

STT Updates

Presented by:
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Outline

- Procurement of Raw material for the **Developmental Prototype**
- Straw tube Prototype Detector Simulation using **Geant4**
- On-going activities (FEA Techniques)

STT Status & Update

- Received 75 more Straws from **LAMINA**
- Already have 50 straws
- Doing Mechanical dimension check of straws
- Already have (20/30 micron) anode wire
- Endplugs, spacers, crimping pins, spring connectors

Waiting for the **Roberto Petti** visit in January, 2016 so that we start constructing the Straws

Detector Simulation

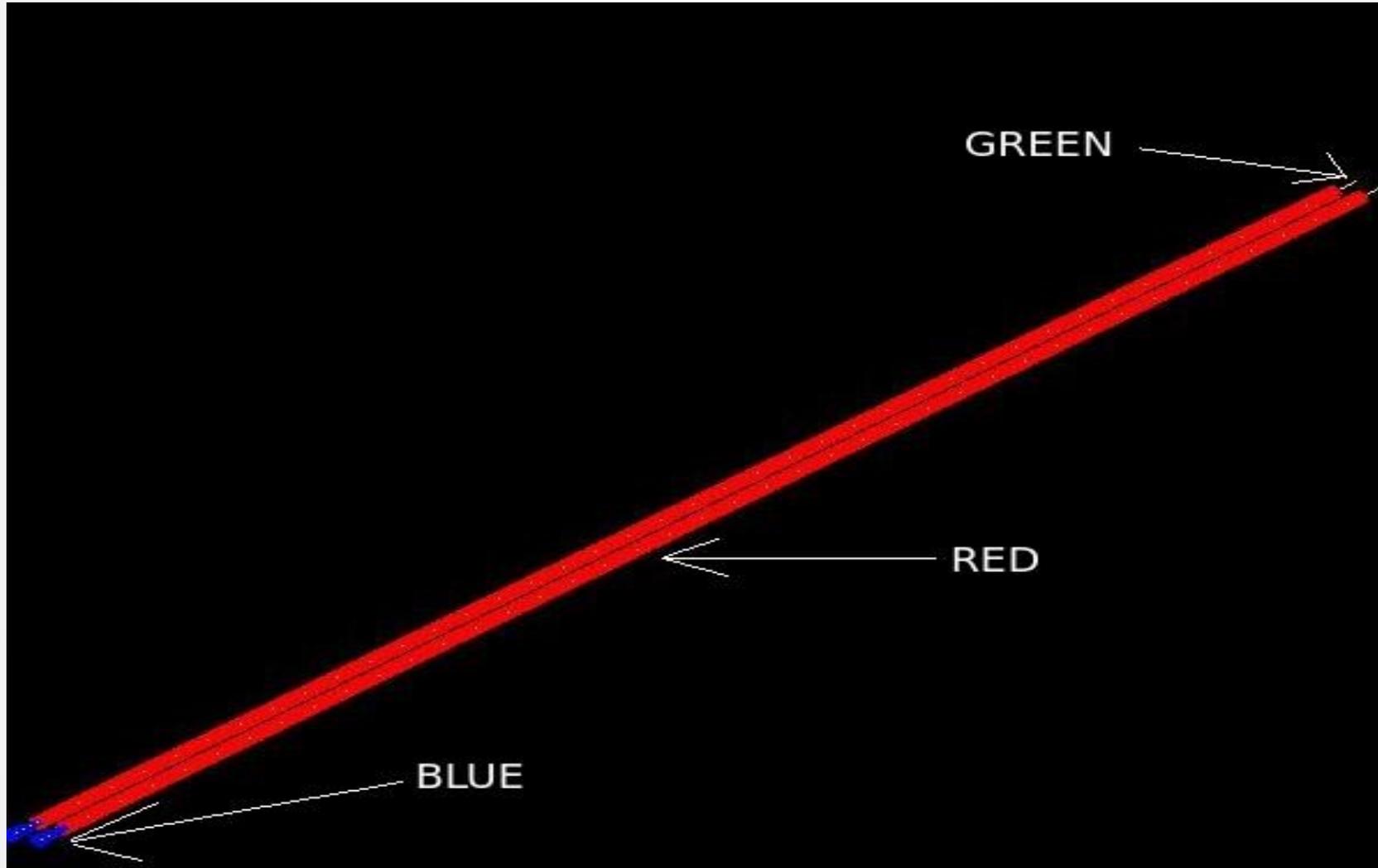
Geant4 Simulation toolkit:

