EM Calibrations and Data Analysis

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Event display of a muon passing through EM

Using GLEAM V3 the official version for EM (not for CDR)

Mechanical support structure is not simulated!
Data Taking Configurations

Muon calibration

![Diagram showing TKR and CAL with arrows connecting to 1 and C.R.](image)
Muon Calibrations

Muon rate from PDG = 1 /cm²/min
Number of MC events = 1,000,000
Sphere around EM = 60000 cm²
Area of a CAL Layer = 32 x 32 = 1024 cm²

<table>
<thead>
<tr>
<th>ID</th>
<th>Description</th>
<th>Log Bin size (cm²)</th>
<th>Normalized Rate</th>
<th># Daily Muons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hz</td>
<td>Hz/cm²</td>
</tr>
<tr>
<td>1</td>
<td>TKR trigger</td>
<td></td>
<td>15.52</td>
<td>0.0152</td>
</tr>
<tr>
<td>2</td>
<td>TKR trigger Number of Tracks &gt; 0</td>
<td></td>
<td>13.95</td>
<td>0.0136</td>
</tr>
<tr>
<td>3</td>
<td>TKR trigger Number of Tracks &gt; 0 Zdir&lt; 10 deg w.r.t vertical</td>
<td>2.7x2.7</td>
<td>3.69</td>
<td>0.0036</td>
</tr>
<tr>
<td>4</td>
<td>TKR trigger Number of Tracks &gt; 0 Zdir&lt; 10 deg w.r.t vertical</td>
<td>2.7x0.27</td>
<td>3.69</td>
<td>0.0036</td>
</tr>
</tbody>
</table>

CAL needs at least 1000 muons/bin to get 3 mm resolution
X and Y Positions of first hit in the TKR assuming 10 degrees with respect to the vertical (corresponds to 20 minutes of data taking)

CAL requested 6 days of C.R. data taking
Data Taking Configurations

Photon Run – TKR trigger

Diagram showing a 3 and C.R. with an arrow pointing to 17.6 MeV $\gamma$.
17.6 MeV $\gamma$  
3 GeV $\mu$

Expected photon rate 0.0127 Hz ~1000 photons a day
Photon Spectrum
(3 W foil)
1W versus 3 W

After L1T cut

After all cuts

Number of tracks

CAL Energy (MeV)
Data Taking Configurations

Photon Run – CAL-LO trigger
Reconstructed CAL energy (MeV)

Side entering photons with CAL-LO trigger set to 4 MeV/crystal

Side entering photons with TKR trigger after analysis cuts

- Nent = 49894
- Mean = 14.65
- RMS = 1.8
- Under = 0
- Over = 0
### SUMMARY

<table>
<thead>
<tr>
<th>Config</th>
<th>Description</th>
<th>Photons (Hz)</th>
<th>Muons (Hz)</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Calibration</td>
<td>N/A</td>
<td>3.7</td>
<td>6</td>
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<tr>
<td>2</td>
<td>Control Sample</td>
<td>N/A</td>
<td>0.4</td>
<td>1</td>
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<tr>
<td>3</td>
<td>Photon Run TKR trigger</td>
<td>0.0127</td>
<td>0.0000*</td>
<td>5</td>
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<tr>
<td>4</td>
<td>Photon Run CAL-LO trigger</td>
<td>1</td>
<td>0.0000*</td>
<td>1</td>
</tr>
</tbody>
</table>

- Analysis is not completely background free since the background consists of a crude approximation to the real spectrum, photon rates depend on VdG performance

Need to work 14 days around the clock!