Changes to MCShower

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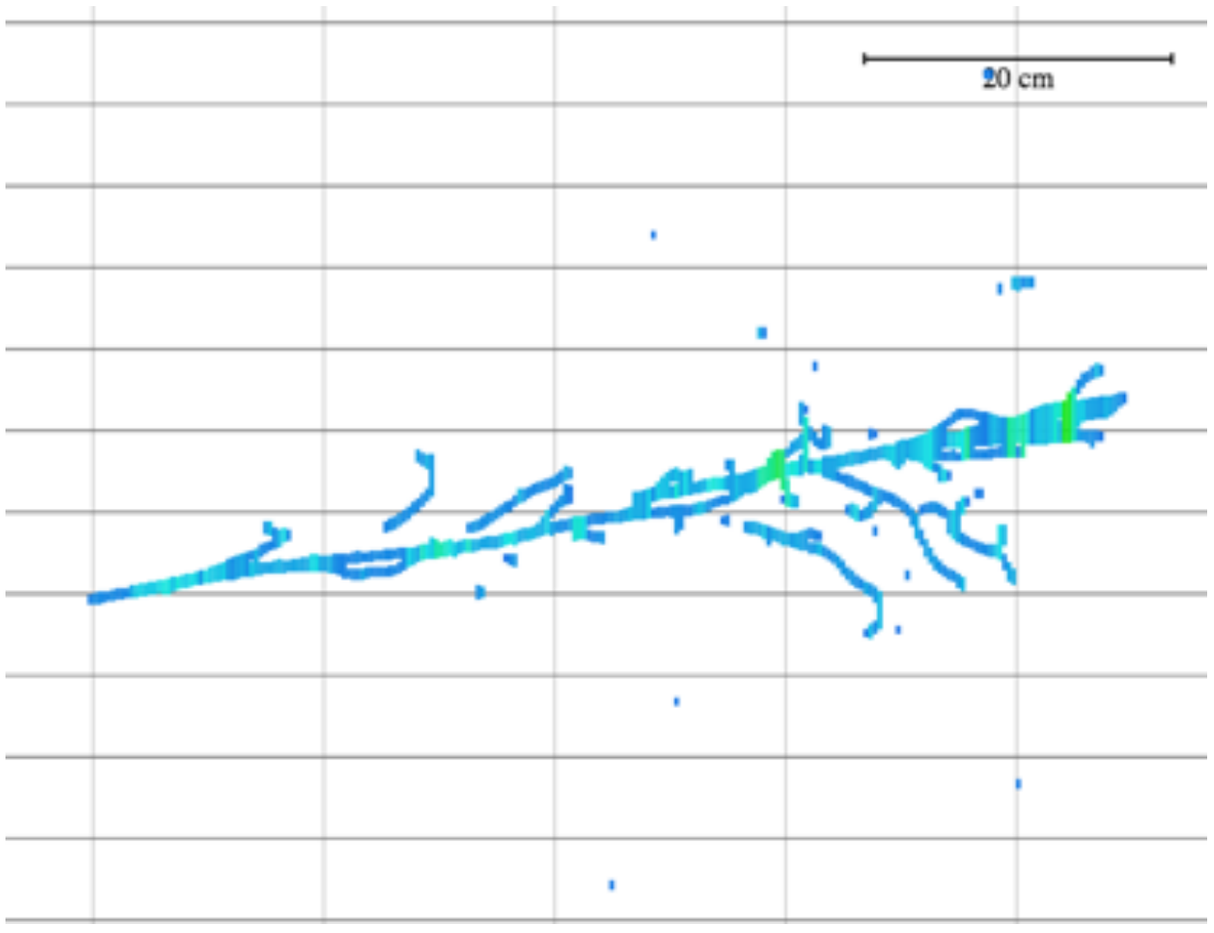
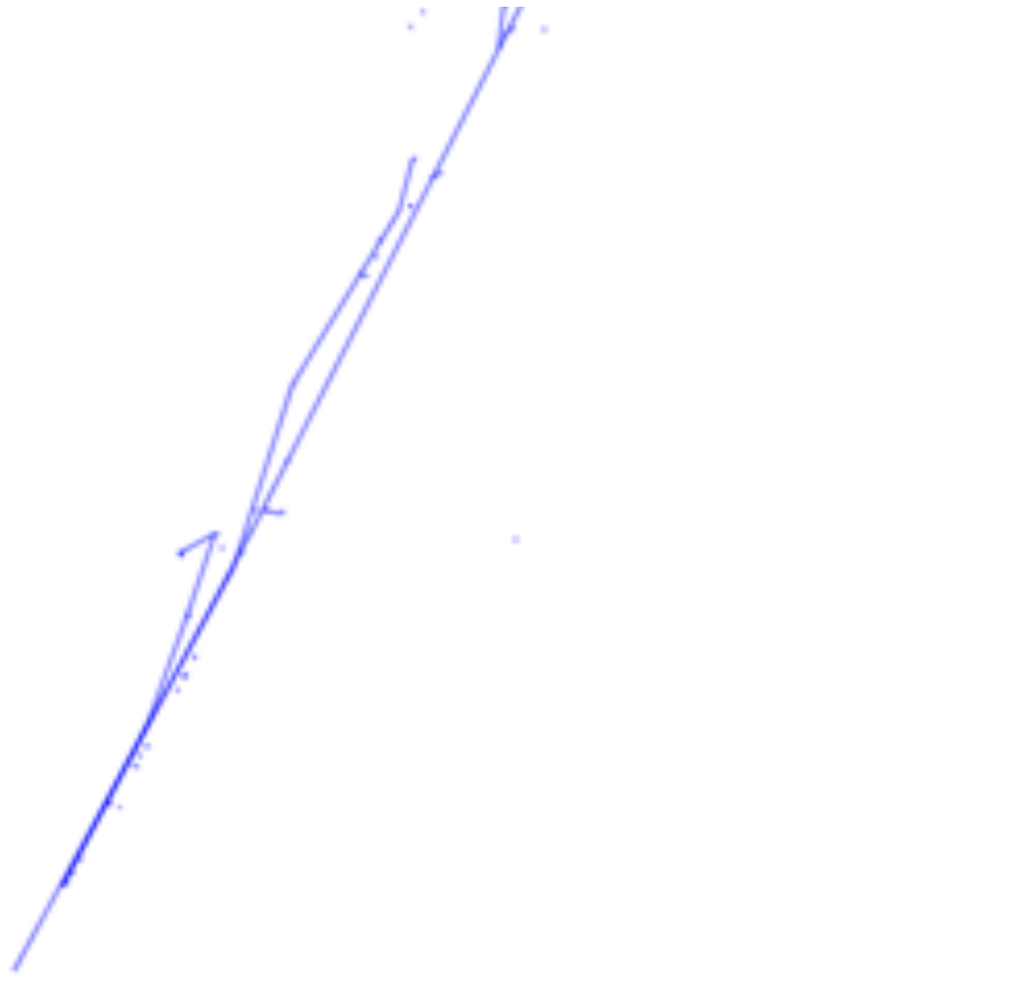
THE UNIVERSITY OF
CHICAGO

