



epspatialcti

November 4, 2014

Abstract

Corrects an EPIC-pn event file for spatially-dependent CTI effects

1 Instruments/Modes

Instrument	Mode
EPIC PN	IMAGING

2 Use

pipeline processing	yes
interactive analysis	yes

3 Description

Corrects an EPIC-pn event list for spatial variations in the charge-transfer-inefficiency (CTI). This task should be run on the event file produced after all of the other CTI and gain corrections have been applied.

Measurements of the spectra of bright extended sources have shown that there is a pixel-to-pixel variation in the energy scale which is mainly caused by CTI changes due to partial trap saturation [1]. These can be represented, and corrected for, by a spatial CTI correction. For example the spatial variation in the measured energy of the O VII line (0.57 keV) from the VELA SNR can be seen in Fig. 1. After correction the response is much more uniform (Fig. 2).

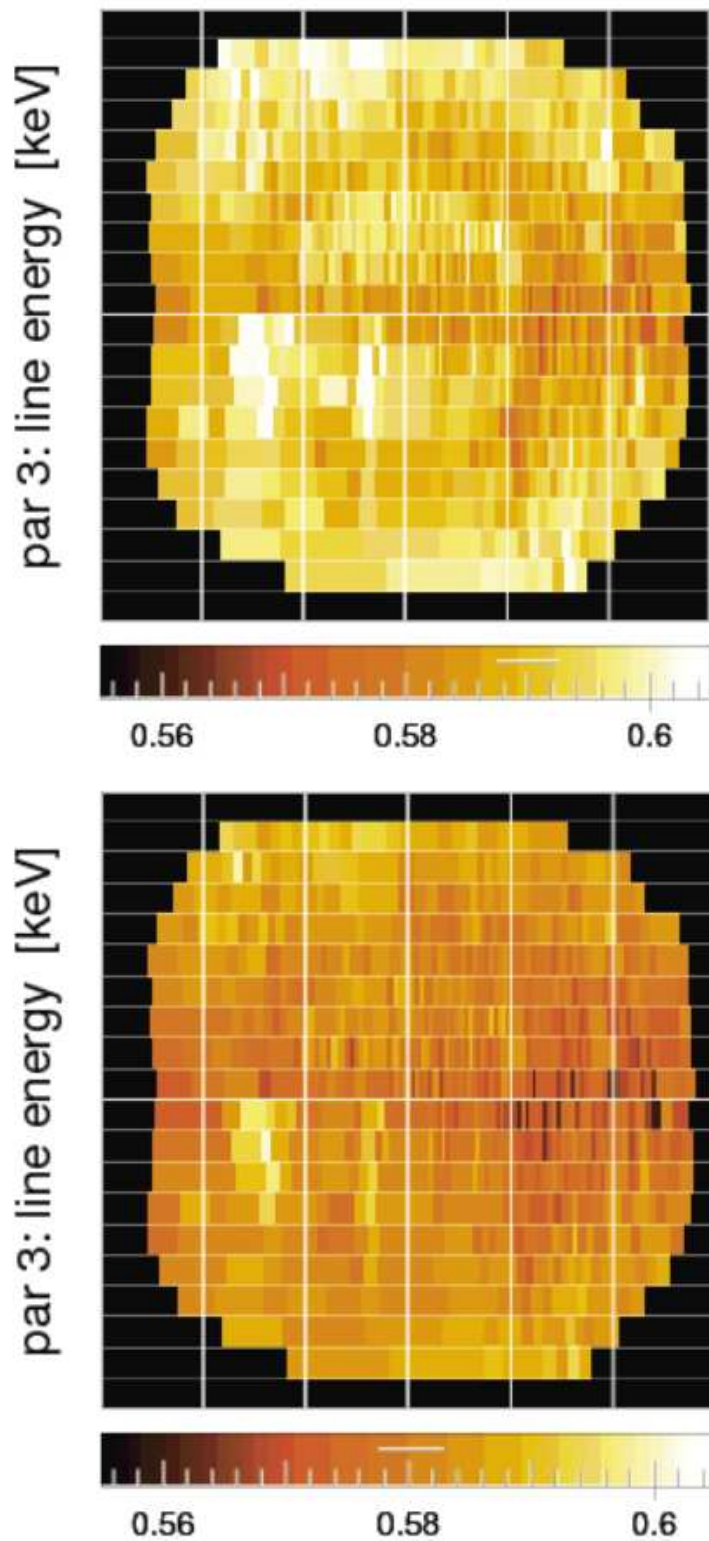


Figure 1. Upper: The apparent energy of the OVII (0.57 keV) emission line before correction with `epspatialcti`, Lower: The apparent energy of the OVII (0.57 keV) emission line after correction with `epspatialcti`.

It is currently recommended to apply this correction for observations taken in FullFrame and Extended-FullFrame modes. There is some evidence that it may also produce an improvement in LargeWindow



and SmallWindow modes, however, it should not be applied for Timing mode or Burst mode observations.

To avoid the corrections being applied twice, a keyword *SPATCTIC* is set in the header of the EVENTS extension when the task terminates successfully.

4 Parameters

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

Parameter	Mand	Type	Default	Constraints
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table	yes	dataset		none
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The event table to be corrected.

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.

AlreadyCorrected (*error*)

The header keyword SPATCTIC indicates that the events in this file have already had the spatial correction applied. No further correction will be made.

label (*warning*)

explanantion

corrective action: this is the corrective action

6 Input Files

1. An EPIC-pn event file with a PI column.

7 Output Files

1. The input EPIC-pn event file with modified PI column values.

8 Algorithm

Open the input event file



```
Read the observing mode from the input event file
Read from the EPN_CTI CCF coefficients and template values
```

```
Loop over each event
```

```
    set coefficients(a,b,c) from the event CCD, RAWX, RAWY values
    set template value from the event CCD, RAWX, RAWY values
```

```
    h = log10(event_pi) - 3.0;
    f = a + (b + c * h) * h;
```

```
    event_pi = event_pi - template_value * f
```

```
end of loop
```

```
Add the keyword SPATCTIC = 'yes' into the EVENTS header
```

9 Comments

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References