

Electron Transport Simulation 2

Data meets MC (soon)

Bruce Baller

Feb 3, 2009

Goal

- Compare electron transport & electronics simulation with real data
 - Use Bo cosmic ray data
 - MC inputs to simulate Bo configuration
 - 4.7 mm wire spacing
 - 6.2 mm plane spacing
 - Induction Plane 1 \rightarrow -300V
 - Induction Plane 2 \rightarrow 0V
 - Collection Plane \rightarrow 400V

Plan

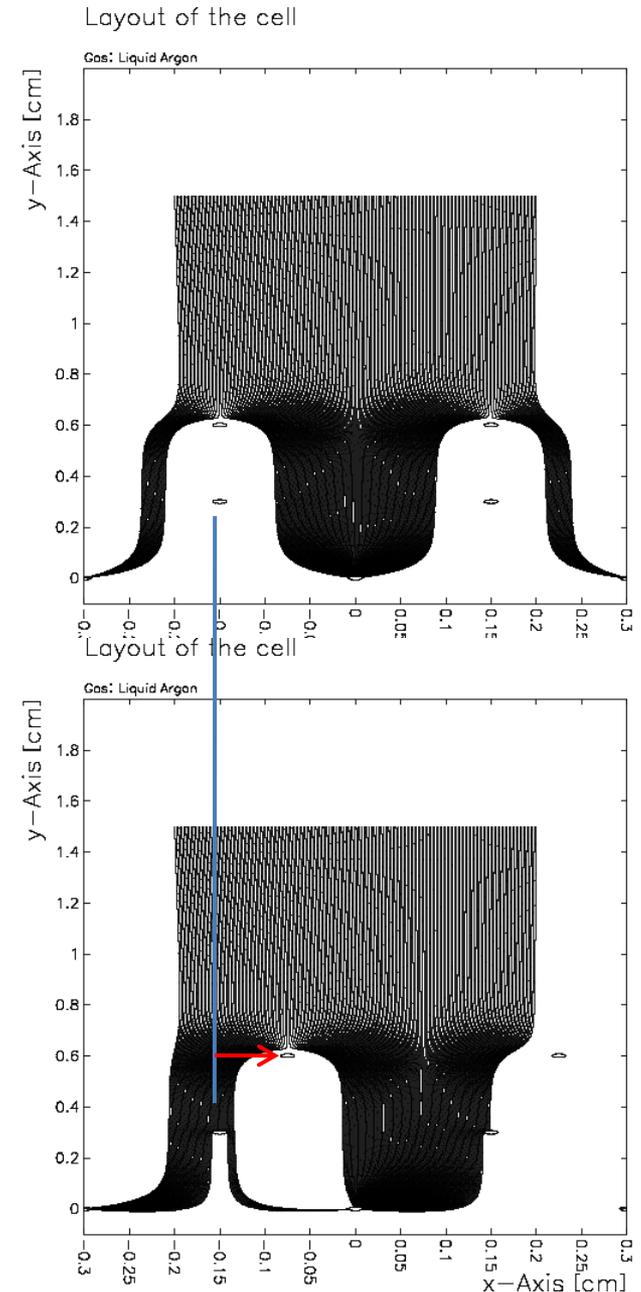
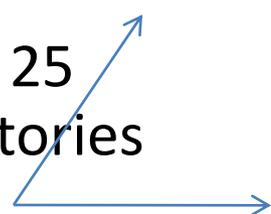
- Improve electron transport simulation in the wire plane region
 - The rest of this talk
- Select Bo cosmic ray events
 - Small dip angle tracks near the wire plane
 - ~Parallel to the wire plane
 - ~Orthogonal to collection (induction) planes
 - Requested Bo runs
- Use version of electronics similar to μB
 - Requested step function response from Dan Edmunds