MCShower

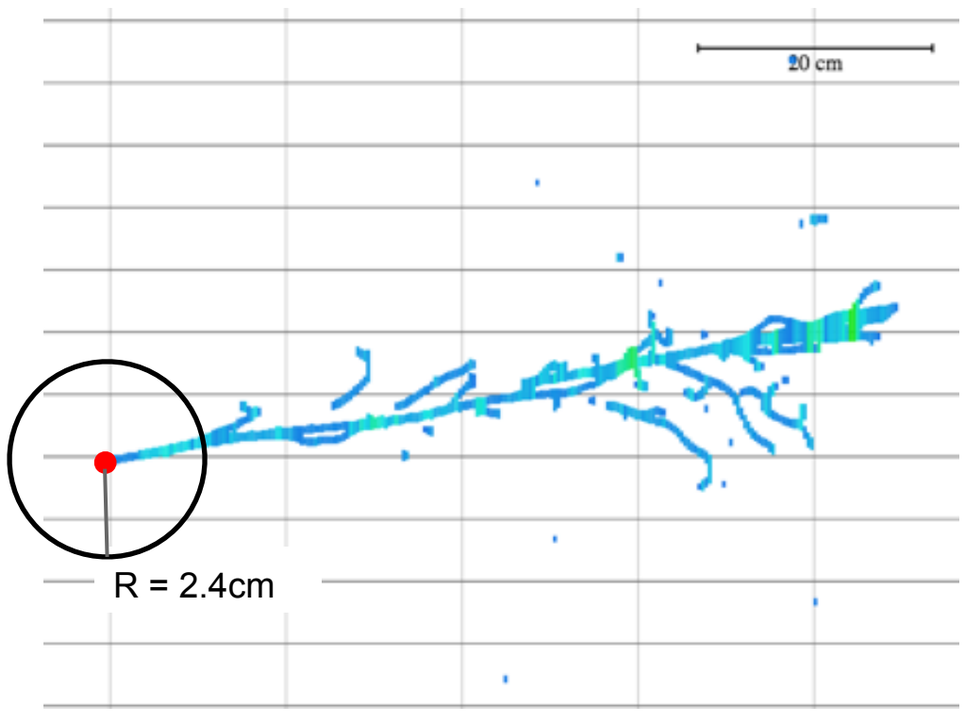


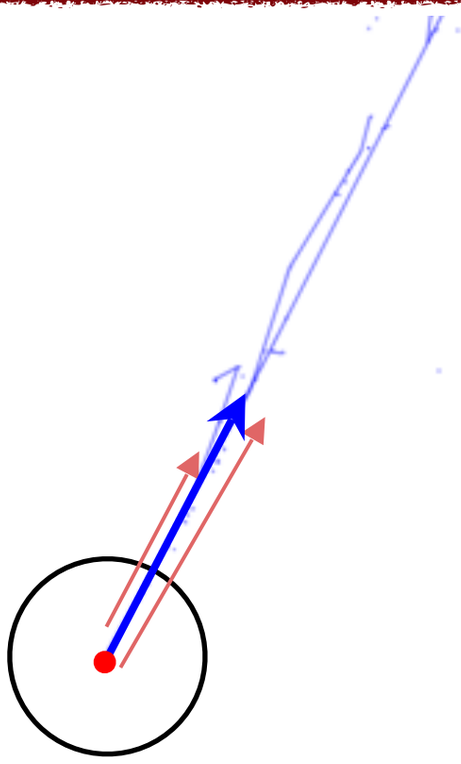


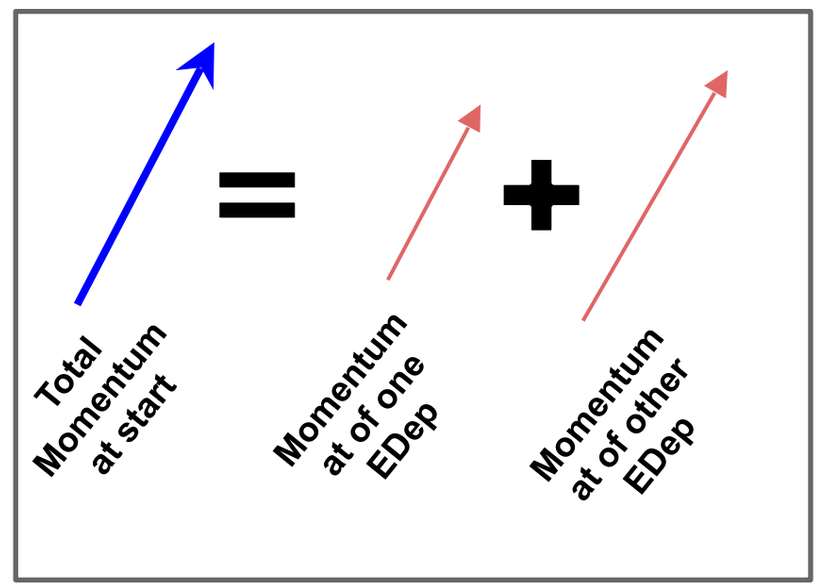
Traditionally MCShowers contain a start point, a direction of the first particle, the total energy deposited, the total momentum of all the shower components, and PDG ID.