- Stimulates particle interaction in matter
- **GE**ometry **ANd** **T**racking 4
- HEP background
- C++ based/Object Oriented
- Install version [geant4.9.04.p04](#) , [geant4.10.00.p04](#)
(using **Stand-alone G4**)

STT in ND-FGT

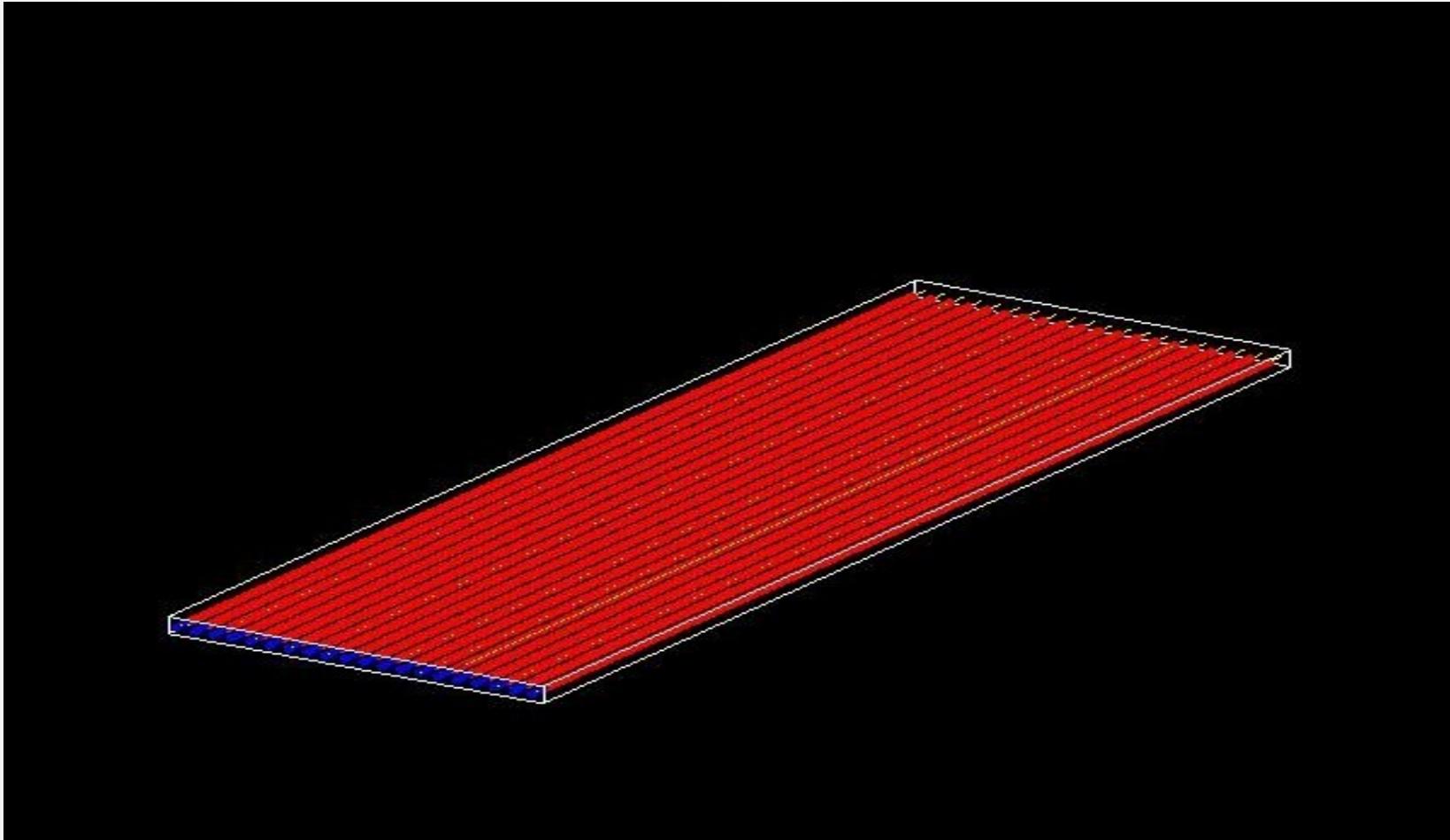
- **Straw Tube Tracker (STT)** is the heart of proposed **DUNE ND-FGT**
- Using the **GEANT4 Simulation toolkit**, we construct the Straw Tube Prototype Detector geometry and also do the simulation in it.

