# proton

May 4, 2016

**Abstract**

`proton` uses the spectral fitting results from Xspec and model soft proton detector maps to create model soft proton contamination maps for a given observation.

## 1 Instruments/Modes

| Instrument | Mode |
|---|---|
| EPIC | Imaging |

## 2 Use

| | |
|---|---|
| pipeline processing | no |
| interactive analysis | yes |

## 3 Description

*proton* uses the spectral fitting results from Xspec and model soft proton detector maps to create model soft proton contamination maps for a given observation.

**Warning and requirements:** `proton` is part of the package *esas*, integrated into SAS, but (still) limited to work within *esas*' data reduction scheme. This is specially true wrt input files structure and names. In particular, `proton` assumes that another task from the package, `mos-spectra` / `pn-spectra`, and `mos_back` / `pn_back`, have been successfully run for the mos / pn exposures to be used.

## 4 Parameters

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

| **Parameter** | Mand | Type | Default | Constraints |
|---|---|---|---|---|
| **prefix** | yes | string | | |

Detector and exposure identifiers (eg. "1S001") for the MOS exposure S001) to be processed.

| | | | | |
|---|---|---|---|---|
| **caldb** | yes | string | | |

Directory containing all the ESAS specific calibration files

| | | | | |
|---|---|---|---|---|
| **specname** | yes | string | | |

File name of spectrum file used in the spectral fit to determine the residual SP contamination

| | | | | |
|---|---|---|---|---|
| **ccd[1-7]** | yes | string | 1 | |

Flag to include (1) or not (0) a CCD.

| | | | | |
|---|---|---|---|---|
| **elow** | yes | int | 400 | |

The low energy for the band in eV

| | | | | |
|---|---|---|---|---|
| **ehigh** | yes | int | 1250 | |

The high energy for the band in eV

| | | | | |
|---|---|---|---|---|
| **spectrumcontrol** | yes | int | 1 | |

1 for a power law model, 2 for a broken power law

| | | | | |
|---|---|---|---|---|
| **pindex** | no | | 0 | |

Fitted power law index, only if spectrumcontrol=1

| | | | | |
|---|---|---|---|---|
| **pnorm** | no | | 0 | |

Scale factor for power law index, only if spectrumcontrol=1

| | | | | |
|---|---|---|---|---|
| **binds** | no | | 0 | |

Fitted soft broken power law index, only if spectrumcontrol=2

| | | | | |
|---|---|---|---|---|
| **bbreak** | no | | 0 | |

Break energy for broken power law model, only if spectrumcontrol=2

| | | | | |
|---|---|---|---|---|
| **bindh** | no | | 0 | |

Fitted hard broken power law index, only if spectrumcontrol=2

| | | | | |
|---|---|---|---|---|
| **bnorm** | no | | 0 | |

Normalization for broken power law, only if spectrumcontrol=2

| | | | | |
|---|---|---|---|---|
| **clobber** | no | boolean | yes | T/F |

Clobber existing files?

# 5 Input Files

The filtered event files, products from running `mos-filter` or `pn-filter`, following the particular nomenclature used in the esas package, eg.: *mos1S001-clean.fits* or *pnS003-clean.fits*.

# 6 Output Files

Where MOS data are processed:
`mos`*prefix*`-prot-im-det-`*elow*`-`*ehigh*`.fits` – The soft proton image in detector coordinates.
Where PN data are processed:
`pn`*prefix*`-prot-im-det-`*elow*`-`*ehigh*`.fits` – The soft proton image in detector coordinates.

# 7 Algorithm

# 8 Comments

# References