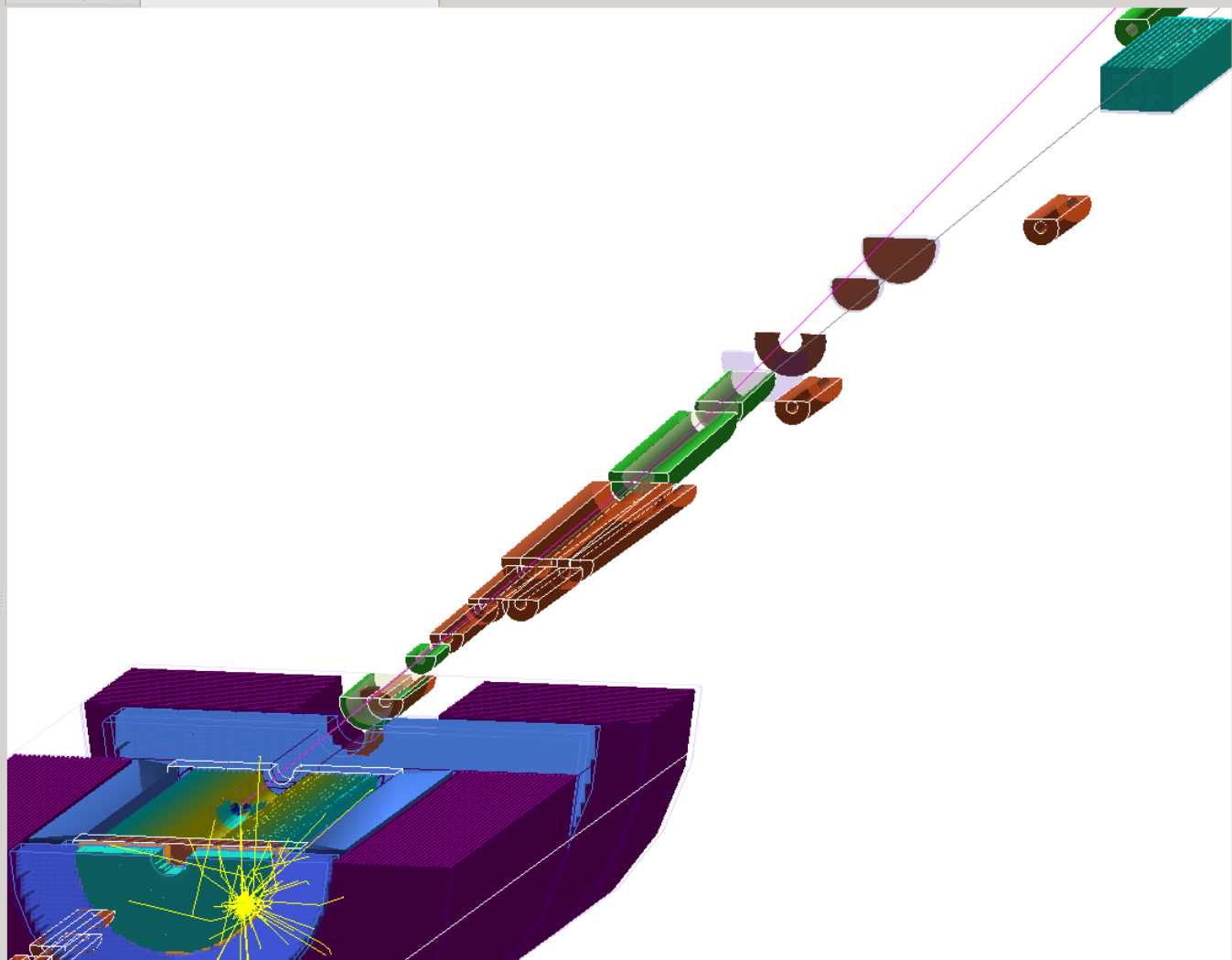
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Session :

Search :

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