



XMM-Newton Cross-Calibration Archive data processing

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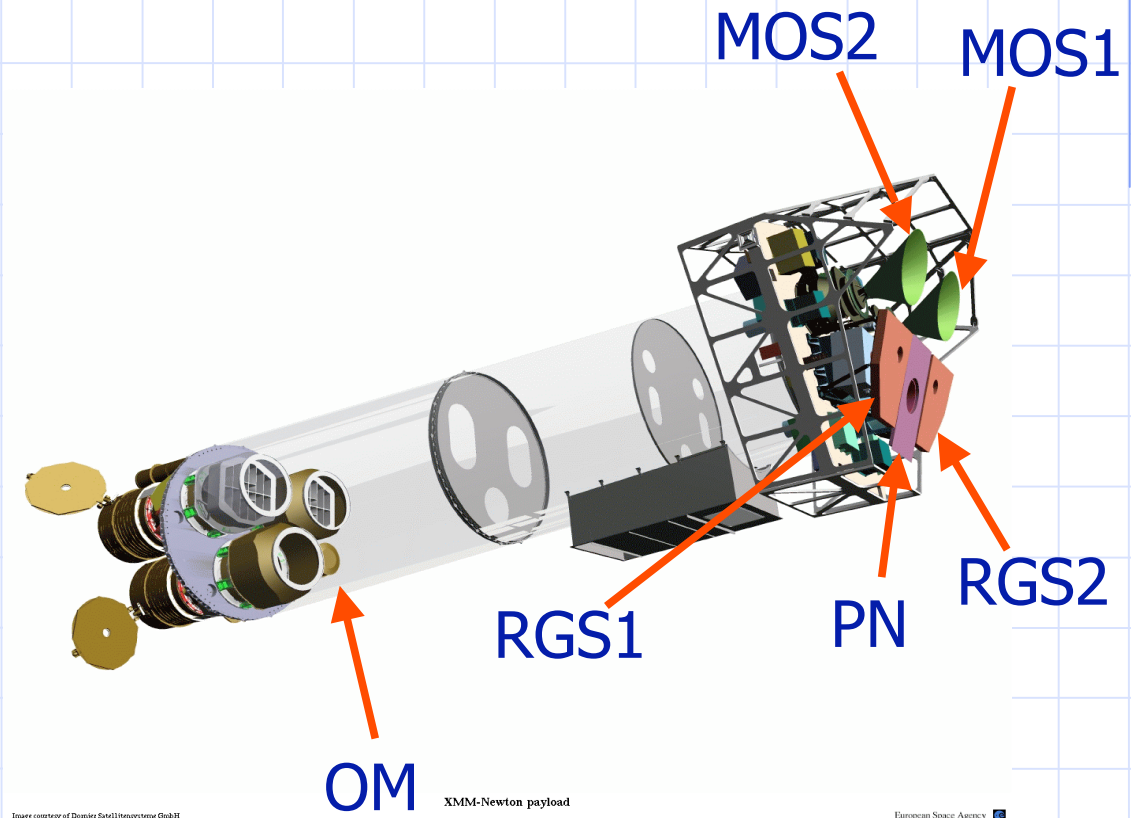
Overview

- Calibration archive
 - overview and structure
- Old data reduction package
 - calibration process
- XARV package
 - improvements

XMM-Newton: EPIC and RGS detectors

- 5 independent cameras
 - EPIC MOS1, MOS2
 - Array of 7 CCDs
 - EPIC PN
 - Array of 12 CCDs
 - RGS1, RGS2
 - High resolution spectroscopy

- Observing in X-ray from 0.2-12 keV



Why do we need a calibration archive?

- to verify the calibration systematically on a huge number of observations → reliable statistics
- unique, fast and automated extraction process



Project Aim

- cross calibration of X-ray sources for EPIC-MOS, -PN and RGS detectors
 - testing and extending a new master processing package (XARV)
 - extending the archive
 - introduce extended sources

Calibration archive : Overview

- contains 52 individual objects
- 254 observations
 - 38: AGN/LMXB/HMXB/Pulsars/NS
 - 10: Stars
 - 4: SNR
 - 0: Galaxy clusters
- 21 targets with 92 observations ready
 - no Stars, SNR or Galaxy clusters yet!

