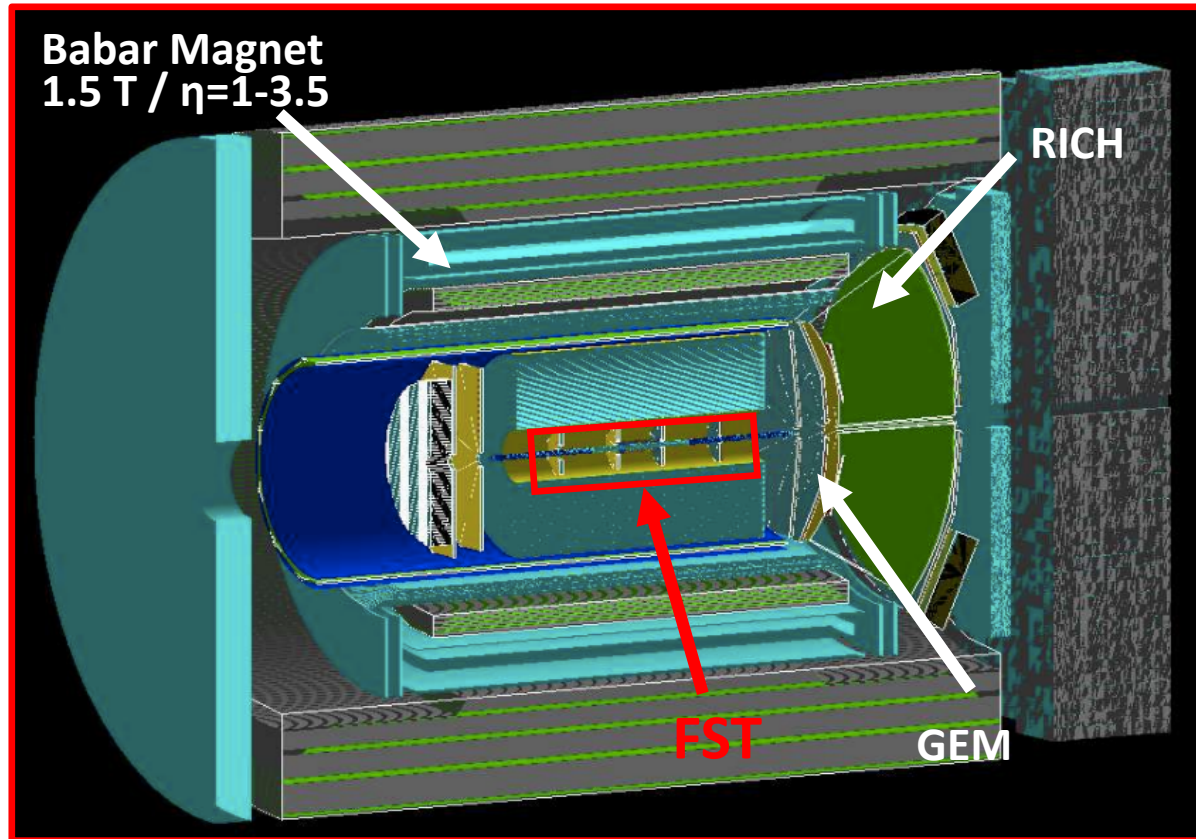# Forward silicon tracker simulation studies in the Fun4All framework

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05-14-2020

Special thanks to Chris Pinkinberg (BNL) and Jin Huang (BNL)

Start with ePHENIX EIC Detector Setup

- Using other central+forward detector of the ePHENIX as a starting point.