Straw Tube Construction using Geant4



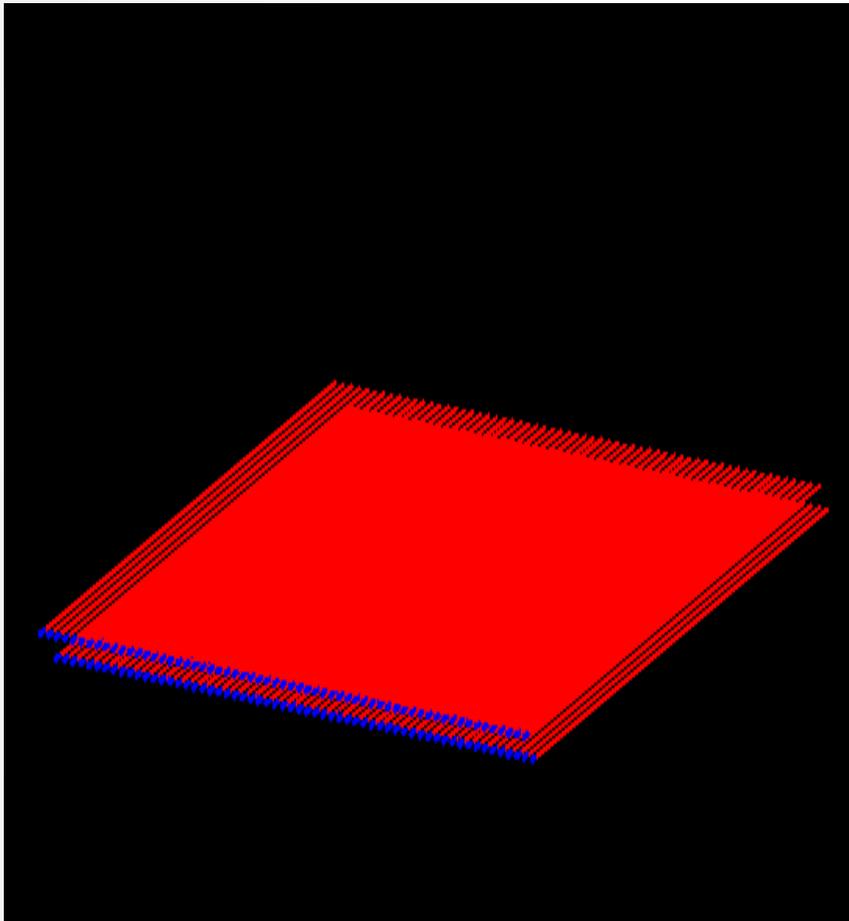
Straws constructed using G4

Straw tube Prototype Detector Geometry

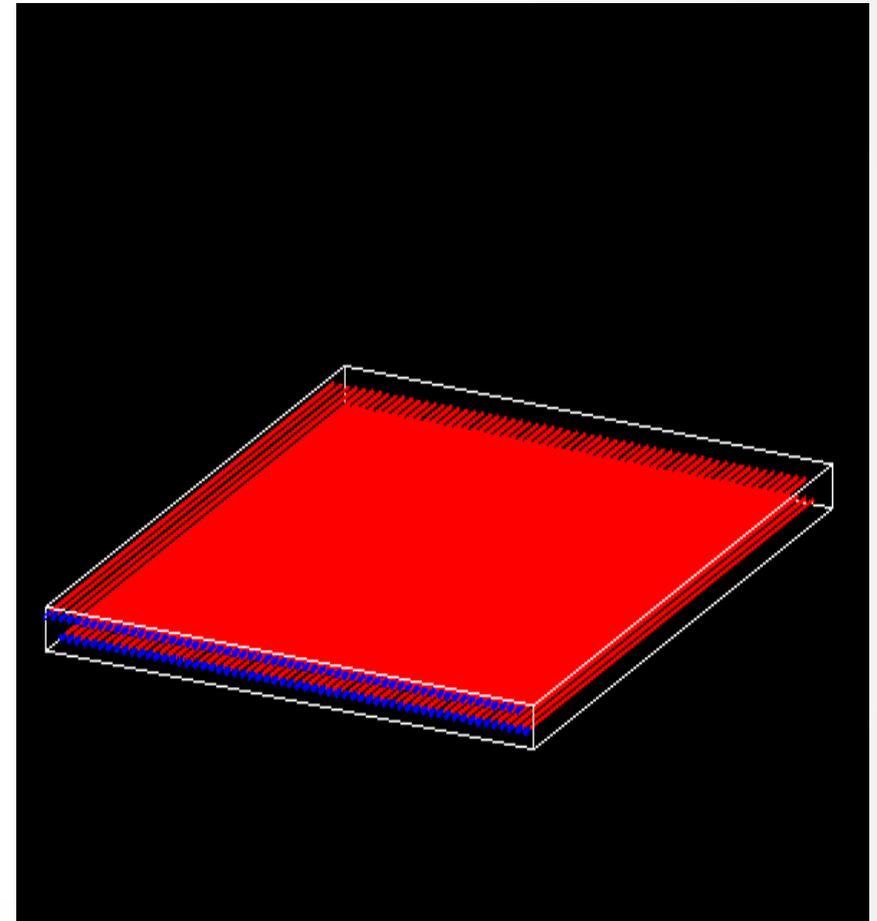


