Investigation of the XRT XPSF Wings

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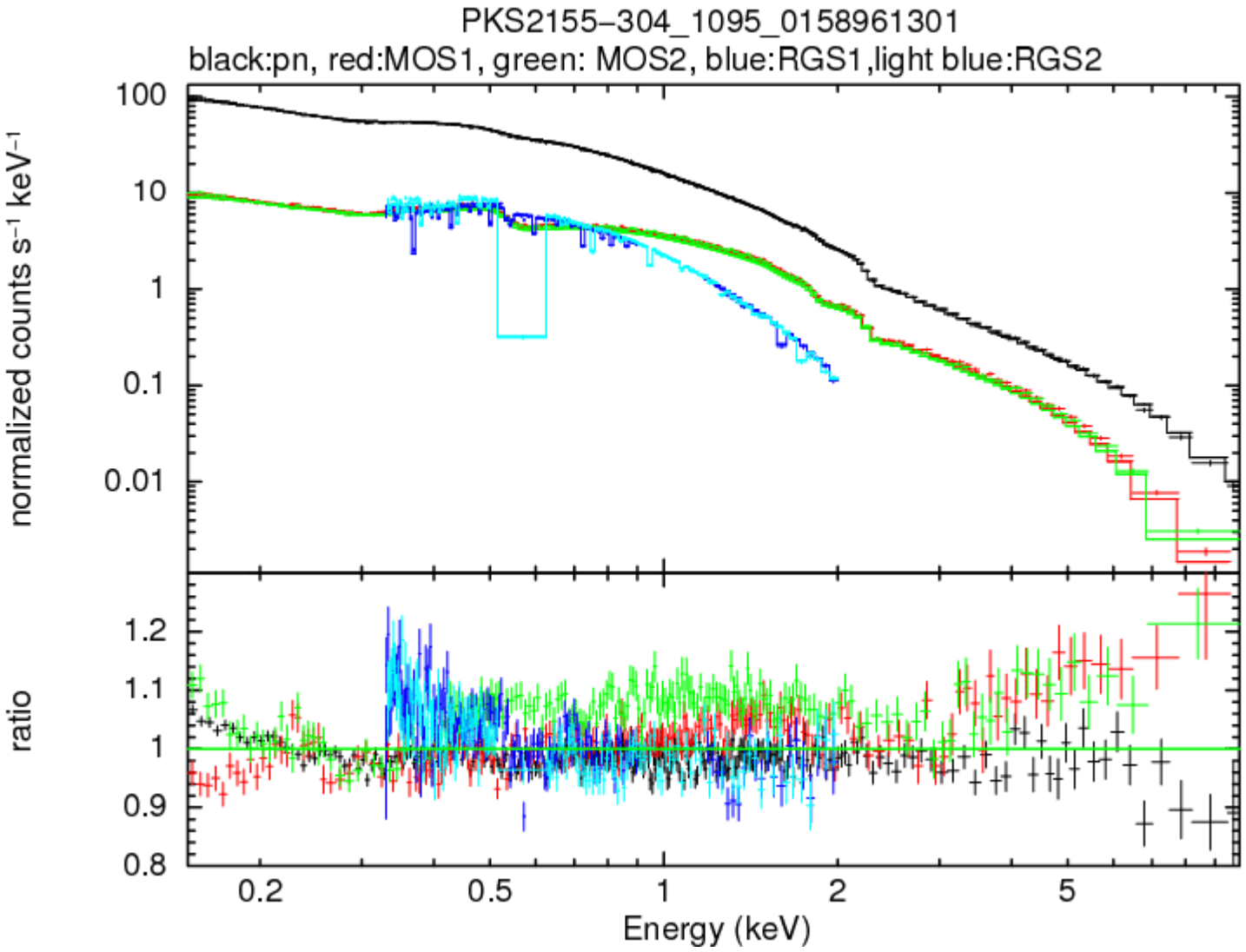
Post SAS 14.0 CCFs

