ECAL Summary 7

ECAL Fiber Hole Update
Fiber Holes in the G4 Geometry
Update

• Compare sampling fractions before and after adding fiber holes to all the ecal blocks
• Input 10 – 11 GeV muons to check energy deposit variation
• High energy muons produce less soft-energy charge particles (due to the EM shower)
• Compare energy deposited only from muons to debug the ECAL shower
Electrons
With No Holes: Sampling Fraction

Shower Sampling Fraction

Entries: 65077
Mean: 0.1998 ± 2.553e-05
RMS: 0.006513

Pre-Shower Sampling Fraction

Entries: 65077
Mean: 0.2907 ± 0.0002927
RMS: 0.07466
Electrons
With Fiber Holes: Sampling Fraction

Shower Sampling Fraction

Pre-Shower Sampling Fraction

Entries
Mean
RMS
22770
0.2727 ± 3.863e-05
0.005829
22770
0.3028 ± 0.000501
0.0756
Muons
With No Holes: Sampling Fraction

Shower Sampling Fraction

Entries: 31251
Mean: 0.2879 ± 0.0001079
RMS: 0.01907

Pre-Shower Sampling Fraction

Entries: 31251
Mean: 0.2158 ± 0.0002876
RMS: 0.05083
Muons
With Fiber Holes: Sampling Fraction

Shower Sampling Fraction

Entries: 31659
Mean: 0.3061 ± 7.184e-05
RMS: 0.01278

Pre-Shower Sampling Fraction

Entries: 31659
Mean: 0.2185 ± 0.0002935
RMS: 0.05222
Only Edep from Muons
With No Holes : Sampling Fraction

Shower Sampling Fraction

Entries: 31251
Mean: 0.3113 ± 2.991e-05
RMS: 0.005288

Pre-Shower Sampling Fraction

Entries: 31251
Mean: 0.2113 ± 7.621e-05
RMS: 0.01347
Only Edep from Muons
With Fiber Holes : Sampling Fraction

Shower Sampling Fraction

<table>
<thead>
<tr>
<th>Entries</th>
<th>31659</th>
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<tbody>
<tr>
<td>Mean</td>
<td>0.307 ± 3.013e-05</td>
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<td>RMS</td>
<td>0.005361</td>
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Pre-Shower Sampling Fraction

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<tr>
<th>Entries</th>
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<tbody>
<tr>
<td>Mean</td>
<td>0.2109 ± 7.611e-05</td>
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<tr>
<td>RMS</td>
<td>0.01354</td>
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## Average Energy Deposit for Muons

<table>
<thead>
<tr>
<th>Description</th>
<th>No Holes Avg. Energy Dep. Per track (MeV)</th>
<th>Holes Avg. Energy Dep. Per track (MeV)</th>
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</thead>
<tbody>
<tr>
<td>Shower (Lead + Scint)</td>
<td>297</td>
<td>293</td>
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<tr>
<td>Shower (Lead)</td>
<td>213</td>
<td>204</td>
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<tr>
<td>Shower (Scint)</td>
<td>84</td>
<td>89</td>
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<tr>
<td>PreShower (Lead)</td>
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<tr>
<td>PreShower (Scint)</td>
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Average Energy Deposit for Muons: Only with Muons Energy Deposit

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<tbody>
<tr>
<td>Shower (Lead + Scint)</td>
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<td>206</td>
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<tr>
<td>Shower (Lead)</td>
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<tr>
<td>Shower (Scint)</td>
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<td>63</td>
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<tr>
<td>PreShower (Lead)</td>
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<tr>
<td>PreShower (Scint)</td>
<td>4</td>
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</tbody>
</table>
Backups
Energy Deposit in Lead

Shower Lead Edep

Entries: 9168
Mean: 1988 ± 4.265
RMS: 408.3

Entries: 26126
Mean: 2189 ± 2.771
RMS: 448

With no fiber holes
With fiber holes
Energy Deposit in Scintillator

With no fiber holes
Mean: 544.3 ± 0.7151
RMS: 115.6

With fiber holes
Mean: 744.4 ± 1.611
RMS: 154.2
Scint. Energy Deposit Z Profile

With no fiber holes
With fiber holes

Shower Scint Edep Z

Entries 1.324548e+07
Mean -4.591 ± 0.002708
RMS 9.855

Entries 5593229
Mean -4.056 ± 0.004263
RMS 10.08
Average Energy Deposit for Electrons 2 – 4 GeV

<table>
<thead>
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<tbody>
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<td>Shower (Lead + Scint)</td>
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<td>2732</td>
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<tr>
<td>Shower (Lead)</td>
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<td>PreShower (Lead)</td>
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<tr>
<td>PreShower (Scint)</td>
<td>67</td>
<td>69</td>
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</tbody>
</table>

• With holes shower lead had 201 MeV less energy deposited
  – This 201 MeV energy is now deposited in the Scint
• 9 % less energy deposit in the lead with holes