- Implement the LANL Forward Silicon Tracking detector (FST) with 6 forward planes in the forward region.
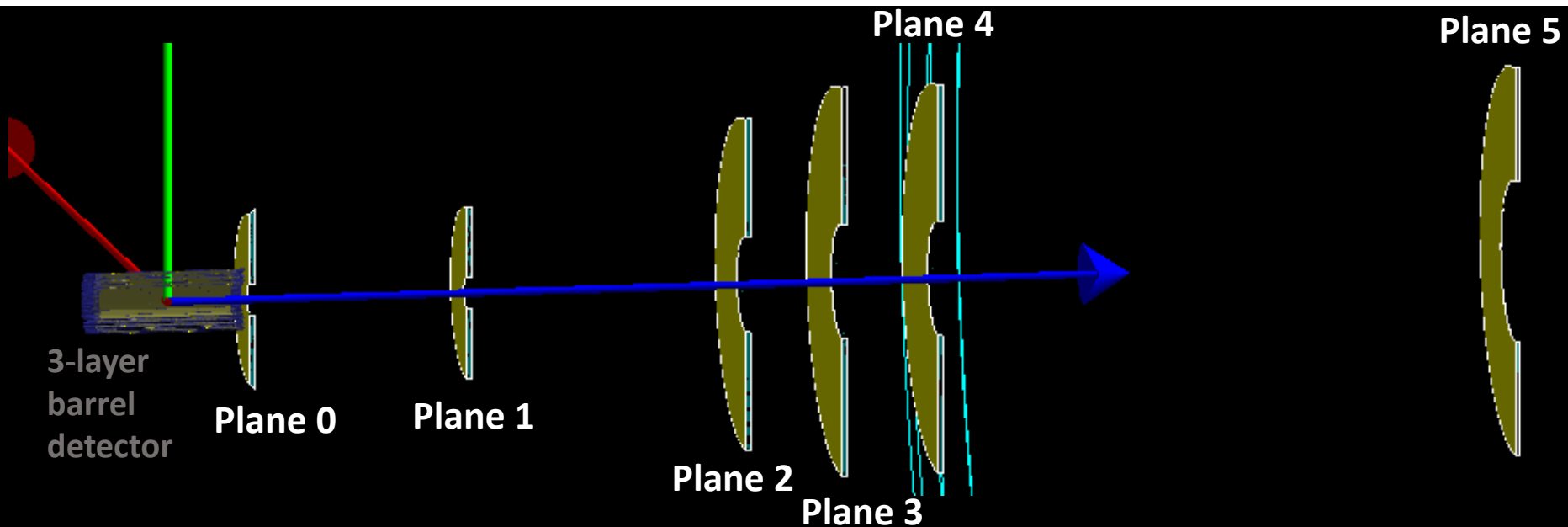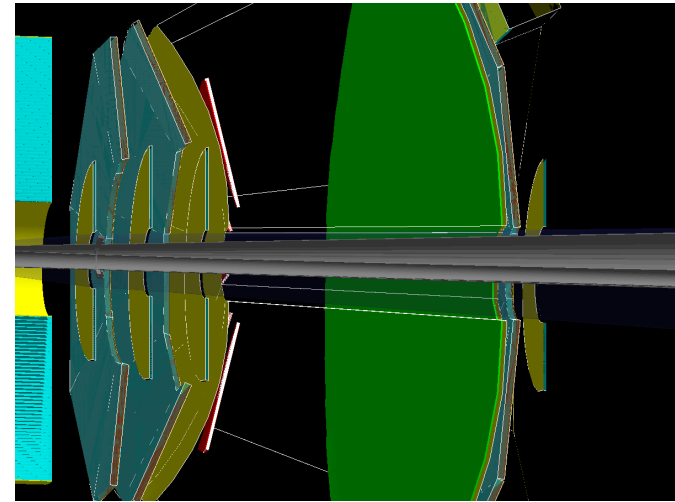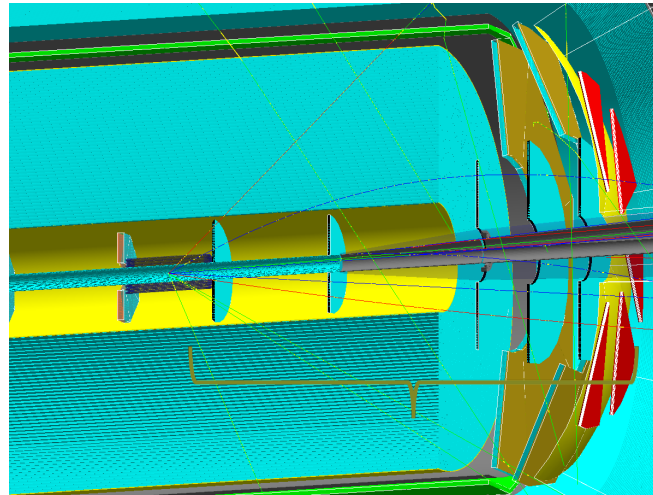
Preliminary design of the LANL FST

- Thank Jin and Chris for implementing the geometry for us.
- Detailed material budget implementation and detector geometry optimization is underway.