But no dE/dx or dQ/dx

MCShower Start Direction

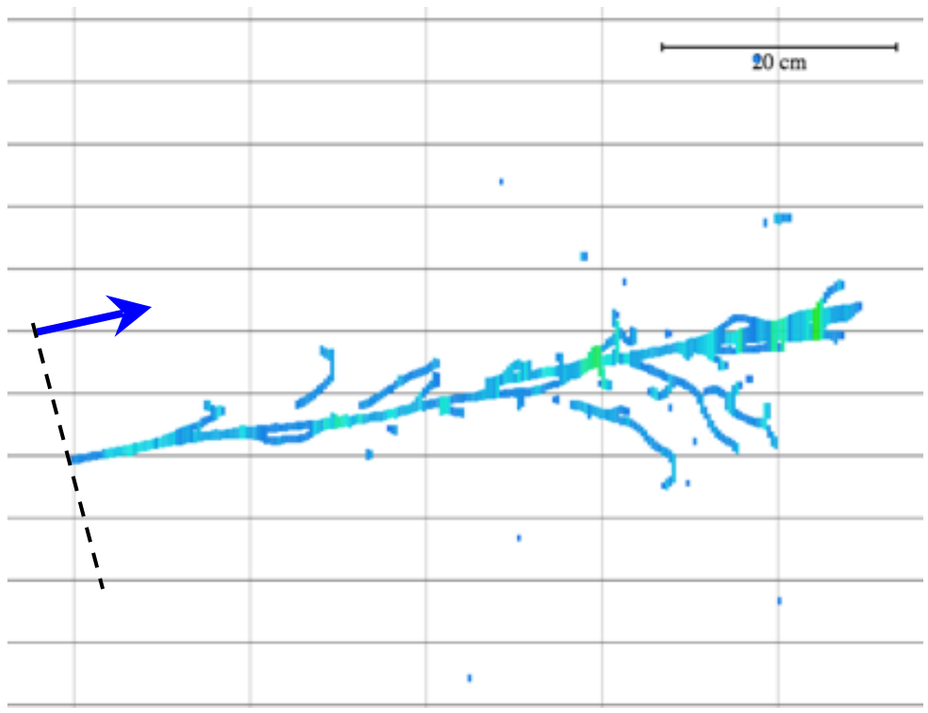


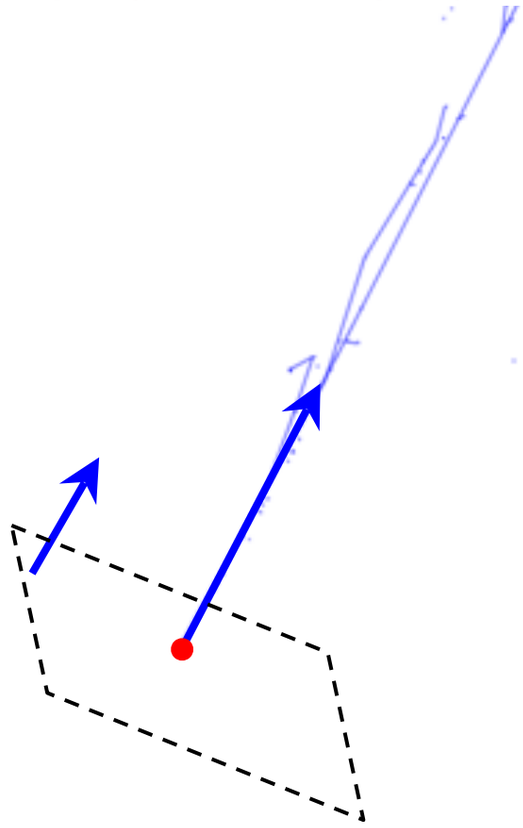




- Need to start by figuring out where the shower is going at the start
- This is one of the variables that has been added to MCShower, “fStartDir”

