Proton reconstruction (Roman Pot)

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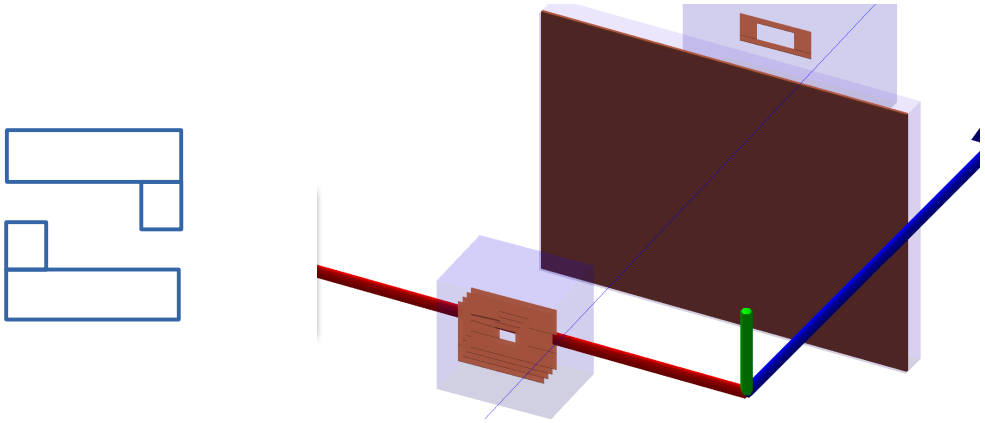
Roman Pot Setup

The roman pot station has N square plates within square hole in the center. Each square plate is composed with two L shape plates. However, there is no L shape or similar geometry in Geant4, so I used 2 different square plates to make 1 L shape plate. The setup would like below:

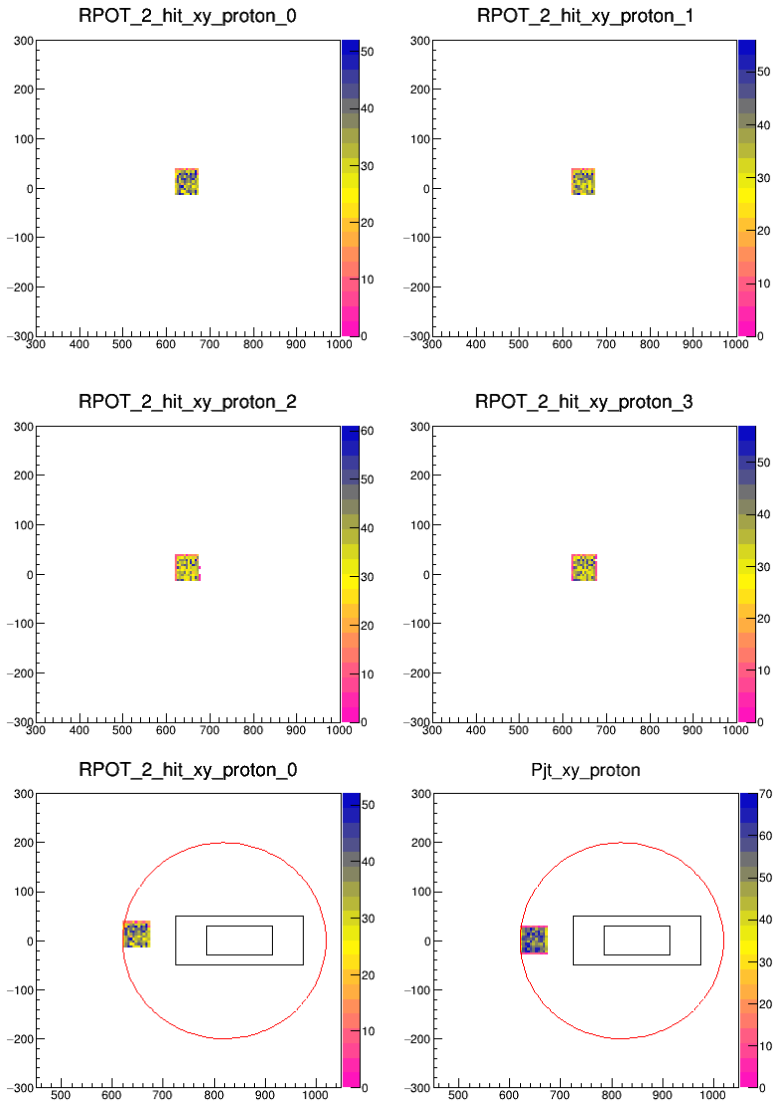


The left hand side plot is the cartoon to show how I construct each sensor layer. The right hand side plot is the g4e visualization of 2 roman pot station.

The size of plates and the number of plates are parameterized in g4e. In order to study the hit position of the protons, I change the parameters to create the larger plates without the hole, which make all protons can leave hit information on the plates. And the center position of 2 roman pot stations in the global coordinate system are:
[0.85m, 0, 26m] || [0.94m, 0, 28m] respectively. I will focus on the fist station in the following study.

Pure protons beam

In this case, I generate the pure proton events with crossing angle 25 mrad. Additionally, in order to increase the hit area and make it more easily to understand in the plots than just a point, I increase the cross section area of beam with the crossing angle 24 ~ 26 mrad. Below are the results,



The upper 4 plots are the hit distribution of the 4 plates in the first station. There is a small shift, ~2 mm, in x direction in the hit distribution between plate_0 and plate_3, the distance between two plate is 90 mm. The shift is causing by the original crossing angle of the proton beam. In the lower 2 plots, the left hand side plot is the hit position of the proton and the right hand side plot is the projected position of the proton beam. Two different roman pot plates are drew here to make comparison, black one is proposed in the EIC yellow report and the red circle one is from Yulia. The x & y axis of these plots are the position, mm, in g4e global coordinate system.