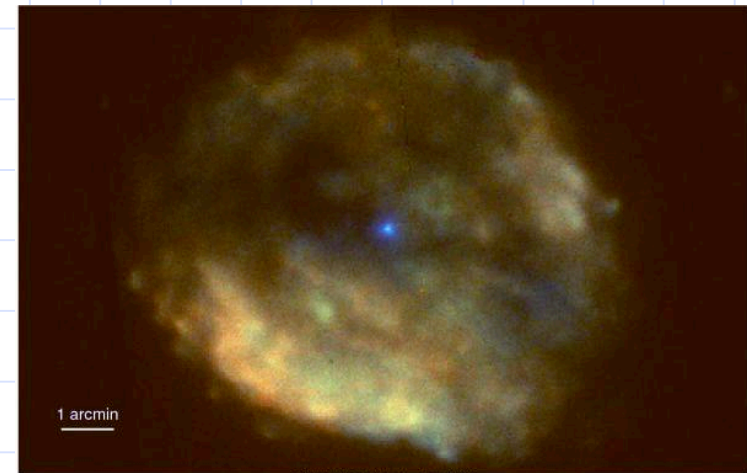


Image : ESA



Image: ESA

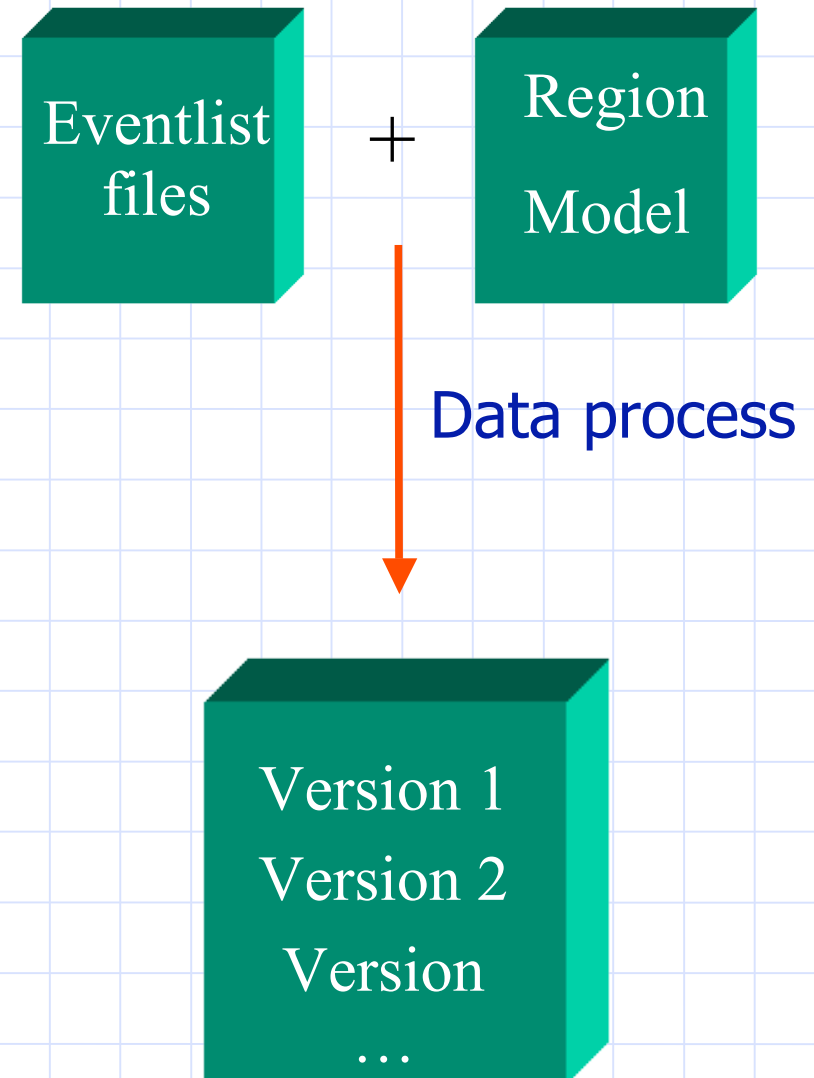
Calibration archive: Structure