Build Plane at Start of Shower

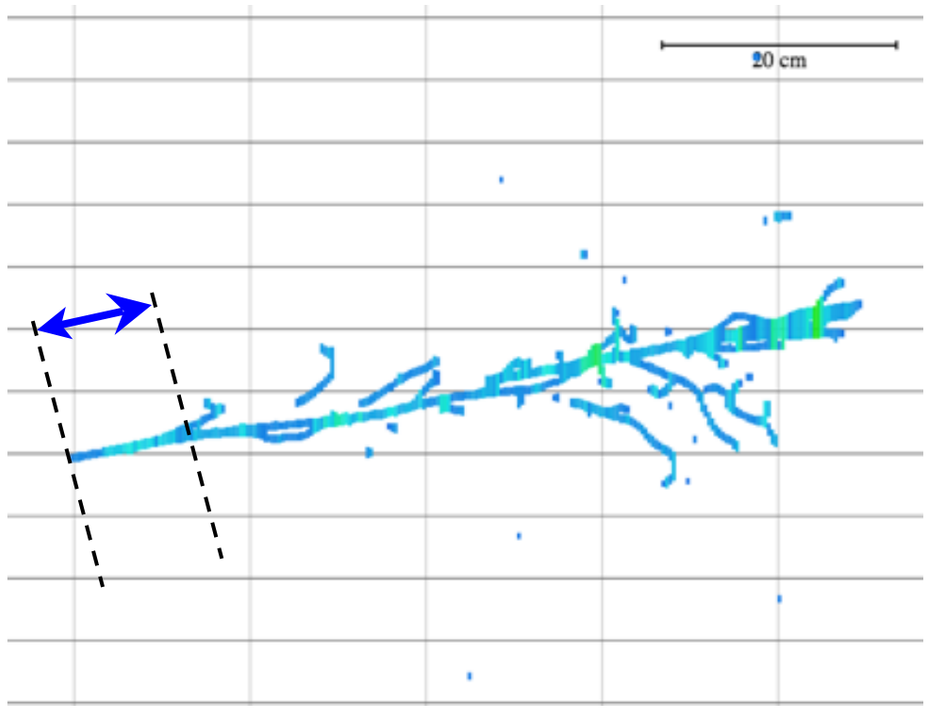


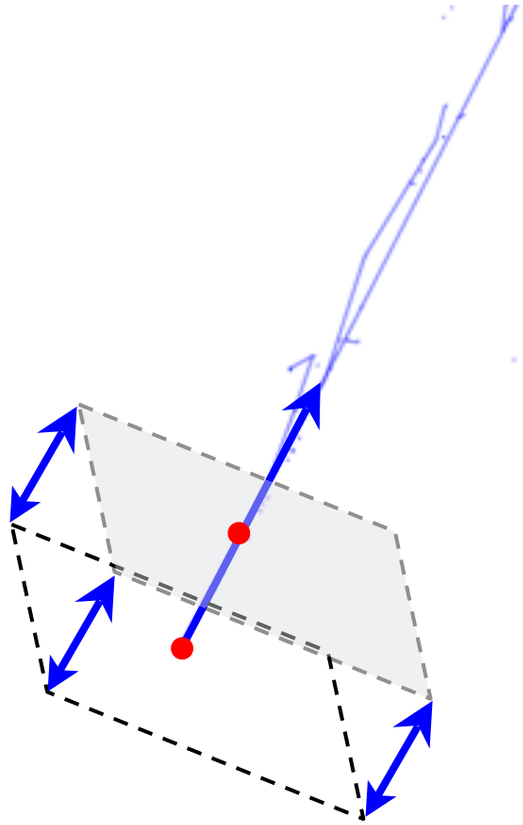


- Build a plane centered on the start point with a normal along the momentum

- Calculate each the signed distance for every energy