

XMM-Newton CCF Release Note

XMM-CCF-REL-245

Rate-dependent CTI correction for pn Timing and Burst Modes

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1 CCF components

Name of CCF	VALDATE	List of Blocks changed	Change in CAL HB
EPN_CTI_0018	2000-01-01T00:00:00	RATE_DEPENDENT_CTI	YES

2 Changes

2.1 Rate-dependent CTI correction

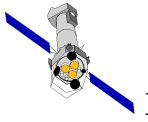
As of SASv8.0, a new task (`epfast`) has been introduced, aiming at correcting rate-dependent CTI effects in pn event lists of exposures taken in Timing and Burst Modes. Readers are referred to the SAS documentation for a full description of the task and its functionalities. It suffices here to say that `epfast` corrects the energy of each individual photon on the basis of the source+background count rate measured at the photon arrival time.

The correction is formally expressed as a linear “gain” factor, G_{corr}

$$G_{corr} = a_0 * X^{a_1} + a_2$$

where X is the number of shifted electrons per pixel per second, and the a_i are numerical coefficients.

The new extension of the `pn_CTI` CCF contains the values of the a_i coefficients for Timing and Burst Mode.



3 Scientific Impact of this Update

The new rate-dependent CTI-correction is still being tested. The values of the a_i coefficients in the current CCF version are therefore dummy values, corresponding to “no applied correction”: $a_0 = 1$, $a_1 = 0$, $a_2 = 0$.

4 Estimated Scientific Quality

Once validated, this correction will allow an improvement of the energy reconstruction at the instrumental Au and Si edges $\simeq \pm 3\%$.

5 Test procedures & results

The new CCF component has been visually inspected with the FTOOLS viewer `fv` to ensure that:

- the values in the `RATE_DEPENDENT_CTI` extension are nominal
- the other extensions have not been accidentally affected by the change

`epfast` was run on a sample of six observations in Timing and Burst Mode: Obs.#0094520101, Obs.#0084020401, Obs.#0090340201, Obs.#0155762501, Obs.#0202401101, Obs.#0412590301. The spectra extracted from event lists corrected with the combination of `epfast` and `EPN_CTI_18` were identical to the spectra extracted from event lists on which such a correction had not been applied.

6 Expected Updates

A new version of the `EPN_CTI` CCF will be released once the scientific validation of the correction is completed. It will contain calibrated values for the a_i parameters for both Fast Modes.