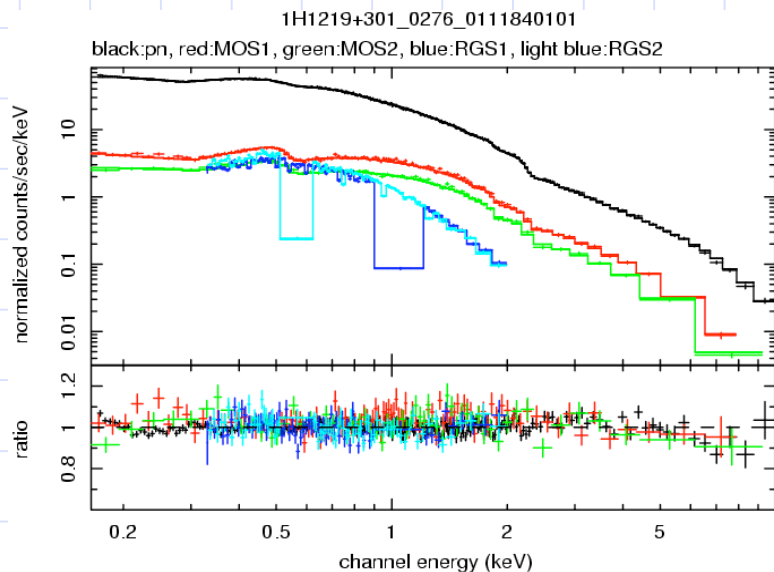
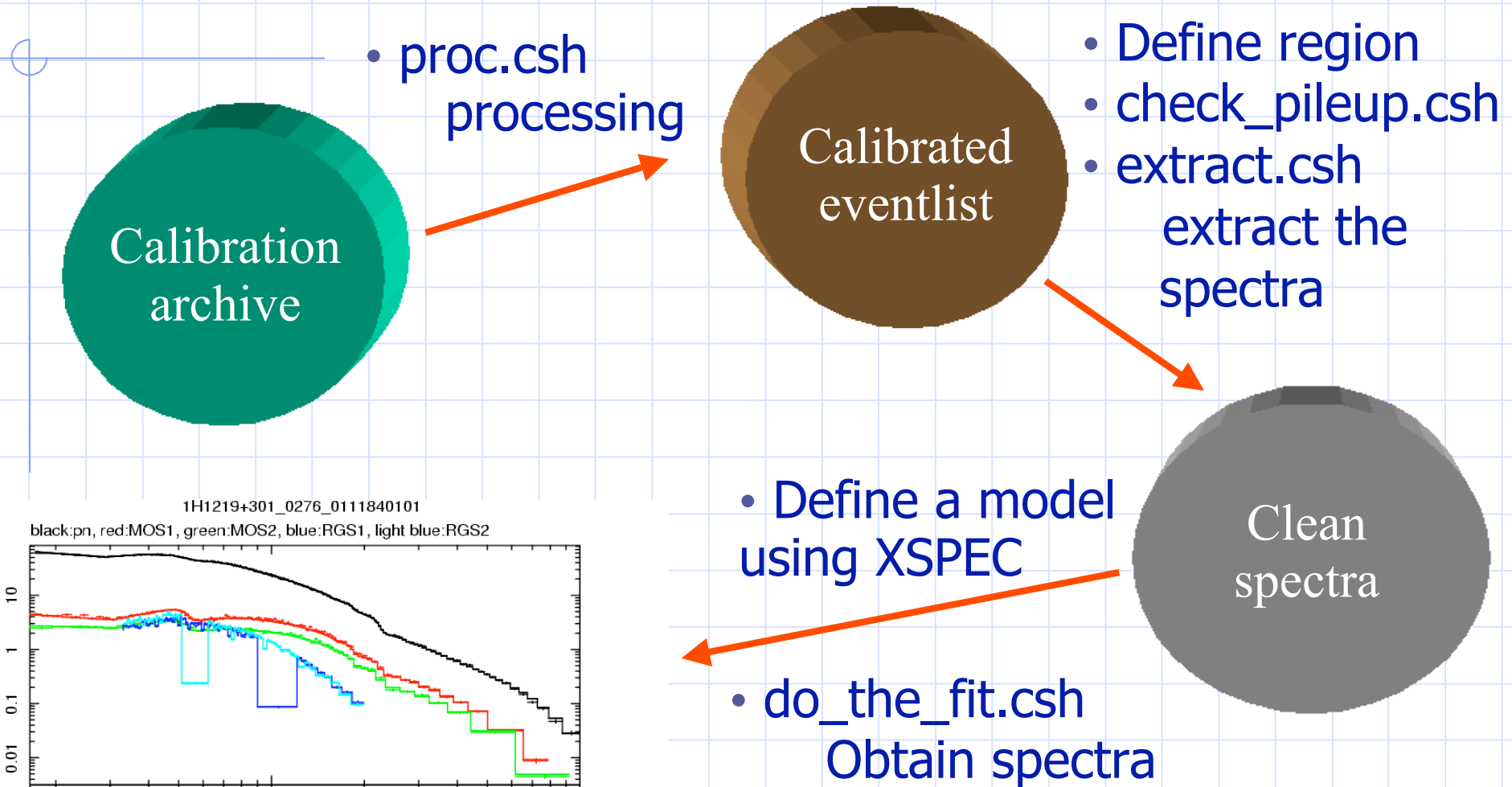
calibration archive contains

