



pointsrc

April 16, 2023

Abstract

Calculates the xspec normalization per square arcminute for the Cosmic X-ray background after removal of point sources to some limiting level (min_flux). ELF is shorthand for the logN-logS. This task was originally a subtask of the SAS *esas* task named *point_source* prior to SAS-21 and retains all of its functionality.

1 Instruments/Modes

Instrument	Mode
EPIC	Imaging

2 Use

pipeline processing	no
interactive analysis	yes

3 Description

Calculates the xspec normalization per square arcminute for the Cosmic X-ray background after removal of point sources to some limiting level (min_flux). ELF is shorthand for the logN-logS.

We assume that $\int_{0}^{\infty} \text{ELF}(x) dx < \text{cxb_norm}$, or that:

$$\text{CXR} = \text{X} + \int_{0}^{\infty} \text{ELF}(x) dx$$

Therefore, for any given “blank sky” observation where the brightest point source has a flux smax , the total X-ray emission in the field would be:

$$\text{X} + \int_{0}^{\text{smax}} \text{ELF}(x) dx$$

The currently available functions are:

hms: Hasinger, Miyaji, & Schmidt (2005), from ROSAT, XMM, & Chandra):

mushotzky: (????):

cappelluti: Cappelluti et al (2008), from COSMOS:

mateos: Mateos et al (2008), from XMM



Output: Xspec normalization for power law in units of photons/cm²/s/am²/keV

Examples:

```
pointsrc func=mateos minsrcflux=5.e-14 cxrbnorm=10.6 index=1.40
```

4 Parameters

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

Parameter	Mand	Type	Default	Constraints
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func	yes	string	mateos	
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Name of logN-logS function.

hms (Hasinger, Miyaji, & Schmidt 2005)

mushotzky (REF TBD)

cappelluti (Cappelluti et al. 2008)

mateos (Mateos et al. 2008)

minsrcflux	yes	real	1.0e-14	
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Source flux cutoff in erg/cm²/s.

cxrbnorm	yes	real	10.6	
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Normalization of the cosmic X-ray background.

index	yes	real	1.46	
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Photon power law index.

5 Input Files

None

6 Output Files

None

Outputs to screen the Xspec normalization for power law in units of photons/cm²/s/am²/keV

7 Algorithm

Read in:

xmmsas_20230412_1735-21.0.0



```
Name of logN-logS function
Choices: Hasinger, Mushotzky, Cappelluti, or Mateos
Source flux cutoff
Normalization of the Cosmic XRB
Photon power law index of the Cosmic XRB

Return Xspec Normalization for power law
Call subroutine based on user selected function choice
Returns:
Integral from 0-infinity
Integral from 0-(source flux cutoff)
numb/deg2
0.5-2.0 keV flux/deg2
Variance in flux
Calculate tot_flux, min_flux
Calculate conversion from energy in 0.5-2.0 keV to normalization
Calculate the energy in 0.5-2.0 in keV
Convert keV to erg
Convert erg/cm2/s/sr to keV/cm2/s/sr/keV
Calculate the bias: bias = cxrb_norm - tot_flux
Calculate the Xspec normalization:
  xnorm = bias + tot_flux
Convert to per arcmin:
  xnorm = xnorm/degree_per_ster/3600.

Output xnorm
```

8 Comments

The original code for this task appeared in the *esas* task 2009-2021 as the subtask *point_source*. It was removed from the task *esas*, and modularized as a single task for SAS-21. The *esas* task was removed in SAS-21.

References