

## Checking encircled energy by spectral fitting

**Goal :** check that fitting results for piled-up point sources are independent of exclusion radius, for spectral shape as well as for absolute flux

Result depend on : 

- correctness of Encircled Energy Function
- effect of pile-up

**Data :** Source GRS1758-258

MOS 1 & 2 in Small Window ~ 22 cts/s ~ 6.6 cts/frame

PN in Large Window ~ 52 cts/s ~ 2.5 cts/frame

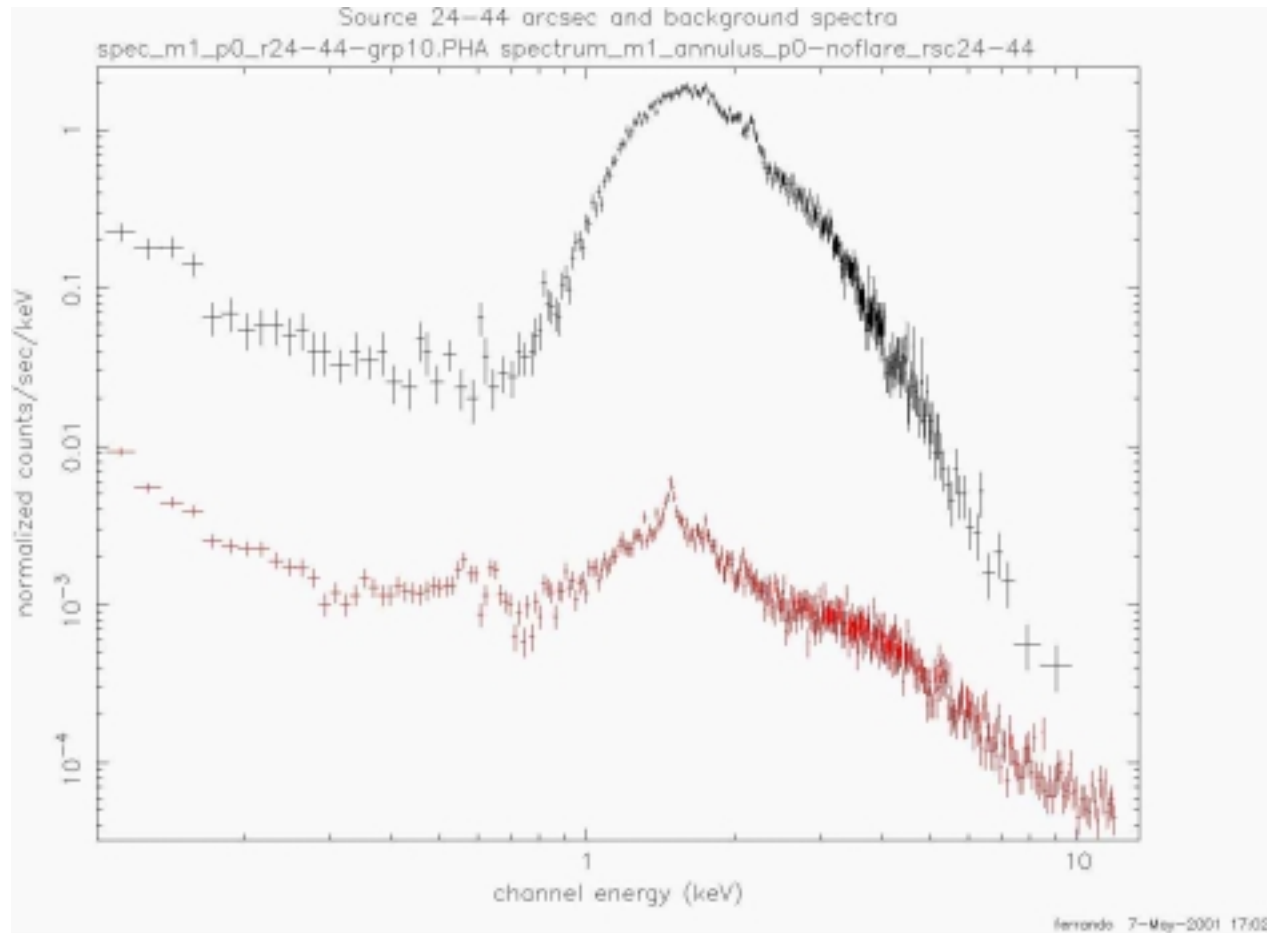
Analysis performed with Andrea Goldwurm (Saclay) and Pedro Rodriguez (Vilspa). PN LW processed in May by MPE.

