



efluxer

January 27, 2025

Abstract

A procedure to generate a fluxed spectrum

1 Instruments/Modes

Instrument	Mode
EPIC	IMAGING, TIMING

2 Use

pipeline processing	yes
interactive analysis	yes

3 Description

efluxer is a tool to generate an X-ray spectrum in physical units ($\text{erg}/\text{cm}^2/\text{s}/\text{keV}$ vs keV) rather than in the usual instrument counts vs channel space. It is based on a method described in astro-ph... that includes corrections for the energy redistribution and the effective area of the telescope, filter and detector combination.

In its current form, the algorithm is applicable to EPIC spectra from any combination of scientific modes and filters. One of the drawbacks of the method is that the effective spectral resolution in the output spectra is degraded with respect to the intrinsic spectral resolution of the instruments. Therefore, the resulting spectra can be safely used to obtain model independent fluxes in broad energy bands or in analysis of continuum shapes or for quick-look analysis and visualization. But for analysis of narrow spectral features or, in general, to exploit the full spectral resolution of the EPIC cameras, the users are recommended to employ traditional fitting techniques of physical models convolved with the redistribution matrix and effective area.



3.1 Examples

3.1.1 A fluxed spectrum with default binning

```
efluxer spectrumset=my_src.ds arfset=my_src.arf respset=my_src.rmf fluxedset=my_src.fluxed.ds
```

This command line produces the file `my_src.fluxed.ds` which contains the source spectrum in flux units.

3.1.2 A background-subtracted fluxed spectrum with default binning

```
efluxer spectrumset=my_src.ds arfset=my_src.arf respset=my_src.rmf backgndset=my_bgd.ds fluxedset=my_srcbgd.fluxed.ds
```

This command line produces the file `my_srcbgd.fluxed.ds` which contains the source spectrum in flux units after background subtraction.

4 Parameters

This section documents the parameters recognized by this task (if any).

Parameter	Mand	Type	Default	Constraints
-----------	------	------	---------	-------------

spectrumset	yes	dataset		
--------------------	-----	---------	--	--

The name of the input spectrum in counts v channel space.

arfset	yes	dataset		
---------------	-----	---------	--	--

The name of the effective area file (ARF).

rmfset	yes	dataset		
---------------	-----	---------	--	--

The name of the redistribution matrix file (RMF).

backgndset	no	dataset		
-------------------	----	---------	--	--

The name of a background spectrum

fluxedset	no	dataset	fluxedspec.ds	
------------------	----	---------	---------------	--

The name of the output fluxed spectrum file

5 Errors

This section documents warnings and errors generated by this task (if any). Note that warnings and errors can also be generated in the SAS infrastructure libraries, in which case they would not be documented here. Refer to the index of all errors and warnings available in the HTML version of the SAS documentation.

**InvalidFile** (*error*)

The input file was no good

BadEnergyNum (*error*)

There was an inconsistency between the number of channels in the input spectrum and the number of channels in the RMF.

NoMatrixBlock (*error*)

Couldn't find the block containing the response matrix from the input RMF file

6 Input Files

- an EPIC spectrum consisting of counts vs P.I. channel.
- an effective area file (ARF) corresponding to the source in question
- a redistribution matrix (RMF) corresponding to the source in question
- an optional EPIC background spectrum consisting of counts vs P.I. channel.

7 Output Files

- A fluxed spectrum in units of $\text{ergs/s/cm}^2/\text{keV}$ vs photon energy (keV). The output spectrum contains the columns, *FLUX*, *ERROR*, *ENERGY*, *ENERGY_BIN*. The header keywords from the input source spectrum are copied verbatim into the header of the output file.

8 Algorithm

9 Comments

References