deposition point from this plane and flag all that are within +2.4cm in front of the plane

Build Plane at Start of Shower





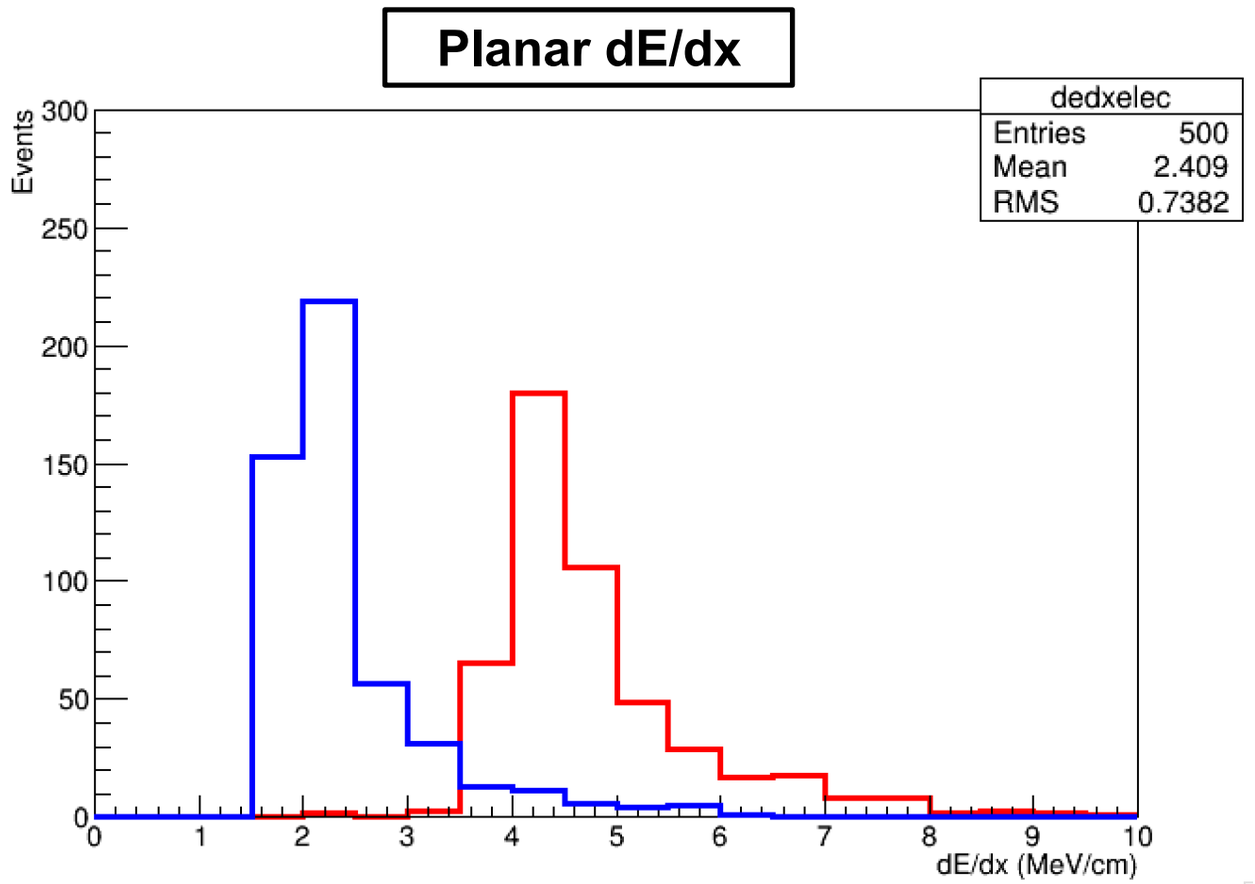
- Build a plane centered on the start point with a normal along the momentum