- eventlists of all observations of targets
- definition of source and background extraction regions
- spectra, response files
- model: parameters to fit spectra

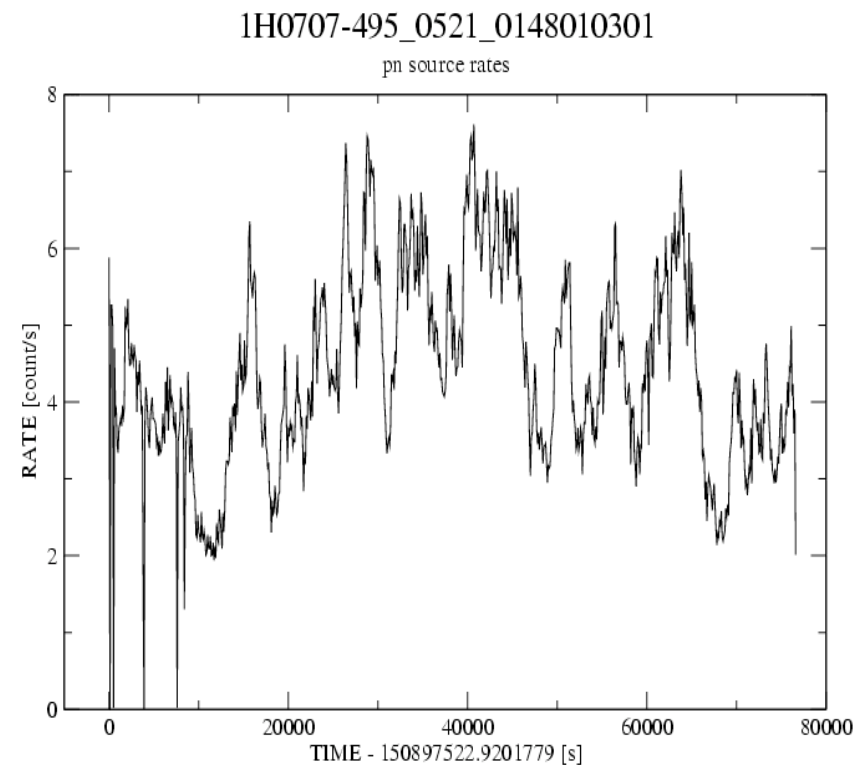
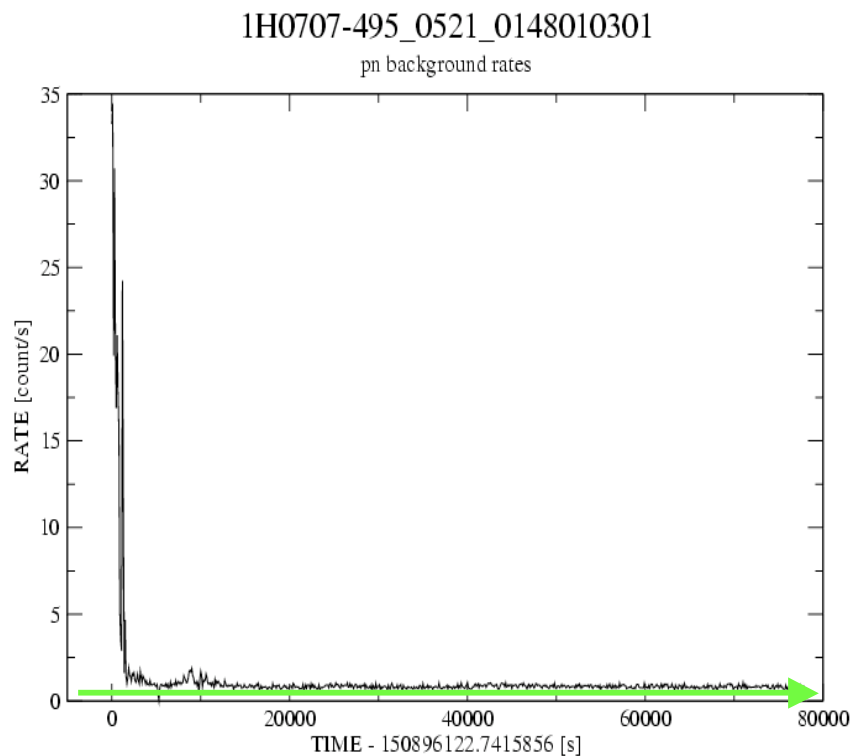
version control