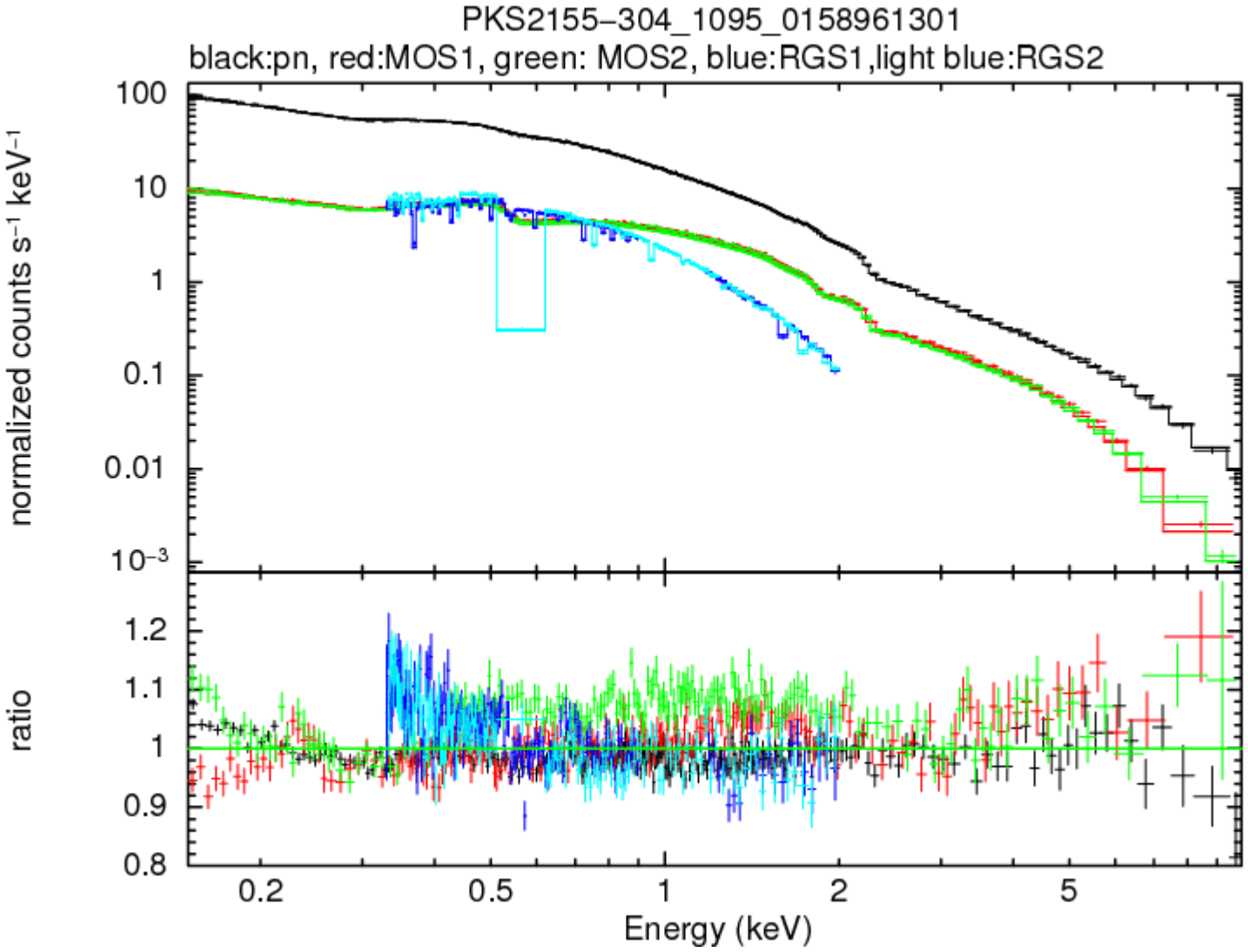


Bright on-axis source

Piled-up

Annular extraction region

XRT3_XPSF_0016.CCF -> XRT3_XPSF_0014.CCF



Bright on-axis source

Piled-up

Annular extraction region

XRT3_XPSF_0016.CCF

XRT3_XPSF_0016.CCF:

