Pisa Instrument Analysis Activities

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Data

a) We have chosen (as was recommended in Eduardo’s presentation “Data Analysis Ideas for Workshop 4” (IAG meeting 10 June 2005) “data from integrated modules”. I.e., the last single tower test runs.

b) All data are accessible from http://glast.pi.infn.it/, in particular from the “tower grid” http://glast.pi.infn.it/database/towers/twrsmenu.html.

<table>
<thead>
<tr>
<th>TkrFM</th>
<th>run id Pisa</th>
<th>run id SLAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>306000475</td>
<td>398000573</td>
</tr>
<tr>
<td>B</td>
<td>306000517</td>
<td>398000750</td>
</tr>
<tr>
<td>1</td>
<td>308002103</td>
<td>398000975</td>
</tr>
<tr>
<td>2</td>
<td>308001819</td>
<td>398000894</td>
</tr>
<tr>
<td>3</td>
<td>309000323</td>
<td>398001090</td>
</tr>
<tr>
<td>4</td>
<td>309000666</td>
<td>398001203</td>
</tr>
<tr>
<td>5</td>
<td>308002603</td>
<td>399002040</td>
</tr>
</tbody>
</table>
1 - Evaluate TKR uniformity by

- Plotting hit maps after basic selection (e.g. 1 track, good chi2)
- Plotting the number of disconnected and partially disconnected channels
- Plotting hit efficiencies per plane
- Evaluating the stability of noisy channels during testing @ SLAC
- Comparing number of dead channels using cosmic rays and charge injection
Dead/Noisy/Interrupted Strips

Strip number determination:

**Dead**: cut on channels with no entry (but not masked). Save method except for at the edge of the acceptance.

**Masked**: use a script which analyzes the TkrFM?_HotStrips.xml

**Partially interrupted**: thresholding on the hit map
these plots and the excel files for all 7 runs (towers) are on the web page
### Dead/Noisy/Interrupted Strips (Illc)

<table>
<thead>
<tr>
<th>Plane</th>
<th>Strip classification</th>
<th>Y0</th>
<th>Y3</th>
<th>Y4</th>
<th>X1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>dead (d)</td>
<td>1</td>
<td>140</td>
<td>0</td>
<td>178</td>
</tr>
<tr>
<td></td>
<td>noisy (n)</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>interrupted (i)</td>
<td>123</td>
<td>141</td>
<td>635</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>total (t)</td>
<td>124</td>
<td>133</td>
<td>635</td>
<td>178</td>
</tr>
<tr>
<td></td>
<td></td>
<td>135</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Efficiencies

Tower A

??? X1 ???
bias: 122 V
DAC: 30 (Pisa)
var. (SLAC)

Pisa run 306000475
SLAC run 398000573
Dead/Noisy/Interrupted Strips (IV)

LayerY7.TkrHits:LayerX7.TkrHits
Tower1 - run 30600594

X7 Y7
0 200 400 600 800 1000 1200 1400 1600
0 200 400 600 800 1000 1200 1400 1600
90 300 310 320 330

Michael Kuss
2 - Evaluate TKR TOT response by

- comparing peak and width of TOT distributions for MIPs at different incident angles

- Make profile plots as a function of \( \cos \theta \) and \( \varphi \)

- Studying events that saturate the TOT. Are they consistent with showers? Can we have saturation from incident particles at large angle?

- Investigating whether noisy hits exhibit a TOT peak close to zero
3 - Study noise in the TKR system by

- comparing ratios of events with 3 and 1 strip hits and/or strip clusters for MIPs at different incident angles
- comparing ratios of events with 2 and 1 strip hits and/or strip clusters for MIPs at different incident angles
- doing the same as above but for runs at different threshold settings

- studying the distance of two clusters
Noise Occupancy

\[ \cos(\theta) \]

0.92 - 1
Noise Occupancy (II)

Look at the maximum distance of two clusters in a plane:

- noise: triangular distribution
- delta rays: grouped at small distances to the cluster on the track

![Graph showing noise occupancy with cuts at 3/4, 1/2, and 1/4 distances.](image)
Noise Occupancy (III)

Maximum distance between strips layer X5

- StripDistance (TkrNumHits>0 & TkrNumTracks==1)
- StripDistance (TkrNumHits>0 & TkrNumTracks==1 & NumClusters==1)
Noise Occupancy (IV)

TkrFM1  398000975 (DAC 0,40)
Noise Occupancy (V)

TkrfM4  398001203 (DAC 0.30)
6 - Evaluate TKR inter tower alignment and intra tower alignment

Produce alignment constants apply to data and compare to MC distributions

Do we need any information from the metrology measurements of the integrated towers at SLAC?

A HowTo on intra tower alignment will be given tomorrow!
Intra Tower Alignment

tower A difference 39800573 - 306000475

![Graph showing difference in alignment across various planes with data points labeled dz, drotz, and dh.](image-url)
Intra Tower Alignment (II)

TkrFM3  difference 398001090 - 309000323

![Graph showing Intra Tower Alignment (II)]
Conclusions

- Pisa started to work on IA
- What should be followed on?
- What has priority?