

XMM-Newton CCF Release Note

XMM-CCF-REL-208

OM Grisms Calibration: correcting count rate in extracted spectrum

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1 CCF components

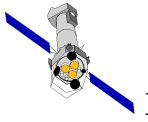
Name of CCF	VALDATE	EVALDATE	List of Blocks changed	XSCS flag
OM_GRISMAL_0004	2000-01-01T00:00:00	—	Header keywords	NO
		—	FLUX_GRISM1	NO

2 Changes

2.1 UV Grism Flux Calibration

SAS task *omgrism* extracts the spectrum from a grism rotated image. The measured count rate is normalized by dividing it by the spectrum sampling step. The new wavelength scale introduced with OM_GRISMAL_0003 for the UV grism implied a change in the wavelength step. The normalization was fixed in the code prior to *omgrism* version 1.9, which shall be released with SAS 7.0. This means that UV grism data processed with SAS 6.5 had a wrong normalization in their extracted spectrum. This was compensated by the ISF because it was derived from extracted spectra having the wrong normalization and therefore the final spectra in flux units are correct.

omgrism will produce from now on spectra with a proper normalization. Instead of re-deriving a new ISF, it is easy to demonstrate that the previous one can be corrected simply by multiplying it by the ratio between the current wavelength step and the one used before in the code. Such a corrected ISF (for the UV grism - GRISM1) is implemented in the new OM_GRISMAL_0004.CCF.



2.2 Keywords in the FITS Header

To avoid usage of this new CCF with previous versions of *omgrism* we have added the ALGOID keyword in its FITS header.

The units of the ISF (FLUX_GRISMn extensions) were defined wrongly in the header of the CCF. They have been changed to *erg/cm²/count*.

3 Scientific Impact of this Update

As already mentioned, the extracted spectra in count rate units produced with SAS 6.5 are wrong. The error varies from 13% at 1800 Å decreasing to 2.5% at 3600 Å. However the fluxed spectrum is correct.

When using the new version of *omgrism* within SAS 7.0 the extracted count rates will be correct and the fluxed spectra will also be correct due to the change made in the ISF.

4 Estimated Scientific Quality

The accuracy of the grism calibration both in wavelength and flux does not change with respect to the previous issue of this CCF.

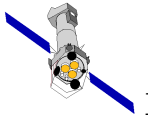
4.1 Wavelength calibration

The internal accuracy of the dispersion relations is 2 Å in GRISM1 and 10 Å in GRISM2.

When the dispersion relation is applied to any extracted spectrum, the main source of error is the determination of the reference point (the zero order centroid). This can introduce shifts in the wavelength scale of up to 10 Å in GRISM1 and up to 20 Å in GRISM2.

4.2 Flux calibration

A first level verification of the flux calibration is obtained by applying the ISF to the spectra of the standard stars used to derive it. This provides a consistency test. The fluxes obtained for the standard stars GD153 and HZ2 agree within better than 5% for GRISM1 and GRISM2.



5 Expected Updates

Future updates will be issued as necessary from the monitoring of the calibration with time.

The current flux calibration does not include coincidence losses in the detector, nor time dependent sensitivity variations.

The spectra used in the derivation of the calibration were extracted from sources located at the standard boresight used in XMM observations. Therefore, possible variations across the detector (particularly in wavelength due to grisms distortions), when we work on field or multi-object spectroscopy, are not included.

6 Test procedures

As it was done with previous versions of this CCF, several standard stars have been processed to verify that both the new version of `uvif` and the arithmetic correction applied to the UV ISF were correct.

7 Summary of the test results

The SAS extracted and calibrated spectra are both correct now.

For more details please refer to XMM-CCF-REL-199.

References