- Refinement of the high-energy XRT3 (=PN) PSF

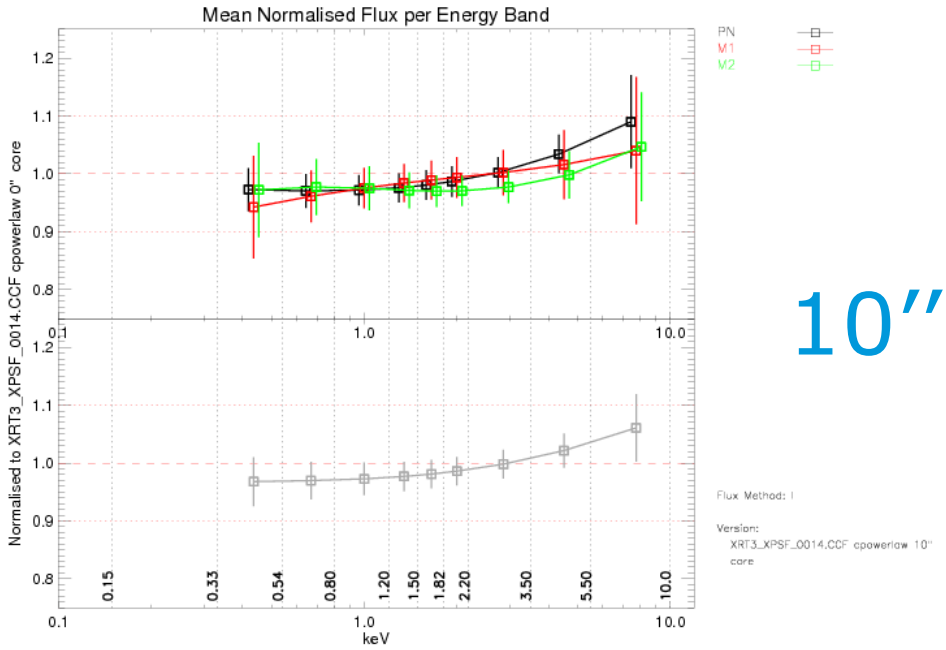
- Based on TI mode data (Mkn 421)

- Optimise parameters describing PSF wings in order to obtain constant measured flux independent of number of excised columns

0014 versus 0016 on Imaging Mode Data

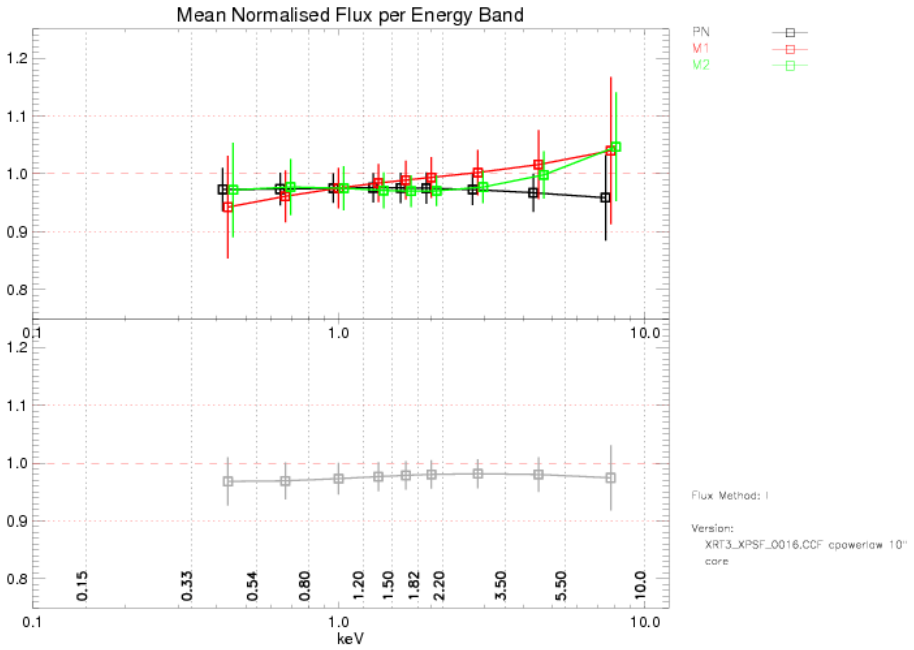
Sample of ~ 30 on-axis non-piled-up sources
Determine band fluxes of various annular regions (varying inner radius) normalised to those of a circular region.