Single Layer of Prototype Detector Geometry

2 layer Prototype Detector Geometry

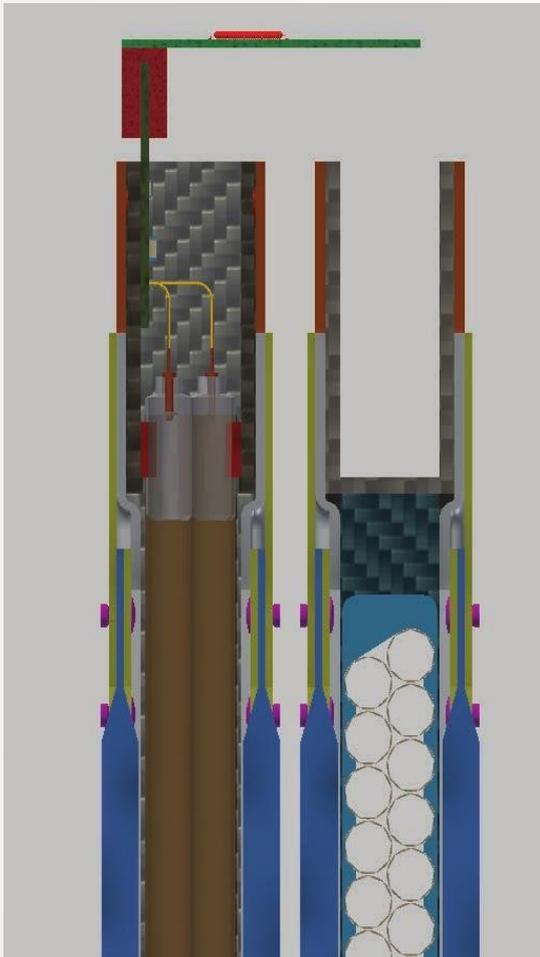


Without frame

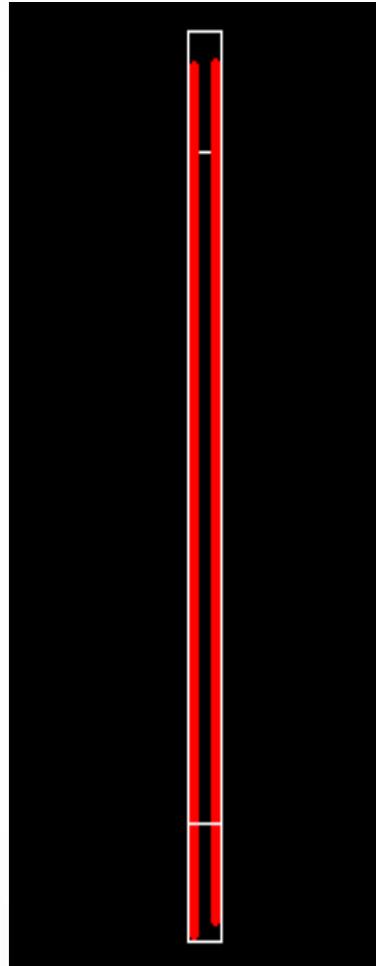