3 barrel layer
MAPS vertex detector

LANL FST

Babar Magnet
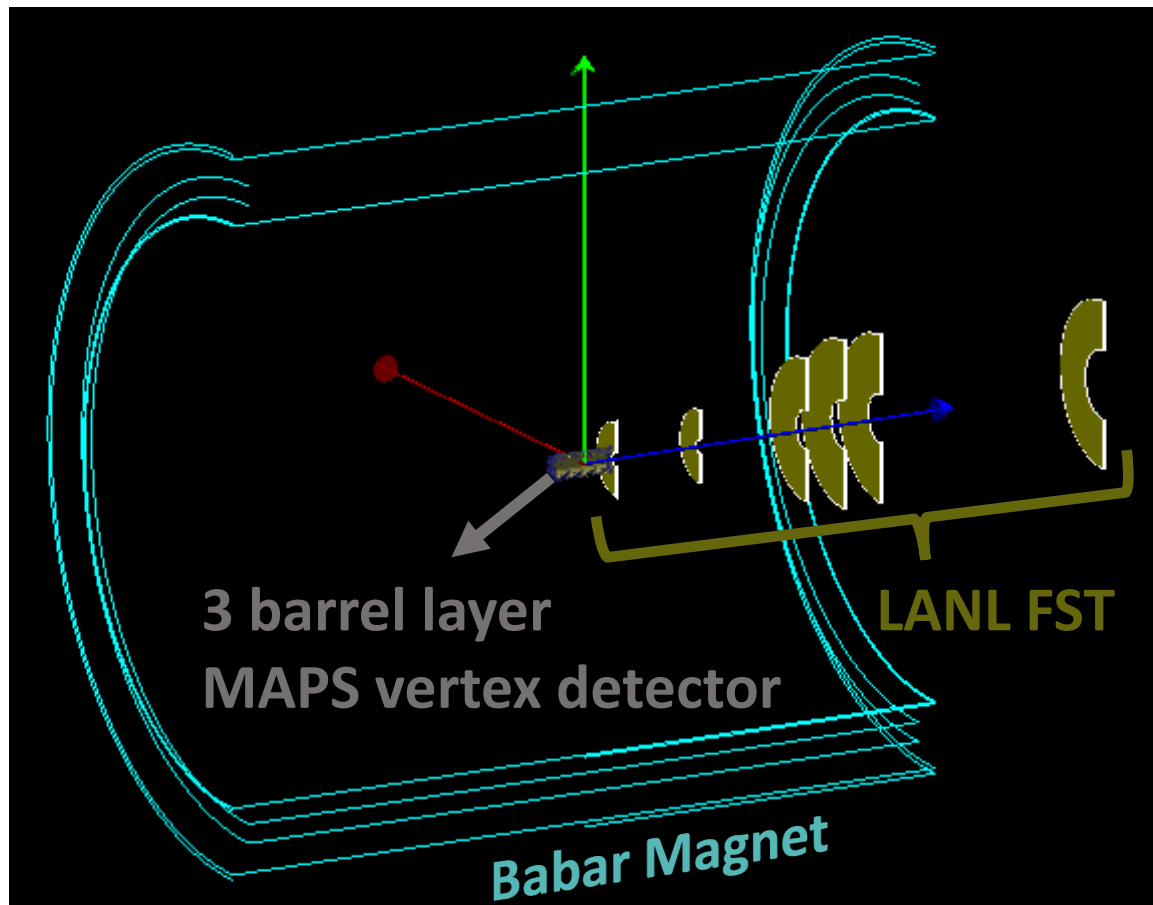
Dimensions of the preliminary LANL FST design

3D view of the FST integrated with other detector sub-systems.

