A time jump analysis on EPIC-pn with some side results

Marcus G. F. Kirsch
M.J. Freyberg, E. Kendziorra
menu

• Do we still have time jumps?
• How can we measure those?
• Can a time jump detection be implemented in a sort of routine check (Qcheck)?
• Are there time issues that we still do not understand?
What is a time jump

If the time difference between the two arrival times of photon a and photon b is not a multiple of the frame time

TIME JUMP
How to detect the jump

- Take all frame times in array: $T$
- $\Delta = (T(i+1) - T(i))/\text{frametime}$
- $\varepsilon =$ difference of $\Delta$ to next full frametime
- Plot $\varepsilon(\Delta)$
- If $\varepsilon > \text{tolerance} \rightarrow \text{time jump}$
Mega processing

- Past: only known problem cases have been checked at MPE
- Now: processing of all public and non-public available archive data at ESAC
- Some characteristic results:
findings

- **Slope:**
  - Is the clock drifting?
  - Are the frame times correctly used?

- **Diagonal patterns:**
  numerical effects
slopes for all ODF

- Different slopes for different modes
- LW similar to Burst \(-1E-5\)
- Rest similar around \(1E-5\)
- Errors:
  - FF group: \(1E-5\) frametimes per frame
- Slight drift in frame times

Oscillator stable, otherwise relative differences should show same shift
resulting absolute error

- Burst, Timing and Small Window mode do show negligible absolute errors
- FF, eFF and LW show room for improvement

→ frame times are not fully correct
→ can be calibrated using the result of that analysis

Not critical for exposure time and timing

Analysis can be used to refine frame times with very high accuracy
Numeric effects

- mjf
How to proceed now

- Determine frametimes
- Repeat analysis with correct frametimes and search for **time jumps**