XRT_XPSF_0014.CCF



10”

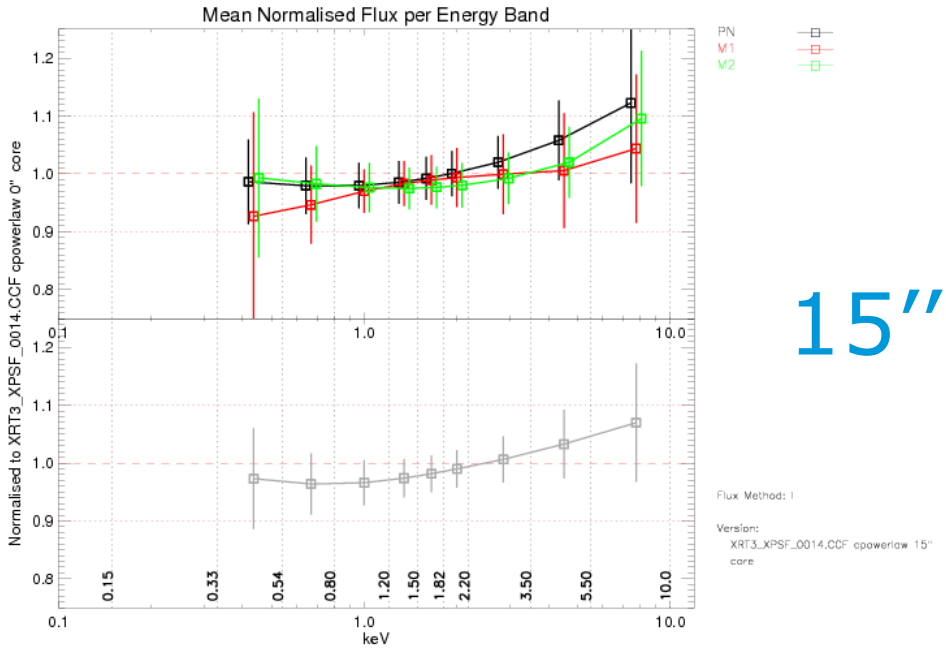
XRT_XPSF_0016.CCF



0014 versus 0016 on Imaging Mode Data

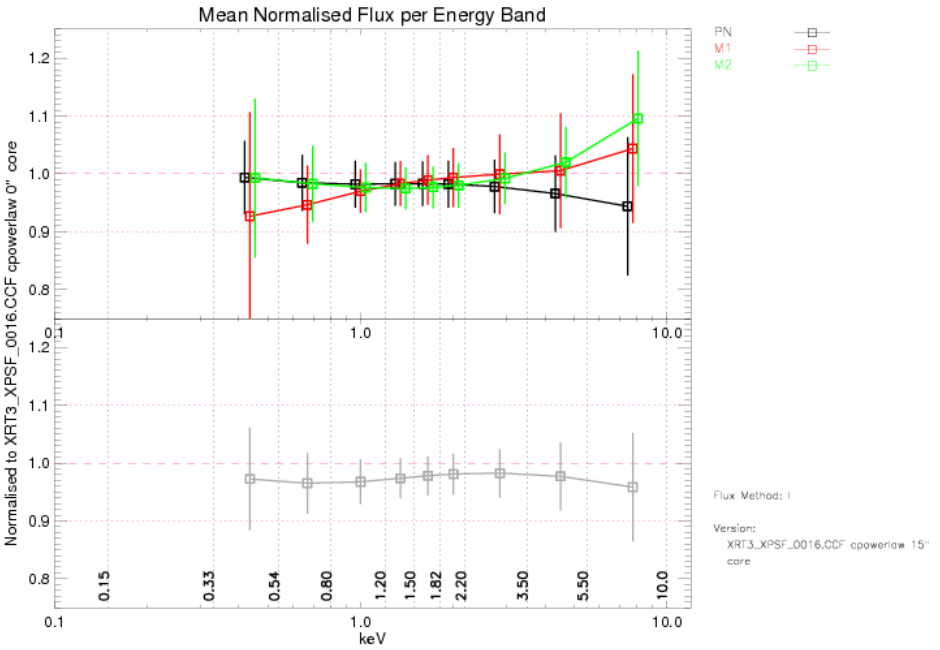
Sample of ~ 30 on-axis non-piled-up sources
Determine band fluxes of various annular regions (varying inner radius) normalised to those of a circular region.

