Feature Extraction Upgrade

Goals:
Same functionality
Faster
How?

Remove unnecessary copying
   PowerPC memory bus is slow

Remove extra iterations over data
   and only 1 load/store execution unit

Remove unnecessary branches (if ... then)
   Defeats benefits of pre-fetching instructions

Use integer arithmetic in place of floating point
   Three parallel integer execution units, only one floating point unit
   Load to floating point registers requires multiple instructions
   (Incidently, floating point registers are not saved across task switches)
Test for Same Functionality

Cosmics Triggers: 1
~100-MeV Hit
($M^*$)

(211 ns “adjustment”)
Energy distribution looks right.
Time distribution looks right.

(subtracting 211ns adjustment)
### Table 1:

<table>
<thead>
<tr>
<th></th>
<th>Old FeX</th>
<th>New FeX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrel</td>
<td>240 us</td>
<td>190 us</td>
</tr>
<tr>
<td>EndCap</td>
<td>180 us</td>
<td>130 us</td>
</tr>
</tbody>
</table>

![Graph showing L1Rate (MHz) over years](image-url)