With frame

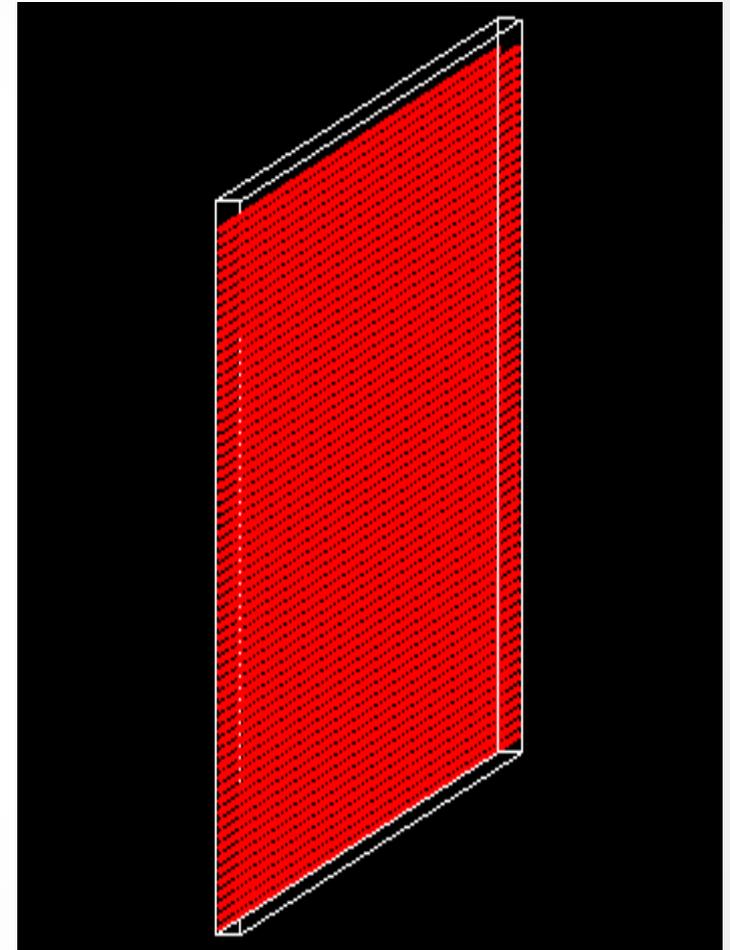
Submodule Geometry in Geant4



STT Module-4 layers



2 Layers

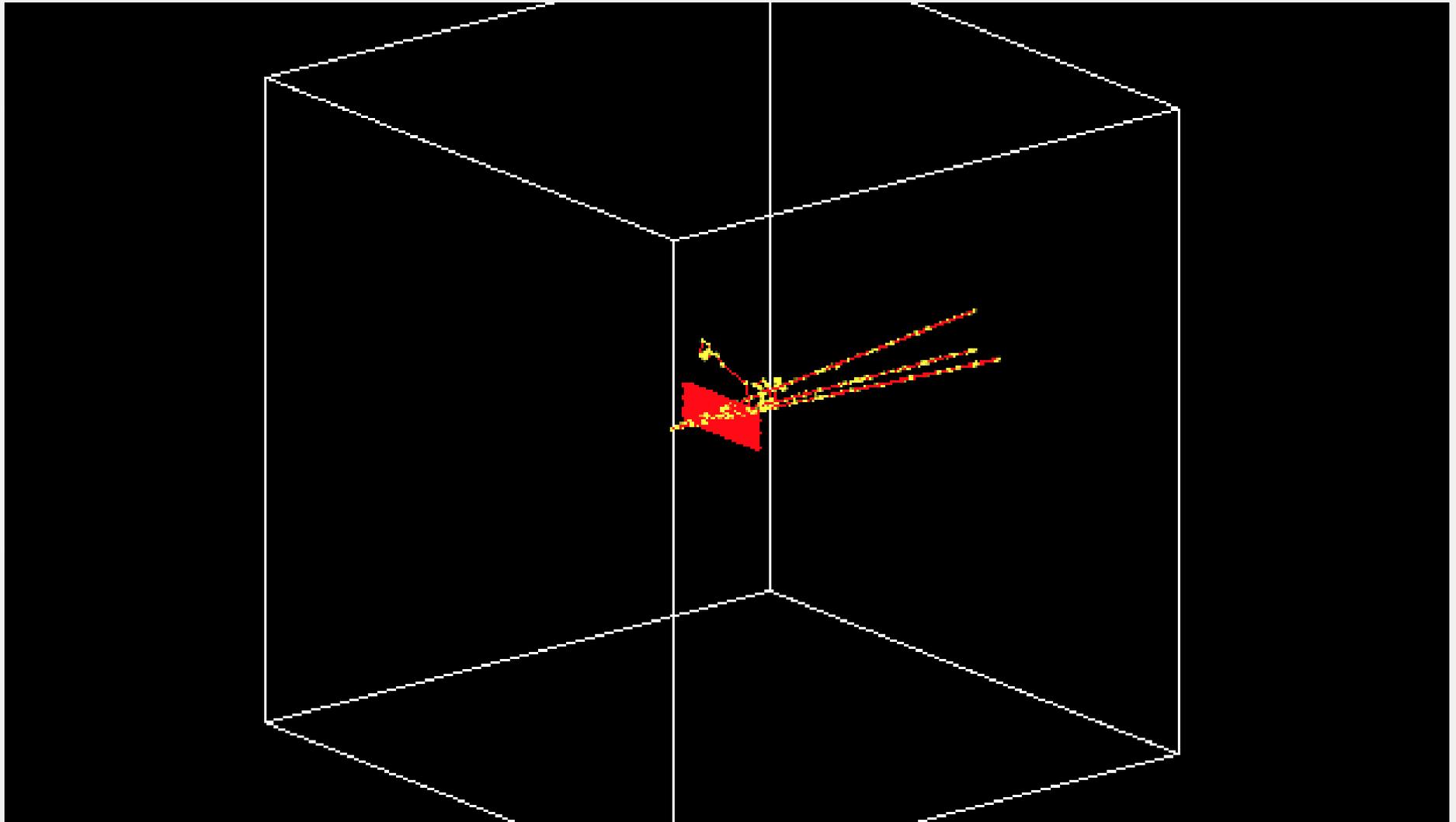


2 Layers Module+ Frame