XRT_XPSF_0014.CCF



15”

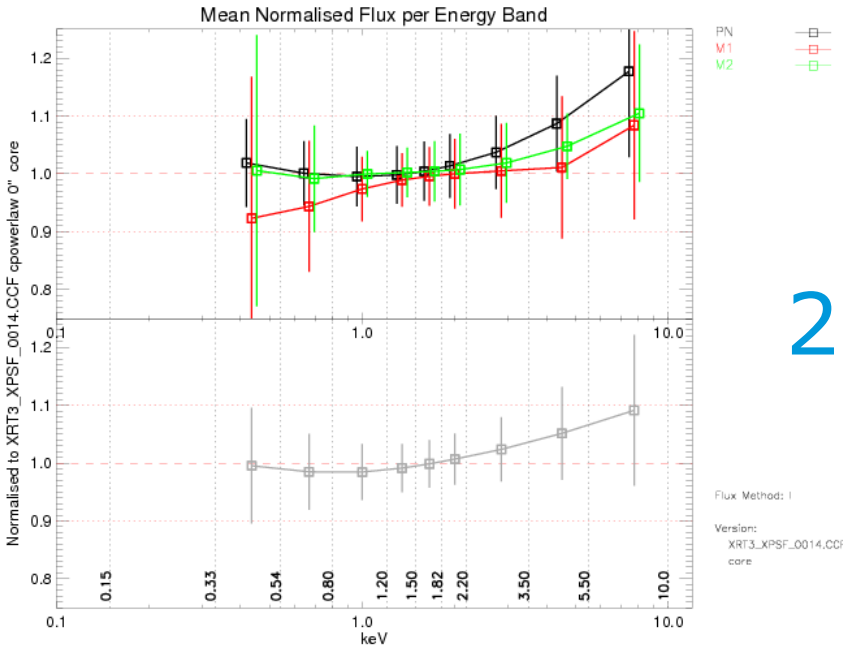
XRT_XPSF_0016.CCF



0014 versus 0016 on Imaging Mode Data

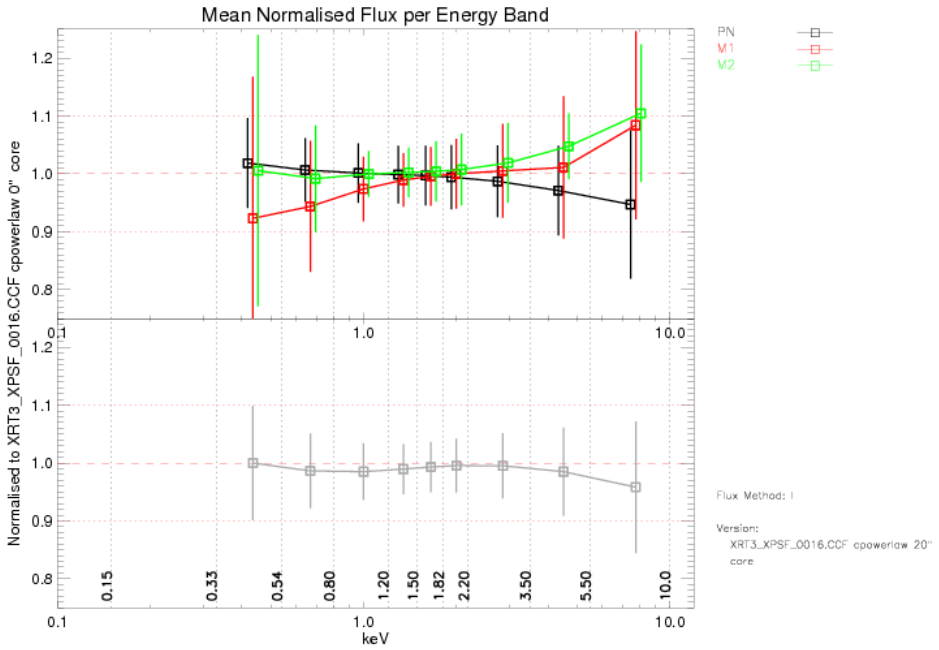
Sample of ~ 30 on-axis non-piled-up sources
Determine band fluxes of various annular regions (varying inner radius) normalised to those of a circular region.