Old package



Calibration process : Flarescreening



(all counts > 10 keV) < 1cts/sec

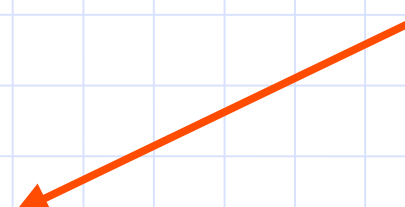
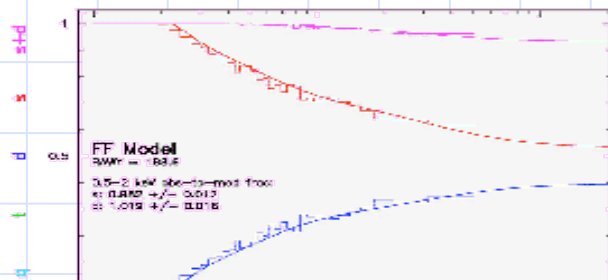
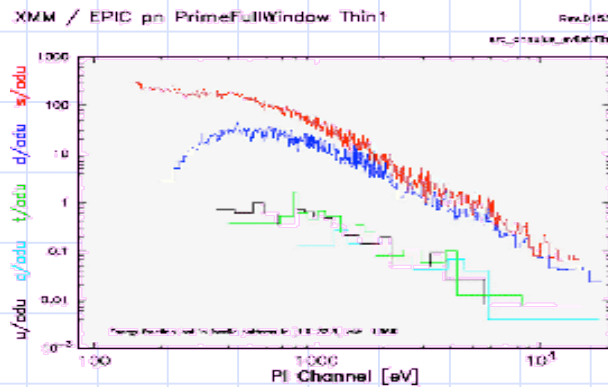
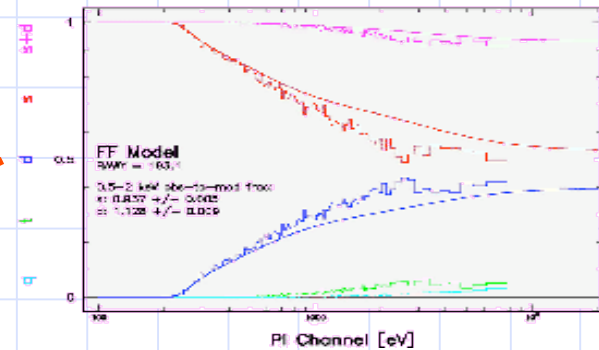
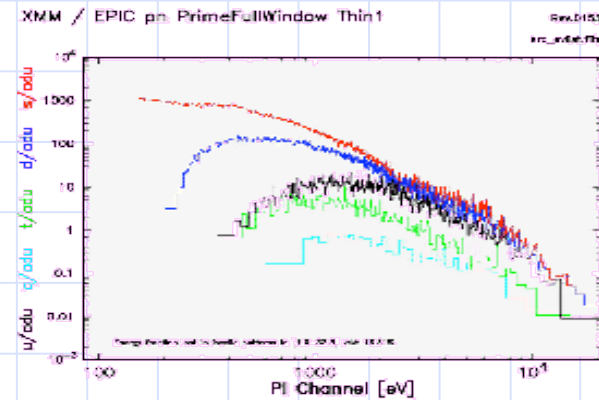
all source counts after filtering

