XMM-Newton data reduction 2

- light curves
- flare filtering

Setup for data products

- examine the produced clean event file with “fv PN.FITS.gz”
- copy a file */your_data_path*/pipe/scripts/paraminput into

  /your_data_path/pipe/data/*objname/obsid* (you defined *objname* and *obsid* in the “do_chain” - file
- edit “paraminput” – file:

  - “obsdate” is the DATE-OBS in the event file
  - “pnmode” is FF or EF (FF for full frame, EF for extended full frame as given by SUBMODE keyword in the event file
- nevermind the keywords “pnexcl”, “m1excl”, “m2excl”

Processing the event file

- From now on, processing is run from a different location: */your_data_path/*data
- Copy there a file */your_data_path/*scripts/run_sas.par
- edit keywords objnamelist and obsidlist and create the defined files
- edit keyword “lclimcode” to correspond to your object
- Use “P” for EPICID so that only PN instrument will be used
- nevermind “source_region” and “source_name” at this point
- activate parameters by “source run_sas.par”

Processing the event file

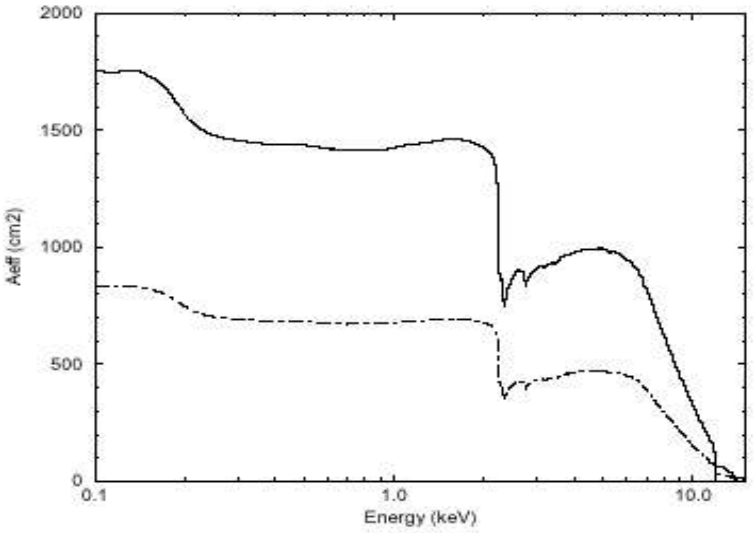
- run 1. stage of processing by “run_sas gt10 1”
- process applies SAS programs “cifbuild” and “odfingest” to organise the calibration information and data files relevant for your object
- process filters out “bad” events (patterns, flag...)
- check that the above process does produce a file