- Calculate each the signed distance for every energy deposition point from this plane and flag all that are within +2.4cm in front of the plane

dE/dx

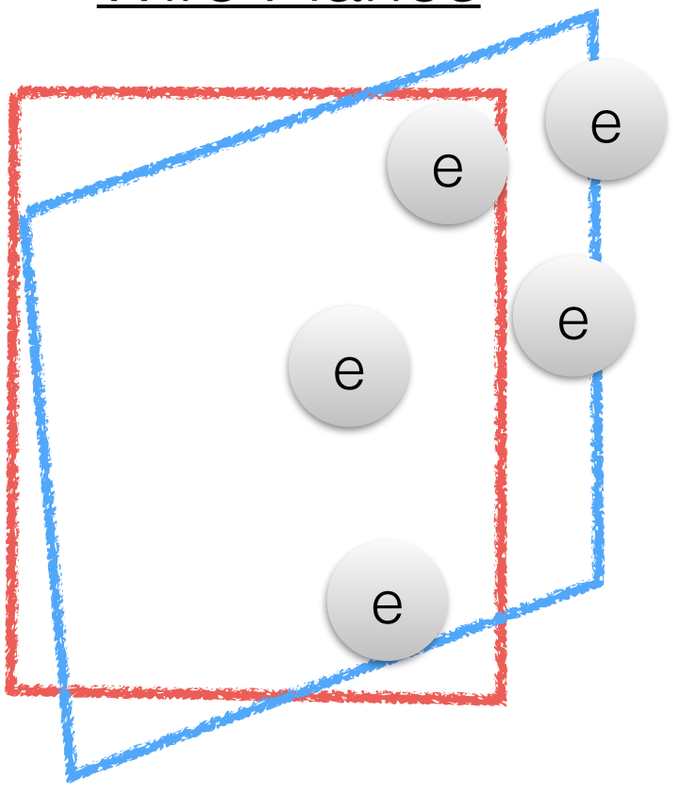
- We then select these “flagged” energy deposition points and total their energy

- This totaled energy is then divided by the 2.4cm distance and a dE/dx for that shower is returned



