

XMM Data Reduction

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Coding Wins and Losses

What is XMM data?

The X-ray Multi-Mirror mission

Pre-requisites

Applying the pipeline

Implementation

Scripting

Post-pipeline

Flaring

Exporting



Wins & Losses

- ▶ Any wins from the past week?
- ▶ Any losses from the past week?
- ▶ Any news from the past week?

X-ray Observatory

- ▶ PSF dependent on 'off-axis' or 'on-axis' observations and photon energies.
- ▶ Effective area characterised by:

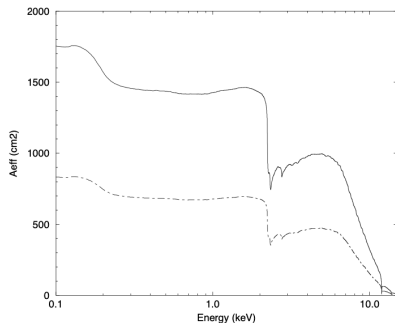


Figure: Jansen+2000

Downloading the data

- ▶ Two ways to download the data:
 - ▶ ESA: Directly or via staging
 - ▶ Demonstration by Tom
 - ▶ HEASARC: less user-friendly but it does contain easy access to all telescope archives
 - ▶ Demonstration by Darius

Software Requirements

HEAsoft

- ▶ A common X-ray software package, but a pain to install locally.

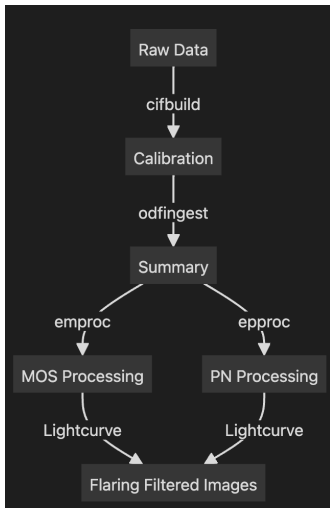
SAS

- ▶ Collection of libraries to reduce XMM observations. Also a pain to install locally

Solutions:

- ▶ Could use a docker image (See [meetup on docker containers](#))
- ▶ Could use Typhon (running on Rocky 8)

The Build



- ▶ Fetching calibration files
- ▶ Creating an observation summary
- ▶ CCDs of the EPIC imager
 - ▶ MOS1
 - ▶ MOS2
 - ▶ EPOC

Julia script

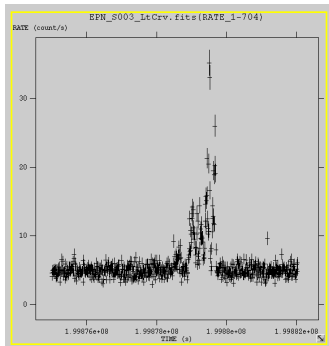
Following the XMM data reduction documentation, Bulk of reduction completed within XMM-Data-Reduction

- ▶ Needs julia set up with package: ArgParse
- ▶ Easy implementation in command line using:

```
julia XMM-Data-Reduction.jl --[Arg]=[input parameter]
```

- ▶ All arguments have default settings based on a long observation of an AGN

Flaring



- ▶ Flaring is a background affect
- ▶ Currently, needs to be removed manually
 - ▶ Find stable count rate for each CCD
 - ▶ Create a Good Time Interval file to filter the observation

Compatibility with other analysis software

- ▶ SHERPA
 - ▶ Used primarily for Chandra analysis
 - ▶ Built off XSPEC
 - ▶ Requires users to generate rmf and arf files
- ▶ XSPEC
 - ▶ General X-ray analysis software
- ▶ SpectralFitting
 - ▶ Better X-ray spectral software
 - ▶ Written in Julia
- ▶ DS9
 - ▶ Fits images visible within ds9