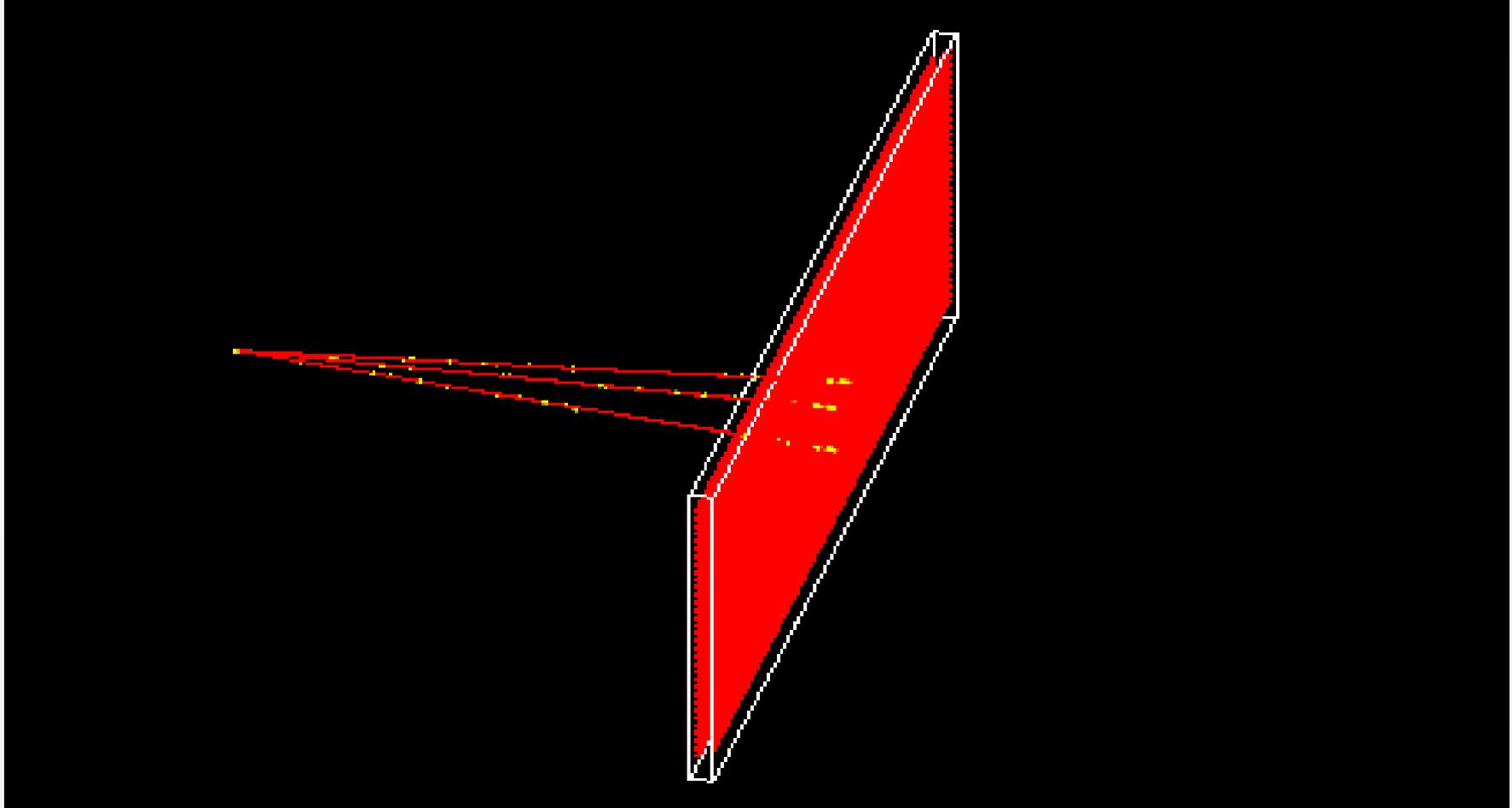
Detector Geometry Parameters

Experimental Hall(frame)	
expHall_x	10 mm
expHall_y	610mm
expHall_z	1810mm
Straw tube (Kapton)	
Inner radius of tube	4.765mm
Outer radius of tube	4.850 mm
Length of tube	1800 mm
StartingAngle of tube	0 degree
SpanningAngle of tube	360 degree
Wire (tungsten)	
Inner radius	0 mm
Outer radius	0.000000030 mm
Length	1800 mm