XRT_XPSF_0014.CCF



20”

XRT_XPSF_0016.CCF



Do MOS XRT PSFs Need Modification?

XRT_XPSF_0016.CCF does what is advertised for PN

Do the MOS XRT PSFs need a similar modification?

Test this, using the same method as used for deriving 0016

But on MOS (and PN) imaging mode data

Using a sample of ~ 30 on-axis non-piled-up sources

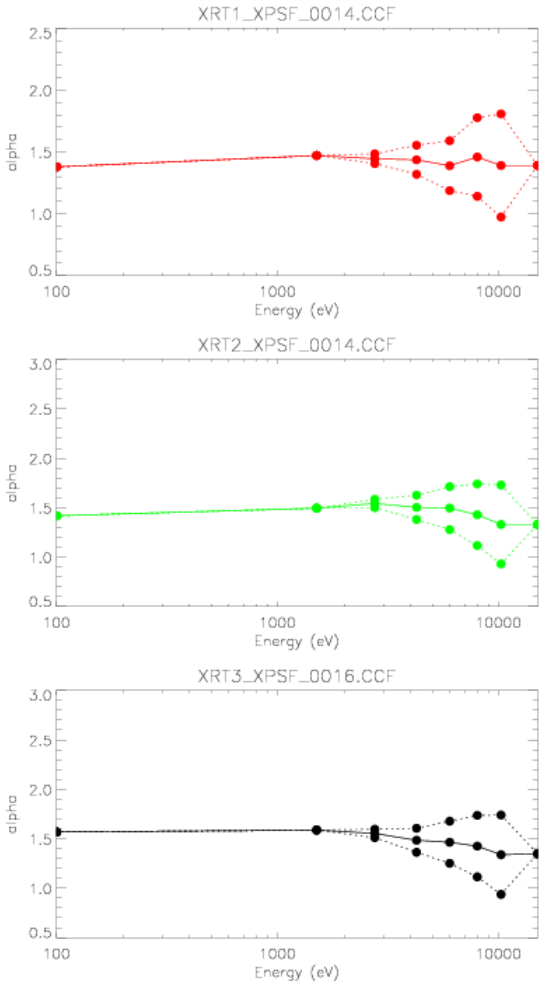
Method

Sample PSF parameter space within reasonable limits.

5 PSF parameters(E):

- beta2d core radius, r0
- beta2d power-law slope, alpha
- ellipticity, epsilon
- gauss2d FWHM
- gauss2d-to-beta2d normalisation

XRT3_XPSF_0016 essentially differed in alpha:
0% at 2keV up to -16% change at 10.5 keV.



Objective

For each:
- alpha parameter value, and
- annular inner radius

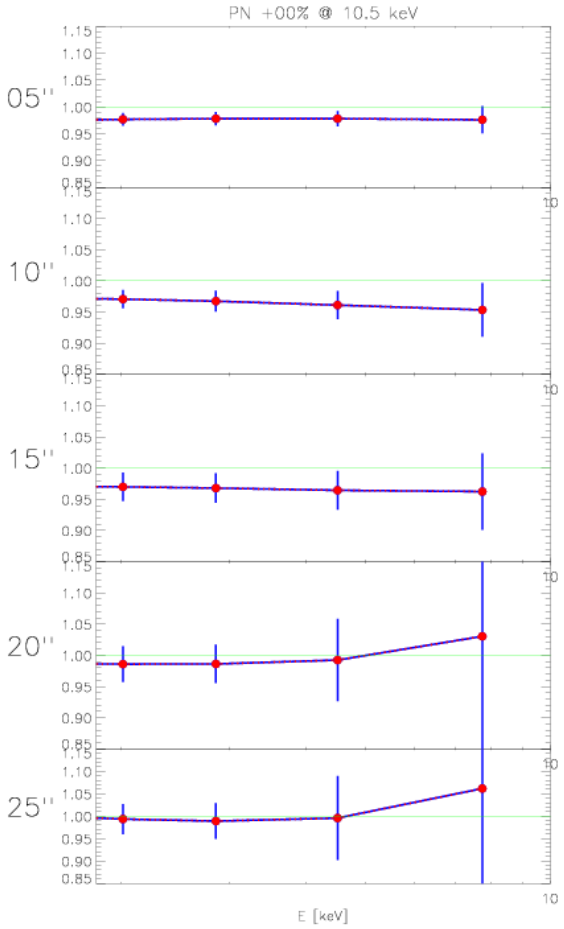
determine the mean band fluxes.

