evqpb

June 2, 2019

Abstract

Event list quiescent particle background creator

1   Instruments/Modes

Instrument	Mode	SubMode
EPIC MOS	IMAGING	FULL FRAME WINDOW
EPIC PN	IMAGING	FULL FRAME WINDOW

2   Use

|	
pipeline processing	yes
interactive analysis	yes

3   Description

The task **evqpb** creates for any given EPIC Full Frame science exposure an event list containing the associated quiescence particle background (QPB) extracted from the Filter Wheel Close data (FWC) repository. The event list containing the expected QPB, or instrumental background, can be used to correct spectra or images by subtracting this background component.

The task takes as input a science EPIC event list. This file will be used as a skeleton (keywords, EXPOSUXX and GTIs extensions) to create the associated QPB file. It also uses the Attitude History file and the SAS ODF environmental variable from the science exposure to properly project into sky-coordinates the events that will make the associated QPB file.

As the associated QPB event list contains less photons than the observation science data, we apply an oversampling factor F, which takes F times more exposure time of FWC data than the original science observation. The user can define this oversampling factor using the parameter `exposurefactor`.

To generate the associated QPB event list, events from the CCF are selected based on proximity in time to the science exposure and around the central time of the exposure. An oversampling factor F, will take F times more exposure time to generate the associated QPB event list than the original science observation. Data accumulates CCD by CCD until the users oversampling exposure time is reached.
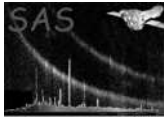
Once the FWC data have been accumulated, **evqpb** randomly distribute the FWC data events among the frames of the current science observation. Then, attcalc is run to re-project the events from detector coordinates to sky coordinates.

4   Introduction

The EPIC CCD cameras on board XMM-Newton are equipped with a filter wheel system and 6 different filter setups. One of this is a CLOSED filter. Exposures taken with the filter wheel in the CLOSED position are dominated by the instrumental background and can be used to model and subtract the internal instrumental background. This is composed by:

- Electronic readout noise (at lowest energies)

- High energy particles producing charge directly in CCD and Camex

- Particle induced X-rays (continuum and fluorescent lines), generated inside the camera

- Thermal CCD noise is negliglible

Filter Wheel Closed (FWC) event lists exist and are available through the SOC web pages for EPIC-pn and EPIC-MOS for the different EPIC modes. evqpb makes use of the CCF containing only FWC event lists corresponding to EPIC-pn Full Frame (FF) Mode and EPIC-MOS Full Frame (FF) Mode. It is highly recommended not to combine event lists from different submodes since line widths and pattern fractions are slightly different for each of the EPIC readout modes.
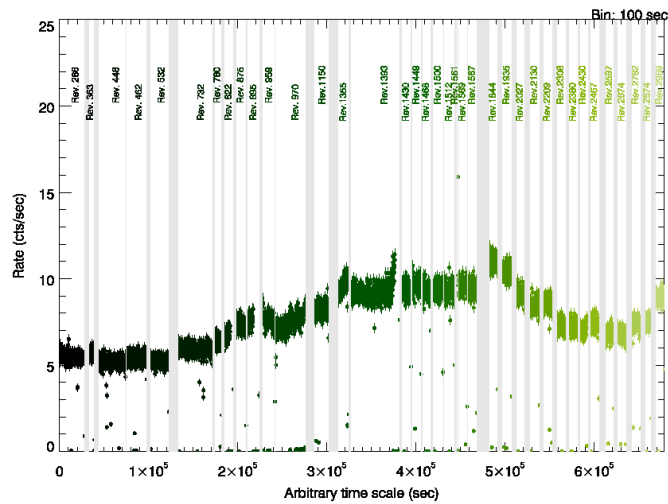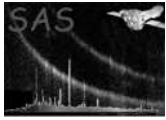

Fig.1 shows as an example the EPIC-pn FF FWC CCF events in a 100 seconds bin light curve. The filter expression used to create this light curves is ($FLAG == 0\&\&PATTERN <= 4$).

5 Parameters

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

Parameter	Mand	Type	Default	Constraints
table	yes	filename		table specifier

EPIC Full Frame event list

attfile	yes	filename		Attitude History file

Attitude History file of the current exposure

exposurefactor	no	integer	2	

Oversampling exposure factor used to accumulate FWC data

outset	no	filename	evqpb.fit	

Output file name

overwritesubmode	no	boolean	no	

Overwrite full frame submode check

6 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.

WrongInstSubmode *(error)*
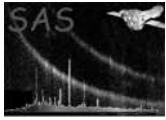   evqpb can only be used in full frame mode

SubmodeCheckingDisabled *(warning)*
    This should be only used for testing purposes.
    corrective action: This warning only appears if parameter overwritesubmode is enabled.

7 Input Files

    1.

8 Output Files

1.

9 Algorithm

10 Comments

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References