Showers in Gas and Scintillator

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Geometries Considered

Scint HCal

Polystyrene 5mm

Steel 20mm

Gas Geom1

Gas 5mm

Steel 20mm

Gas Geom2

Gas 1mm

G10

Glass 1mm
Width Definition

- Find centroid \( \{w_i x_i / \Sigma w_i\} \)
- ‘width’ = \( \sqrt{w_i dR^2_i / w_i} \)
- Three \( w_i \) were used:
  - Unweighted (=1)
  - E weighted (=cell energy)
  - ‘Density’ weighted (nearest neighbor occupancy in 5x5 window in yrs n-1,n,n+1)
Distance to Farthest Cell
Density of Farthest Cell

50 GeV Charged Pions in Gas Geom1 HCal

50 GeV Charged Pion in Scint HCal
Distance to Farthest Cell
Density of Farthest Cell

50 GeV Charged Pion in Gas Geom2 HCal

50 GeV Charged Pion in Scint HCal
Backscatter
Shower Width for 10GeV $\pi^\pm$
Shower Width for 50GeV $\pi^\pm$
$\pi^\pm$ Angular Width

- Unweighted
- Scintillator
- Gas (Geom1)
- Gas (Geom2)

rms shown as error
$\pi^\pm$ Angular Width

Energy Weighted
Scintillator
Gas (Geom1)
Gas (Geom2)
$\pi^\pm$ Angular Width

Density Weighted
Scintillator
Gas (Geom1)
Gas (Geom2)
Comments

- Previous slides indicate that shower separation may not suffer at all
- There is no clear cut case either way at the moment; detailed studies of assessing impact needed
- Going to look at cluster separability next
- Need to evaluate this in the global context of calorimeter performance
Digital E Resolution

Charged Pions in SDJan03 Non-Projective

$\sigma(E_{\text{Gas}}/E_{\text{Scint}})$ vs $E_{\text{GeV}}$

- 5mm Gas/5mm Scint
- 1mm Gas/5mm Scint