Stripline PMT Test @ Hawaii Nov. 24, 2010

• First testing of stripline PMT in Hawaii.
• Two laser spots directed to PMT via fibers.
• PMT operated at 2.4 kV.
• No amplification.
• Data collected with scope:
  – 8 GHz analog bandwidth
  – 20 GSa/s
• Timing extracted with 30% constant fraction method
Sample Scope Traces

*CH0/CH3 are from the same strip; CH1/CH2 are from the same strip
Timing by Channel

![Graphs showing timing by channel with statistical data](image-url)
Differences / Averages within Strips

- \( (\text{hit\_time}[0]-\text{hit\_time}[3]) \)
  - Entries: 5000
  - Mean: -3.125
  - RMS: 0.1867
  - \( \chi^2 \)/ndf: 114.7/73
  - Constant: 178.6 ± 3.1
  - Mean: -3.125 ± 0.003
  - Sigma: 0.1835 ± 0.0019

- \( (\text{hit\_time}[1]-\text{hit\_time}[2]) \)
  - Entries: 5000
  - Mean: -11.41
  - RMS: 0.127
  - \( \chi^2 \)/ndf: 125/77
  - Constant: 158.2 ± 2.8
  - Mean: -11.41 ± 0.00
  - Sigma: 0.1256 ± 0.0014

- \( (\text{hit\_time}[0]+\text{hit\_time}[3])/2 \)
  - Entries: 5000
  - Mean: 142
  - RMS: 0.1539
  - \( \chi^2 \)/ndf: 115.2/76
  - Constant: 157 ± 2.7
  - Mean: 142 ± 0.0
  - Sigma: 0.1518 ± 0.0015

- \( (\text{hit\_time}[1]+\text{hit\_time}[2])/2 \)
  - Entries: 5000
  - Mean: 137.9
  - RMS: 0.1378
  - \( \chi^2 \)/ndf: 221.1/79
  - Constant: 134.4 ± 2.3
  - Mean: 137.9 ± 0.0
  - Sigma: 0.1354 ± 0.0012
Difference between Strip Averages

\[
\frac{(\text{hit}_\text{time}[0]+\text{hit}_\text{time}[3])}{2} - \frac{(\text{hit}_\text{time}[1]+\text{hit}_\text{time}[2])}{2}
\]

<table>
<thead>
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<th>htemp</th>
<th></th>
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<tbody>
<tr>
<td>Entries</td>
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<tr>
<td>Mean</td>
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<tr>
<td>RMS</td>
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<tr>
<td>$\chi^2$/ndf</td>
<td>55.6/76</td>
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<tr>
<td>Constant</td>
<td>165.2 ± 2.9</td>
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<tr>
<td>Mean</td>
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<tr>
<td>Sigma</td>
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</table>
Next steps...

• Add amplification.
  – Current results appear SNR limited.

• Try other algorithms:
  – Cross correlations for same strip timing
  – Template fitting
  – Others?

• Determine number of p.e., take a number of points to scan results vs. number of p.e.