Normalise to those of a circular extraction.

Determine the parameter value for which the energy dependence of the flux ratios is minimal, considering the set of annular inner radii.

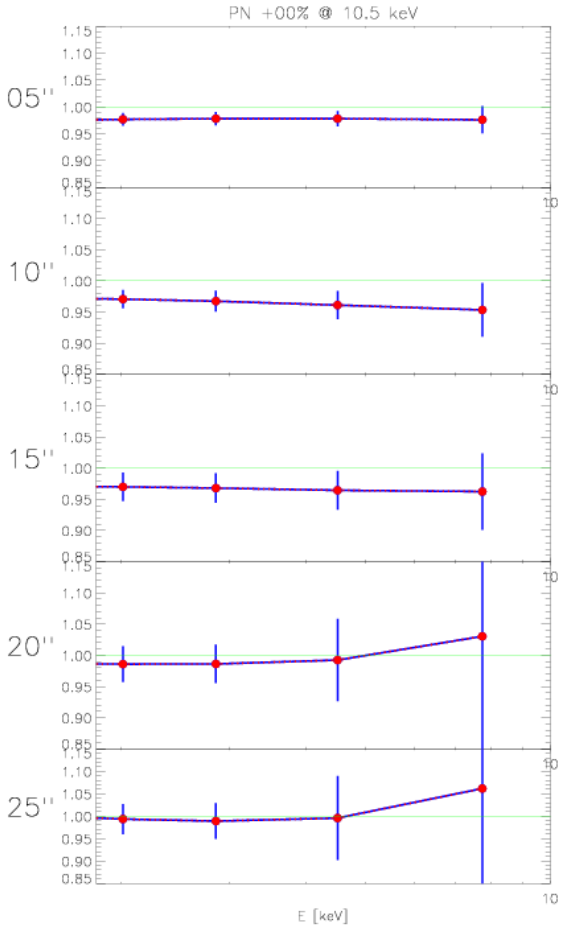
