Time jumps -end of story

M.G.F. Kirsch\textsuperscript{1}, E. Kendziorra\textsuperscript{2}, M. Freyberg\textsuperscript{3}

\textsuperscript{1} ESA XMM-MOC, ESOC Germany
\textsuperscript{2} IAAT, University of Tuebingen, Germany
\textsuperscript{3} MPE Garching, Germany
• time jumps - recap situation
• refined frame times
• refined jump search SAS algorithm
• proposal for SAS setting
• list of still present time jumps
• lets randomise the times now
If the time difference between the two arrival times of photon a and photon b is not a multiple of the frame time, then a **TIME JUMP** occurs.
SAS time jump corrections

- SAS algorithm tries to detect and corrected time jump
- not found jumps can be spotted by EPIC IDT SW at ESAC (now implemented on generic epicmon account)
- list of non SAS found / corrected time jumps is provided
how to detect a non SAS corrected jump

- take all frame times in array: T
- \( \Delta = (T(i+1) - T(i))/\text{frametime} \)
- \( \varepsilon = \text{difference of } \Delta \text{ to next full frametime} \)
- plot \( \varepsilon(\Delta) \)
- if \( \varepsilon > \text{tolerance} \) \( \rightarrow \) time jump
- processing of all public and non public available archive data at ESAC
  --> implemented frame times are not correct
  --> refine frame times using this analysis before time jump analysis can be followed up
• Oscillator stable, otherwise relative differences should show same shift
• Different slopes for different modes
  --> sequencer clocks have not been counted fully correct
  --> errors < 10^{-5} frame times per frame
    (< 20 clocks, 1 clock = 40 ns)
• Slight drift in frame times (see MJF Escorial proceedings)
• refined frame times on that basis not violating quantumization of oscillator clocks
• with that correction still residual drifts caused by temperature changes and aging of the quartz
• can mimic in case of large event differences (counting mode) time jumps
refined (non SAS) search algorithm

- take individual drifts into account
- aequivalent to search with variable tolerance depending of event difference
### non SAS detected time jumps in %

<table>
<thead>
<tr>
<th>Mode</th>
<th>Old FT + old algo</th>
<th>New FT + old algo</th>
<th>New FT new algo</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF</td>
<td>5.8</td>
<td>0.6</td>
<td>1.9</td>
</tr>
<tr>
<td>eFF</td>
<td>20.8</td>
<td>20.2</td>
<td>2.3</td>
</tr>
<tr>
<td>SW</td>
<td>37.2</td>
<td>12.5</td>
<td>6.6</td>
</tr>
<tr>
<td>LW</td>
<td>39.0</td>
<td>1.6</td>
<td>1.4</td>
</tr>
<tr>
<td>Timing</td>
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<td>1.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Burst</td>
<td>52.9</td>
<td>4.2</td>
<td>3.2</td>
</tr>
<tr>
<td>Sum</td>
<td>15.6</td>
<td>4.9</td>
<td>2.2</td>
</tr>
</tbody>
</table>

**Proposal:**
- switch on new algo default in next SAS
- randomise times after further checks by MJF
- if no checks done by MJF with 3 month
  --> randomise