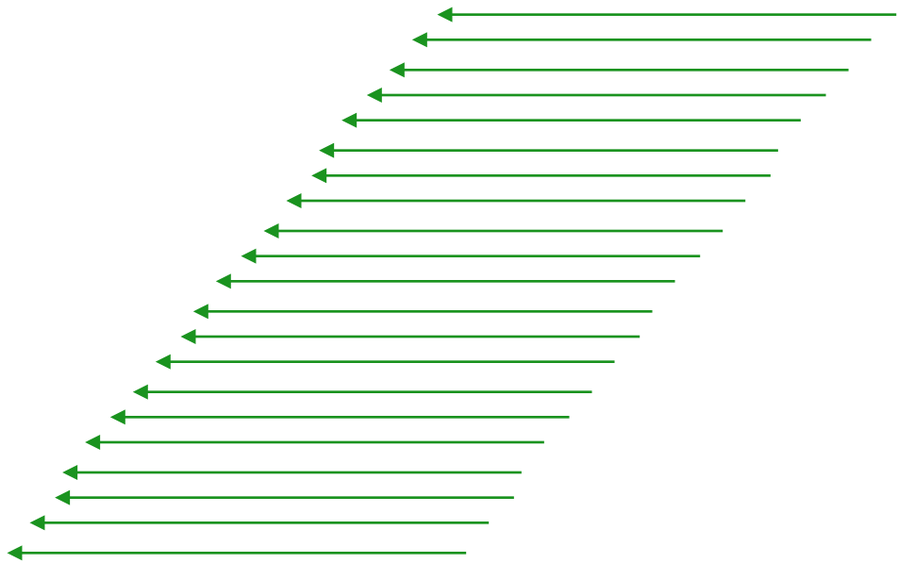
dQ/dx

Wire Planes



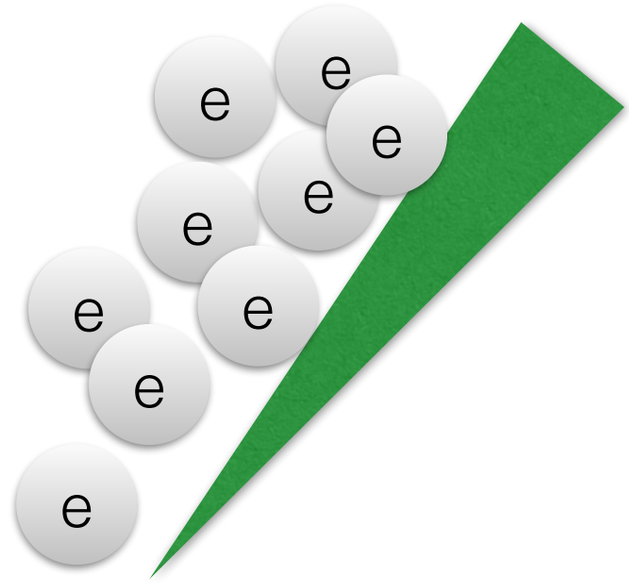
Want to build variables from here…

Drift



This is what we want to probe! Recombination, lifetime effects, etc.

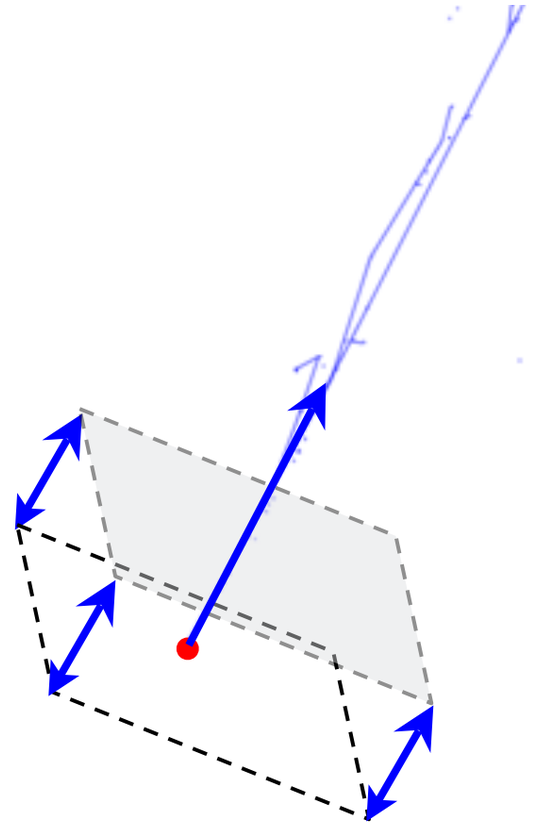
Interaction Point



This is where dE/dx and Shower Energy is defined

Plane Charge and dQ/dx

- To compute the dQ/dx we ask how many electrons the “sim-channel” associated with each flagged energy deposition point placed on the wire plane



- This number of electrons is then divided by the 2.4cm distance and the dQ/dx is reported for each plane

- Additionally, a bug with the PlaneCharge variable was fixed when these changes were introduced