

XMM-Newton CCF Release Note

XMM-CCF-REL-264

2-D PSF Gaussian parameterization

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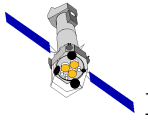
1 CCF components

Name of CCF	VALDATE	List of Blocks changed	Change in CAL HB
XRT1_XPSF_0012.CCF	2000-01-01	ELLBETA_PARAMS	YES
XRT2_XPSF_0012.CCF	2000-01-01	ELLBETA_PARAMS	YES
XRT3_XPSF_0012.CCF	2000-01-01	ELLBETA_PARAMS	YES

2 Change

The elliptical beta, 2-D PSF model (ELLBETA) consists of an elliptical King function plus a central narrow Gaussian to model the core plus spoke structures (see CAL-SRN-0263 for a fuller description). In some cases no Gaussian component is necessary. In the previous release, the default values of the Gaussian full width half maximum (FWHM) and normalization for these cases were set to zero. This has been found to give problems in software which doesn't handle the zeros correctly. To avoid these problems, the FWHM values for the Gaussian is set to a positive, non-zero value for all the data points.

- For EPIC-pn the FWHM is set to a nominal value of 0.1.
- For the EPIC MOS 1/2, the values for energies at 8 keV and above, which were previously 0.0, have been set to the FWHM at 6 keV for that particular off-axis angle. i.e. the 8 keV Gaussian FWHM value for $\theta=0$ has been set to the FWHM value at 6 keV and $\theta=0$. This is to maintain a constant FWHM for energies between 6 and 8 keV where the Gaussian component is linearly interpolated and hence has a non-zero normalisation.



3 Scientific impact of this update

This solves a technical problem, where parts of the SAS software returned NAN values in the PSF image.

4 Estimated scientific quality

5 Test procedure and results

The new CCFs have been used within the `calview` and `psfgen` tasks to generate PSF images for each of the instruments at a range of energies and off-axis angles. In all cases the image is seen to contain real, positive numbers.

The effect of varying the default value used for the Gaussian FWHM from 0.1 to 100.0 has been checked for the EPIC-pn. It was found to make no difference to the final image, which is as expected given that the normalisation is 0.0 in these cases.