Events in STT

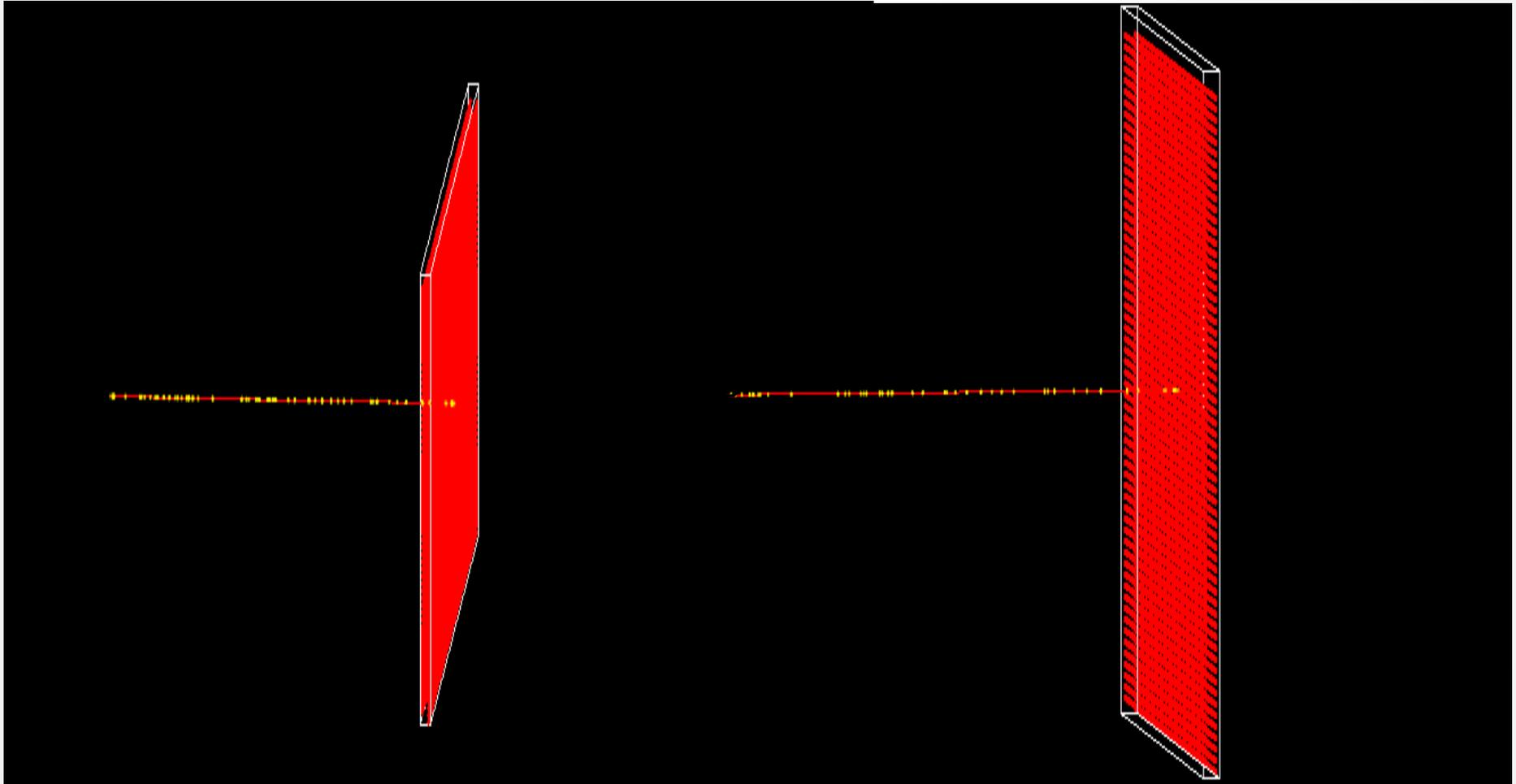


G4 Simulation 2 GeV muons



2 Layer Developmental Prototype with 2 GeV muons

G4 Simulation 2 GeV muon



Gun of muon particle at different angle

FEM Techniques for the Mechanical Structure

FEA – Finite Element Analysis

- Dimension of frame required for holding staggered layers of tubes of various material (Al, C composite) and tension of anode wire, is determined using FEA.

3D Modelling

- 3D models of detector assembly is made using 3D CAD software (Autodesk Inventor®) for Digital Prototyping and Geant4 simulations.

(Ramanpreet Singh)

Future plan

- Our next plan is to trigger the particle gun of different particle at different energy
- Dump the result of simulation produced by Geant4 in **.root file**
- We are in process to install **GENIE**, so that we can generate the Neutrino flux & use it (where we need help)
- Hardware: Construction of 2 layer prototype by this january (during Roberto Petti visit)
- Definitely we welcome more ideas & help from experts (Xinchun & others)

Thanks!!!

Back-up slides

G4 Simulation 300 MeV Proton