Calibration process : Pileup

Pileup: Two or more photons deposit in the same pixel during readout

Photon pileup or pattern pileup

→ Affects spectra and light curves



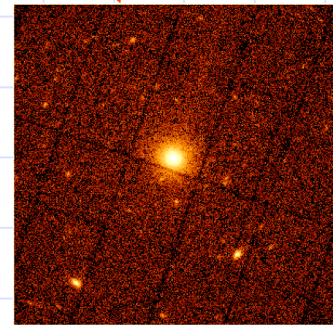
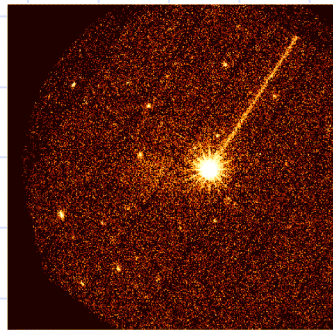
Solution:

- define two annuli, R_{in} , R_{out}
- R_{out} remains fixed
- R_{in} define using xmmselect to exclude pileup region
- Run proc.csh
- SAS task: epatplot

Why we need a new package

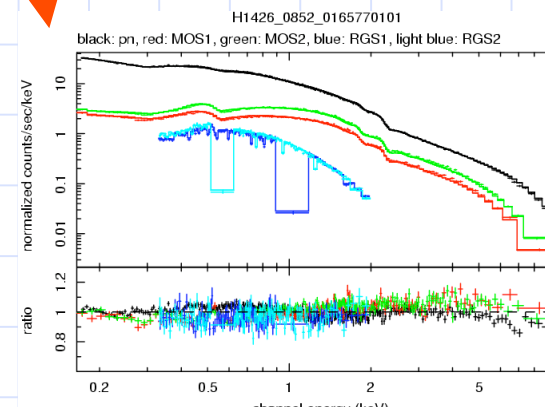
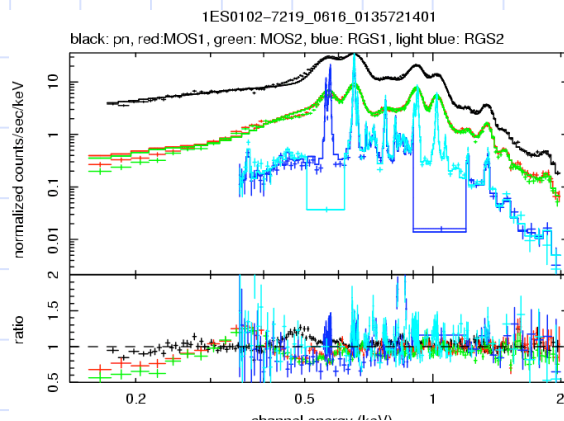
Old extraction process does not take into account source characteristic

- source extent - point or extended e.g./ clusters, SNR
- `rmfgen`, `arfgen` need to know how flux is distributed