Results for alpha

PN: ~0%

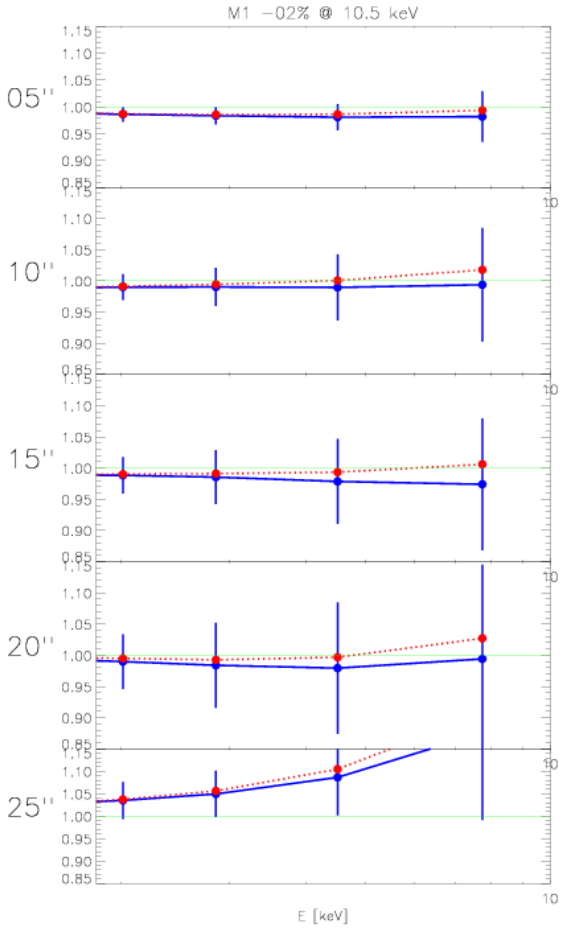


Results for alpha

PN: ~0%

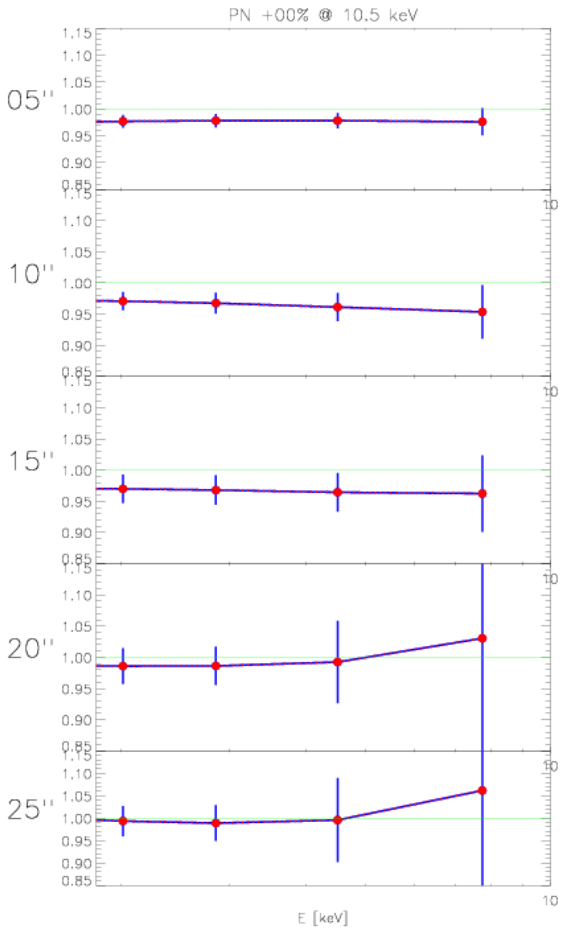


M1: ~0%

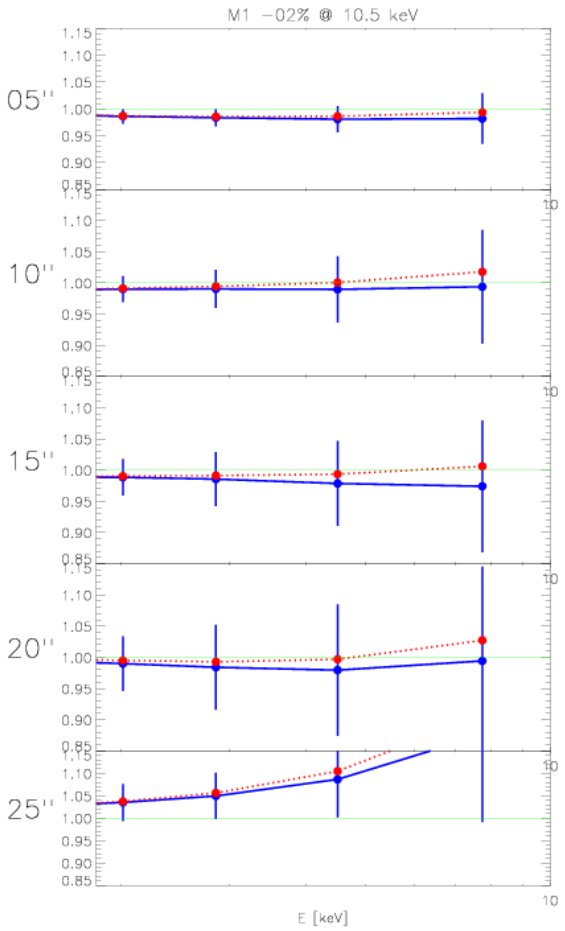


Results for alpha

PN: ~0%



M1: ~0%



M2: -10%