Plane 4

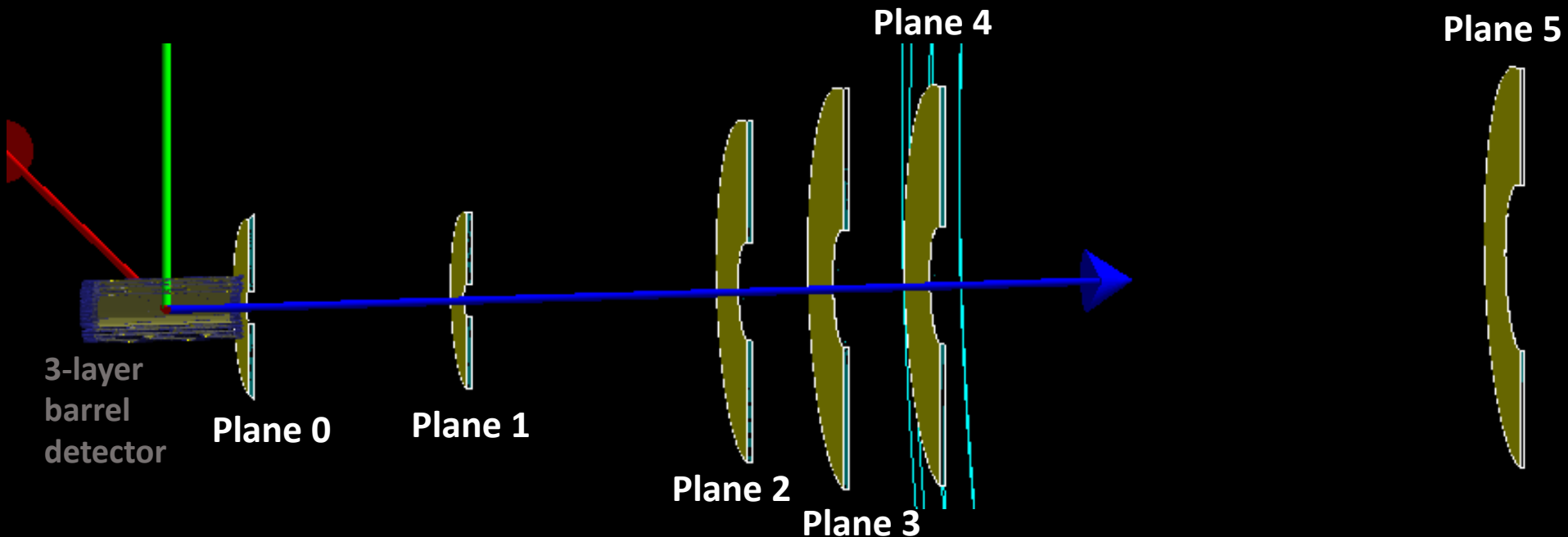Plane 5

3-layer barrel detector

Plane 0

Plane 1

Plane 2

Plane 3

Dimensions of the preliminary LANL FST design

Barrel layer MAPS detector (30cm long)

Layer	r (mm)	Num of stave	Pixel size
inner	36.4	18	
mid	48.1	24	27x29 μm^2
outer	59.8	30	