  /your_data_path/data/*objname/obsid*/PN/pn_1000s_gt10.lc

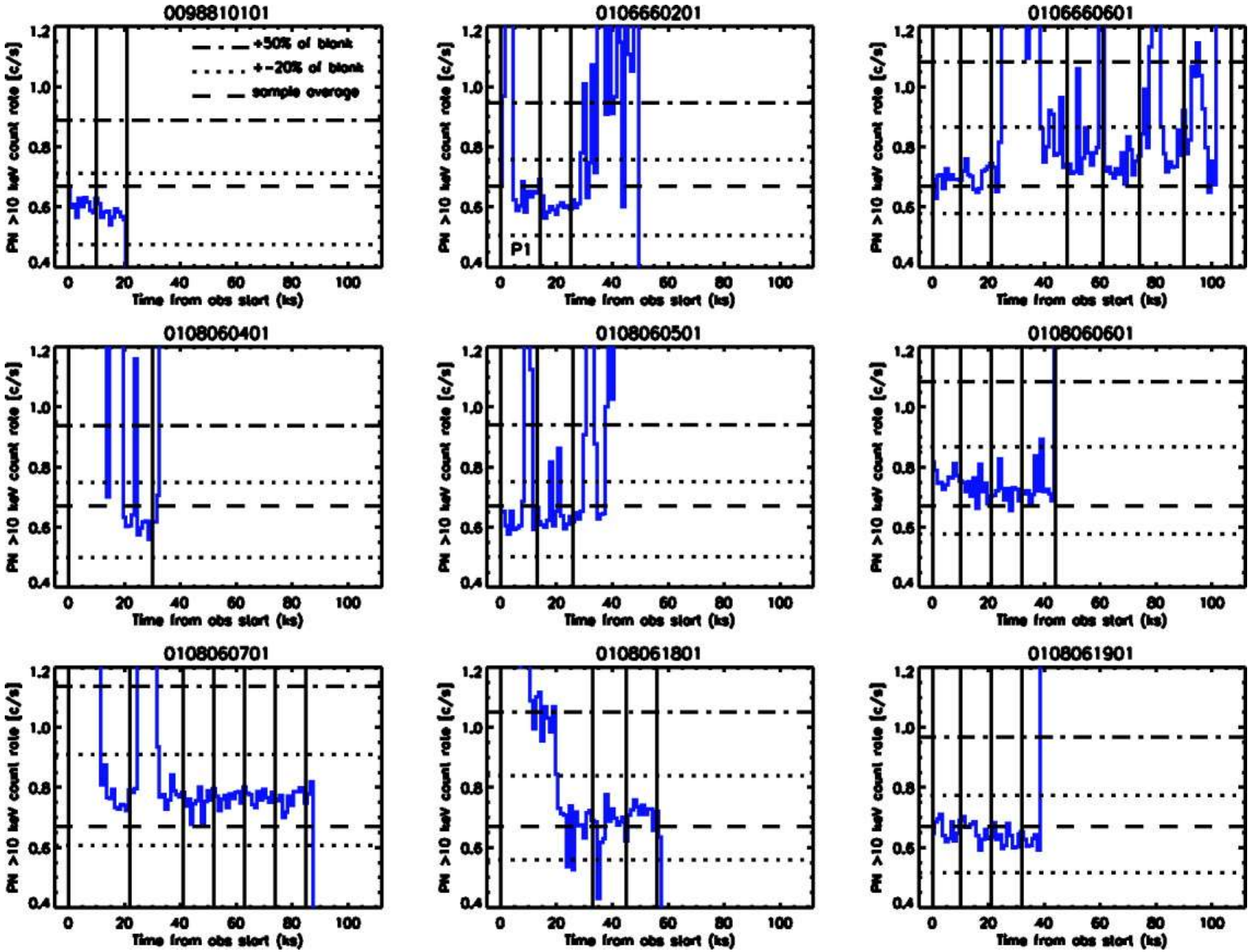
Light curves

- light curve = number of counts per consecutive time bins (see next page)
- XMM-Newton data contaminated by solar particle flares due to high orbit
- at photon energies above 10 keV, the telescope effective area for photons goes to 0
- detectors record events up to 20 keV →
- above 10 keV only particles detectable
- Cosmic Rays quite constant →
- solar flares show up as peaks in the light curve
- >10 keV light curve peaks can be used to define the quiescent periods: accept only such periods when the count rate is within +-20% around the minimum

XMM-Newton telescope effective area



PN light curve examples



Flare filtering

- look at your light curve with FPLOT tool, plotting COUNTS v.s TIME
- make a plot by changing the plot device to postscript: “cpd /ps”
- flares filtered out by creating a Good Time Interval file (GTI)
- create *lclimcode*_pngt10_lolim.list and *lclimcode*_pngt10_uplim.list files where each line gives the lower and upper accepted number of counts in a time bin for a given object (only 1 line in this case, files located at */your_data_path*/data
- *lclimcode* was defined in the “run_sas.par” file
- run this stage by “run_sas gt10 3”
- the process creates a *GTI* file
- check the useful exposure time with “gtisum” tool