Pseudo-3D Garfield Simulation

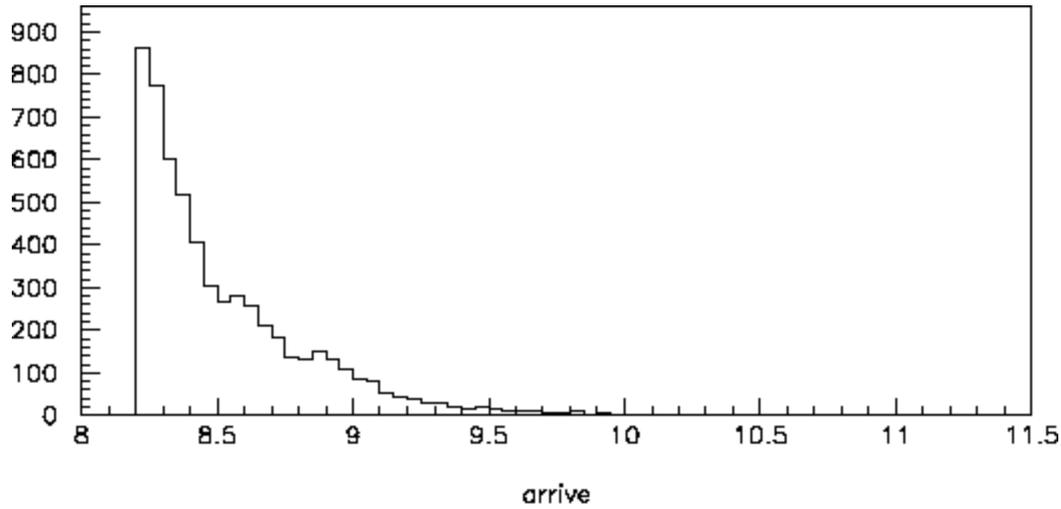
- How does one use a full 3D simulation of the trajectory of electrons through the crossed wire ?
 - Electron trajectories vary dramatically in a 3 mm cell
- Find electron trajectories through many 2D slices of the wire plane
 - Parameterize the electron transit times
 - Treat as a statistical process

2D Slices

- Generate 200 electron trajectories along a 4 mm track 1.5 cm above the collection plane
- Shift Induction plane 1 wires in 1 mm steps
 - Shift Induction plane 2 wires in 1 mm steps
 - Accumulate electron arrival times for every trajectory
- Histogram arrival times for 25 configurations * 200 trajectories
 - Two configurations shown

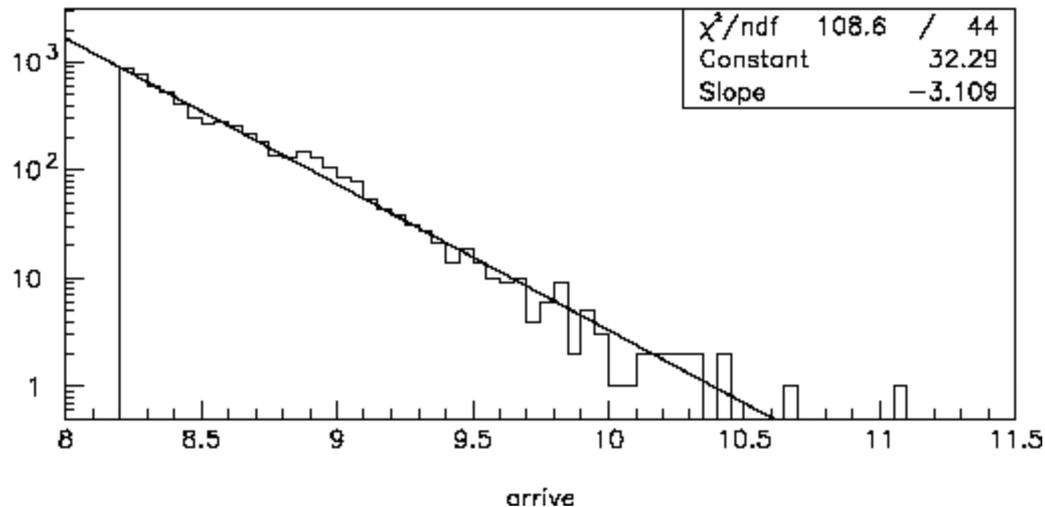


Electron Arrival Times (μs)



70% arrive within 0.4 μs
→ 2 (Bo) time bins

Expect width to \sim double
for a true 3D simulation



Fits well to an exponential

Include in MC simulation