LANL FST

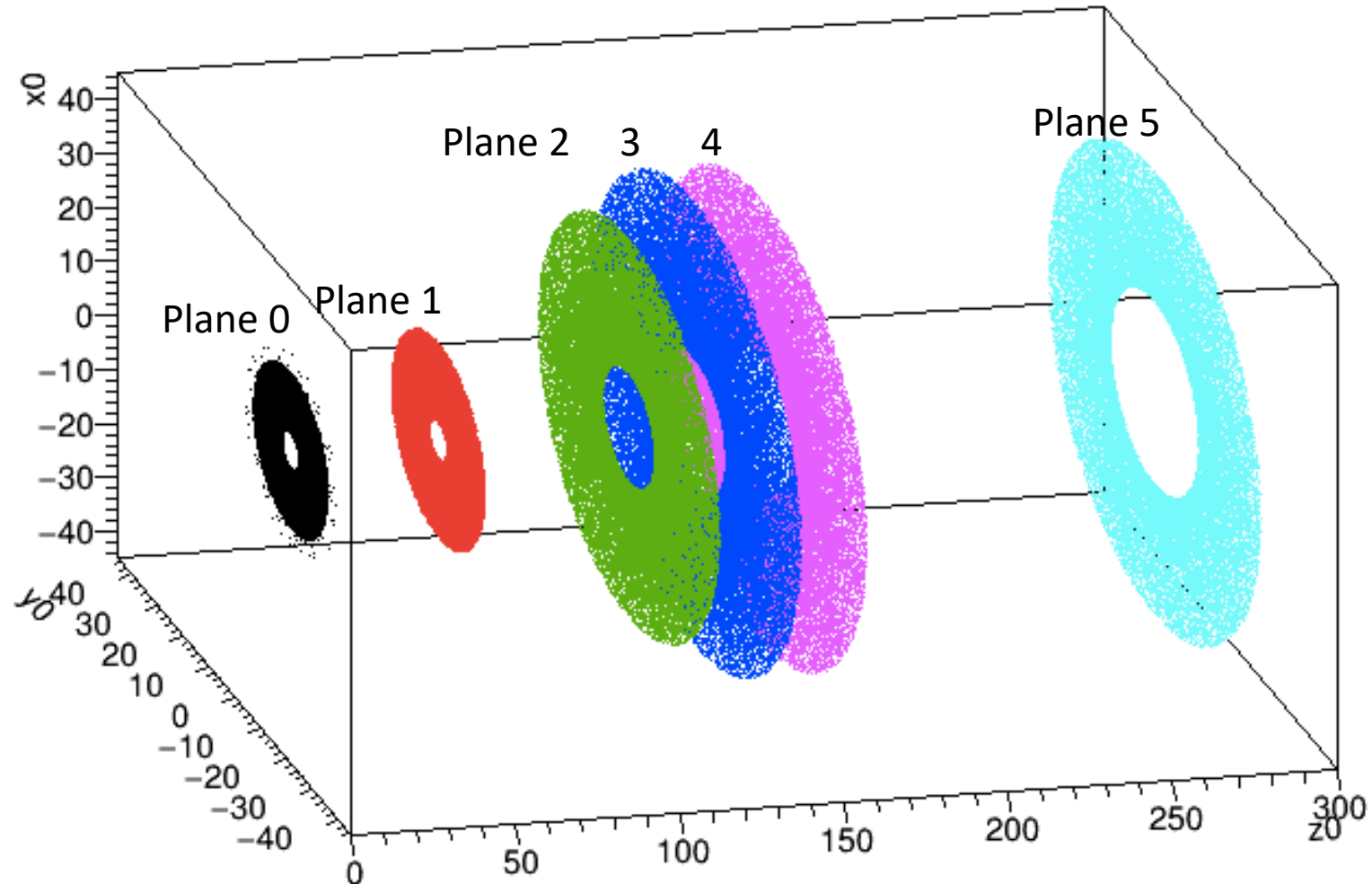| Plane	Z (cm)	r_{in} (cm)	r_{out} (cm)
0	17	3.2	18
1	62	3.2	18
2	120	10	35
3	140	12	41
4	160	12	41
5	280	17	41