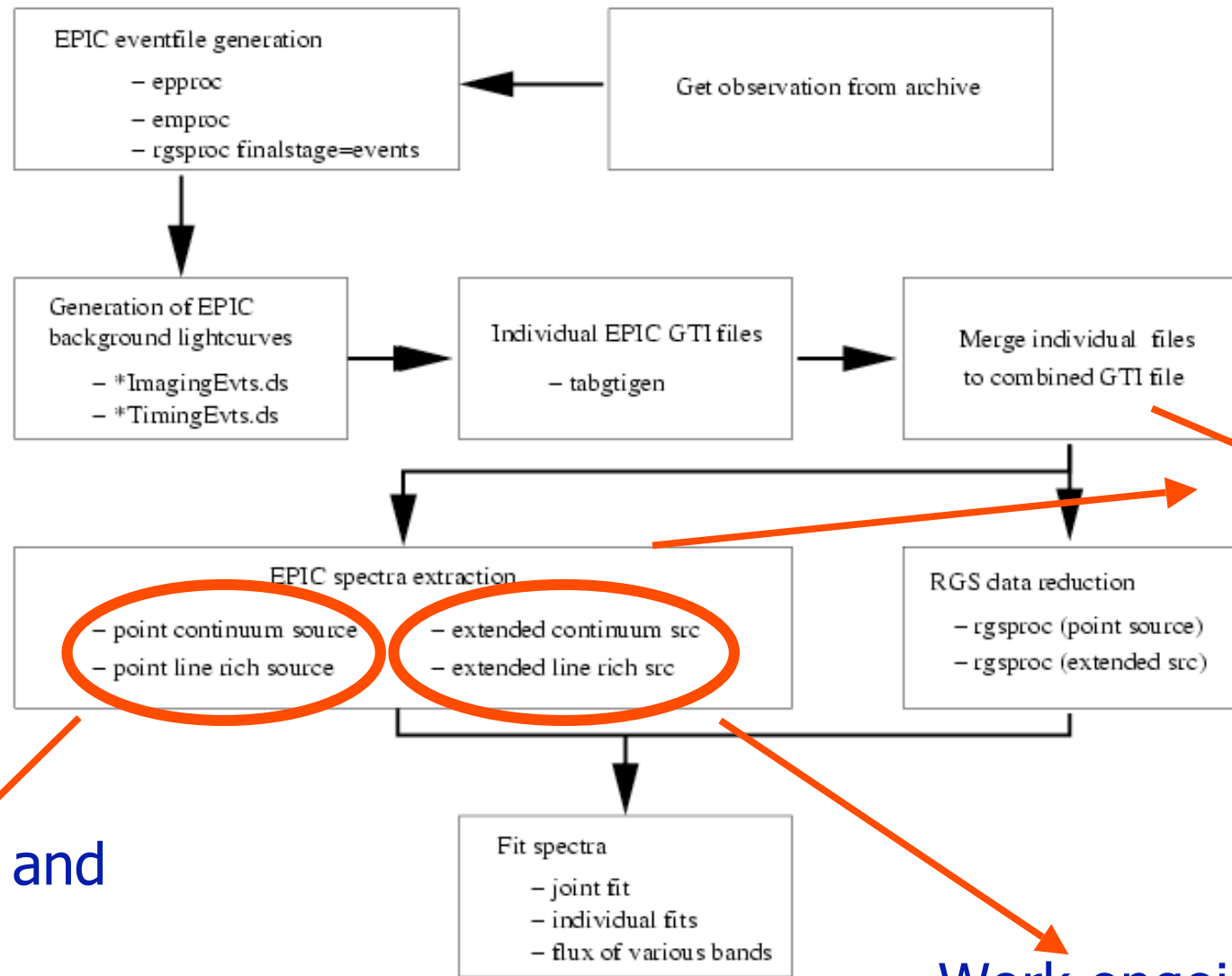


- spectral type – line, continuum

- correct pattern selection for source and background regions



XARV package: automatic data reduction



New processes

Corrected and working

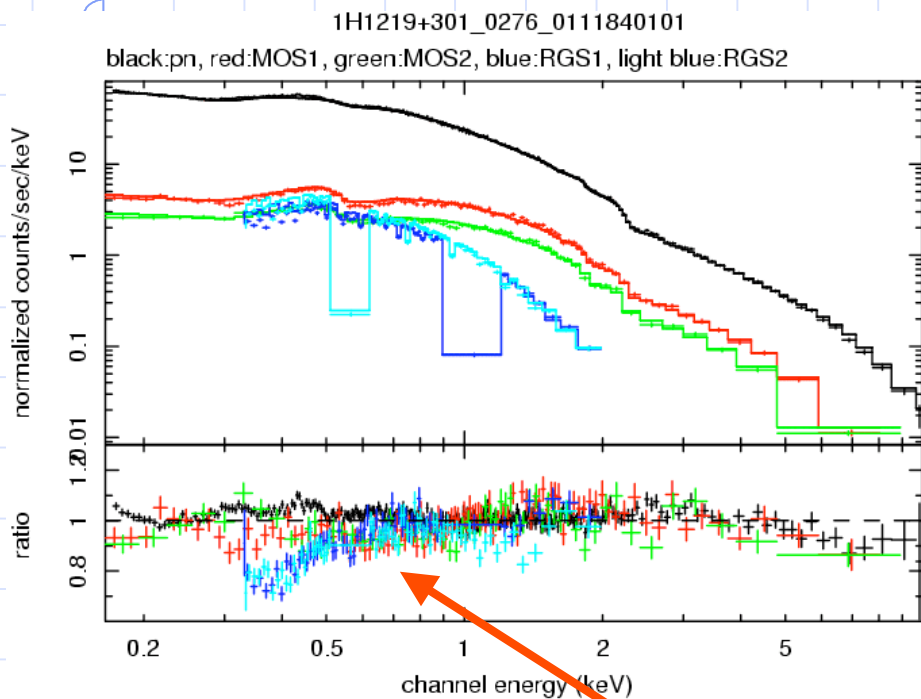
Work ongoing

Improvements



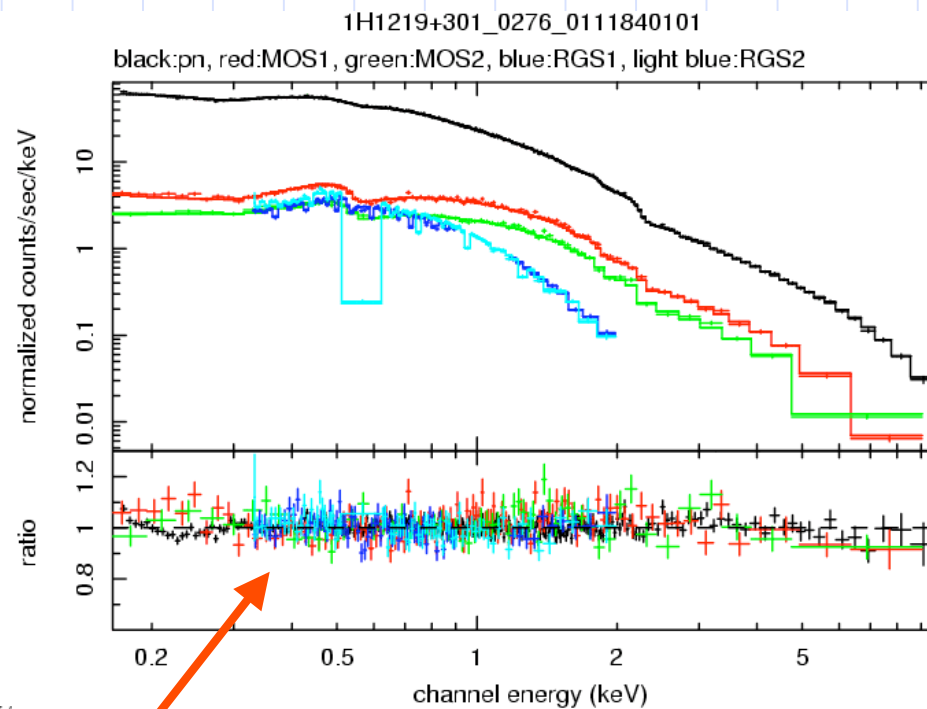
- Old package – large scripts
- XARV
 - built of modules
 - more flexibility (keywords)
 - easy maintenance
 - logfile generation
 - better error handling
 - (will be) fully documented :-)

Example: 1H1219+301



27-4

SAS 6.5



11-Apr-2007 20:00

SAS 7.0

RGS fit improved

Web interface



- Previewtool

Calibration preview tool - XMM-Newton data

This website gives the possibility to judge the calibration situation of the XMM-Newton and Chandra instruments by comparing joint and individual fits and their parameters on various targets and observations.

Preview Tool:
instruments: all
select a target
add target

Additional Tools:
show all available joint fits

show all in the archive available joint fits
select a version: xmmas_20060628_1801-7.0.0_ccf_pub show

evolution of Parameter
Flux - statistical evaluation of fluxes
Flux - output fluxes in various energy bands for all observations
Flux - evolution of flux in various energy bands for one target as a function of evolution
Publish news
Recent archive

PKS2155-304 0411780201 (rev: 1340) hide plot parameter over all versions plot flux over all versions Observation Log Browser for 0411780201

xmmas_20060628_1801-7.0.0_t5_mosqeff17_rgseffa99 see parameter for all cameras see flux for all cameras
xmmas_20060628_1801-7.0.0_t4_mosquanteff17 see parameter for all cameras see flux for all cameras
xmmas_20060628_1801-7.0.0_ccf_pub see parameter for all cameras see flux for all cameras

JOINT JOINT JOINT
PN PN PN
MOS1 MOS1 MOS1

Model	Component	Parameter	Unit	Value	Error
1	TBabs	nH	10 ²²	1.24000E-02	frozen
2	bkpower	PhIndx1		2.62188	
3	bkpower	BreakE	keV	1.22580	
4	bkpower	PhIndx2		2.66913	
5	bkpower	norm		3.49566E-02	