Event display with particle gun
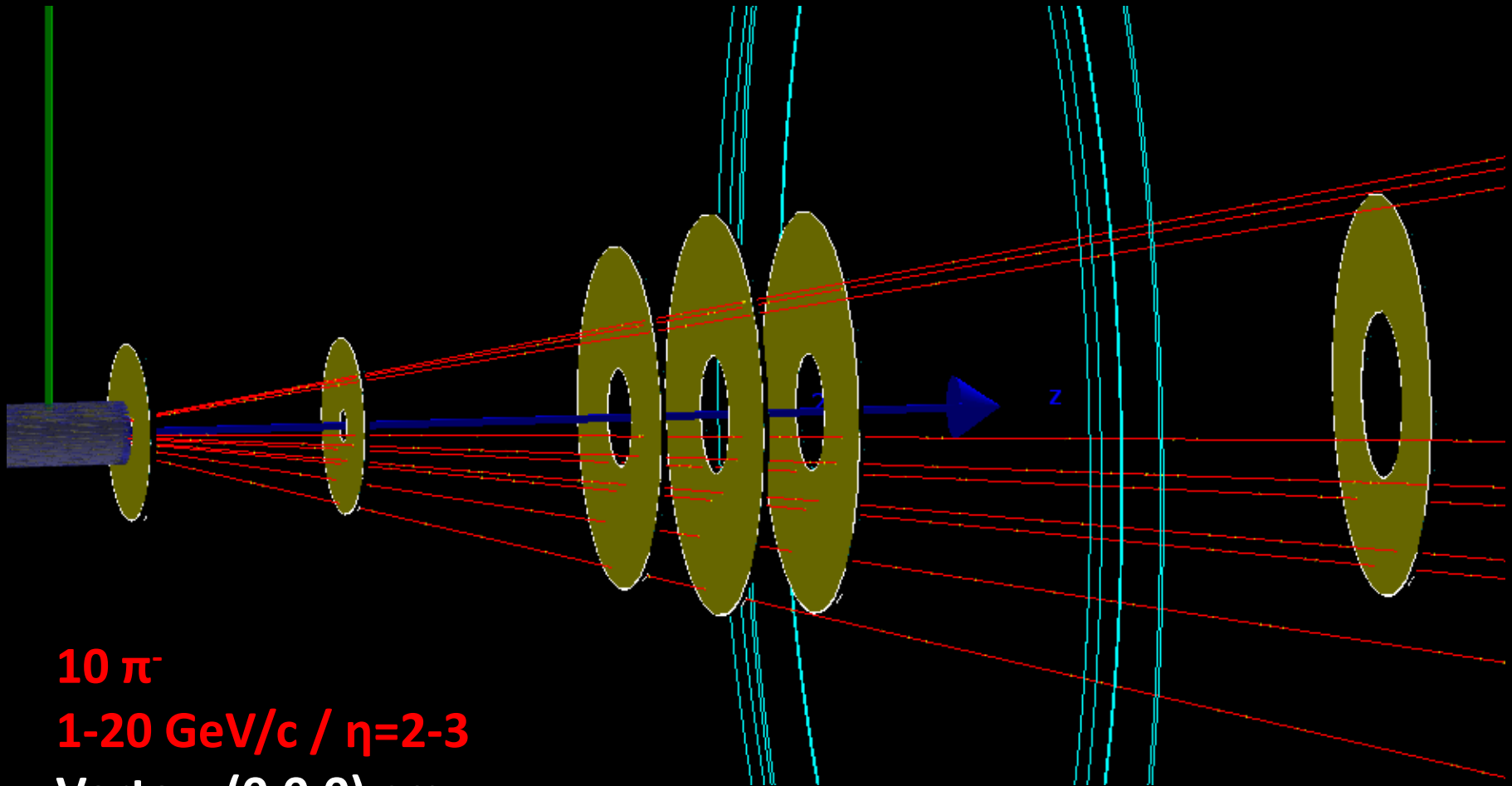
10 π⁻
1-20 GeV/c / η=2-3
Vertex=(0,0,0) cm

Accumulated Hit Maps

- 1M π⁻ simulation: with full momentum 1-20 GeV/c at η=1-3.5.

Near-term plan

- Detector design:
  - Modified the detector dimensions for different options of EIC magnet (BeAST magnet: 3T, η=1-4). Integration with the central tracking detectors, forward PID detectors and etc.
  - Spacing between each forward plane.
  - Update the Pixel size.
  - Update the material budgets with the proposed silicon sensors.

- Detector simulation:
  - Will evaluate the spatial and momentum resolutions for the forward silicon tracker.
  - Will evaluate the tracking efficiencies.
  - Vertex reconstruction.

- Will implement the tracking performance in the relevant physics studies such as heavy flavor and jet measurements.