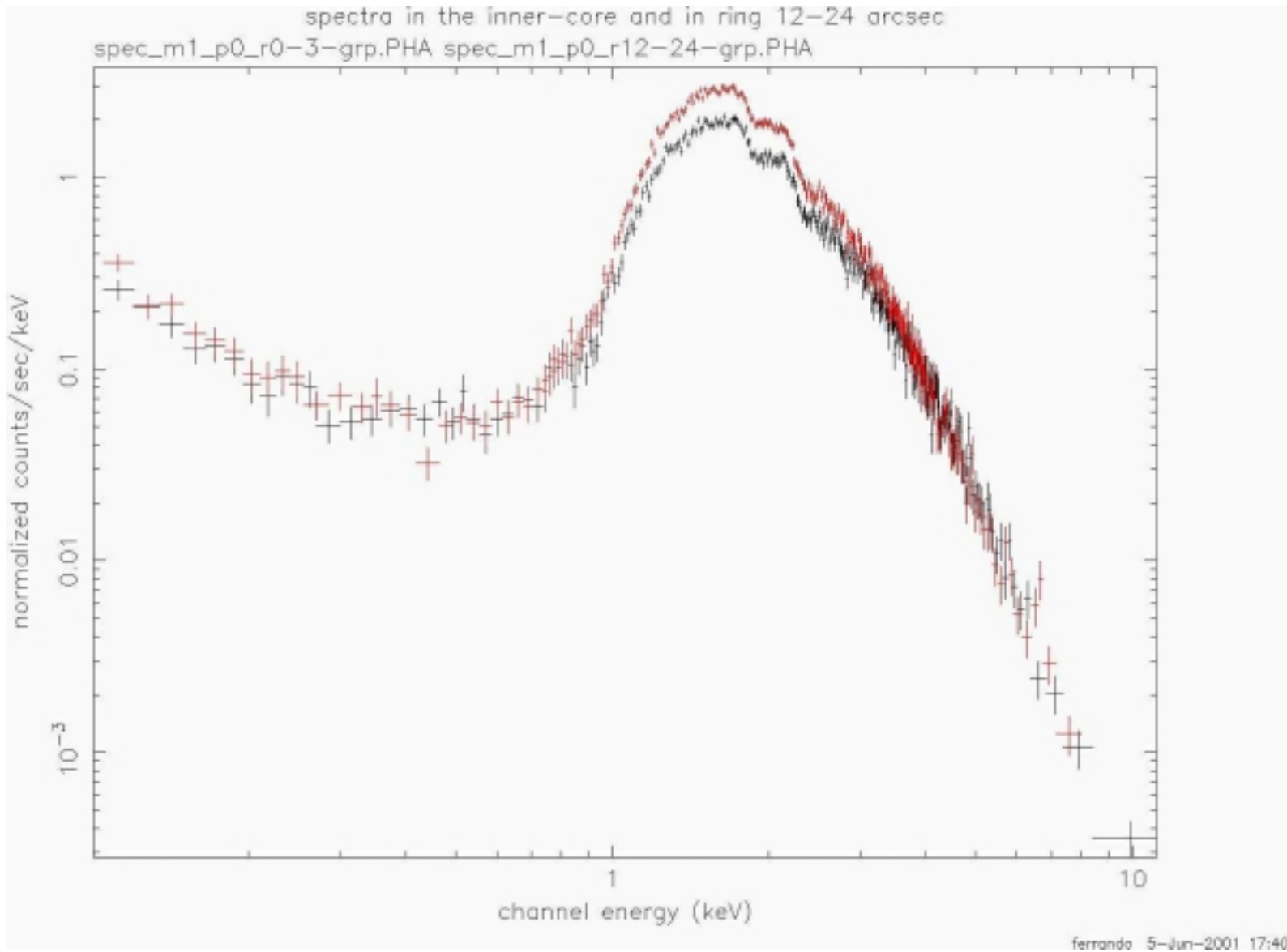
Updates the presentation at last CalOps meeting, under pile-up title, which was using “old” PSF description

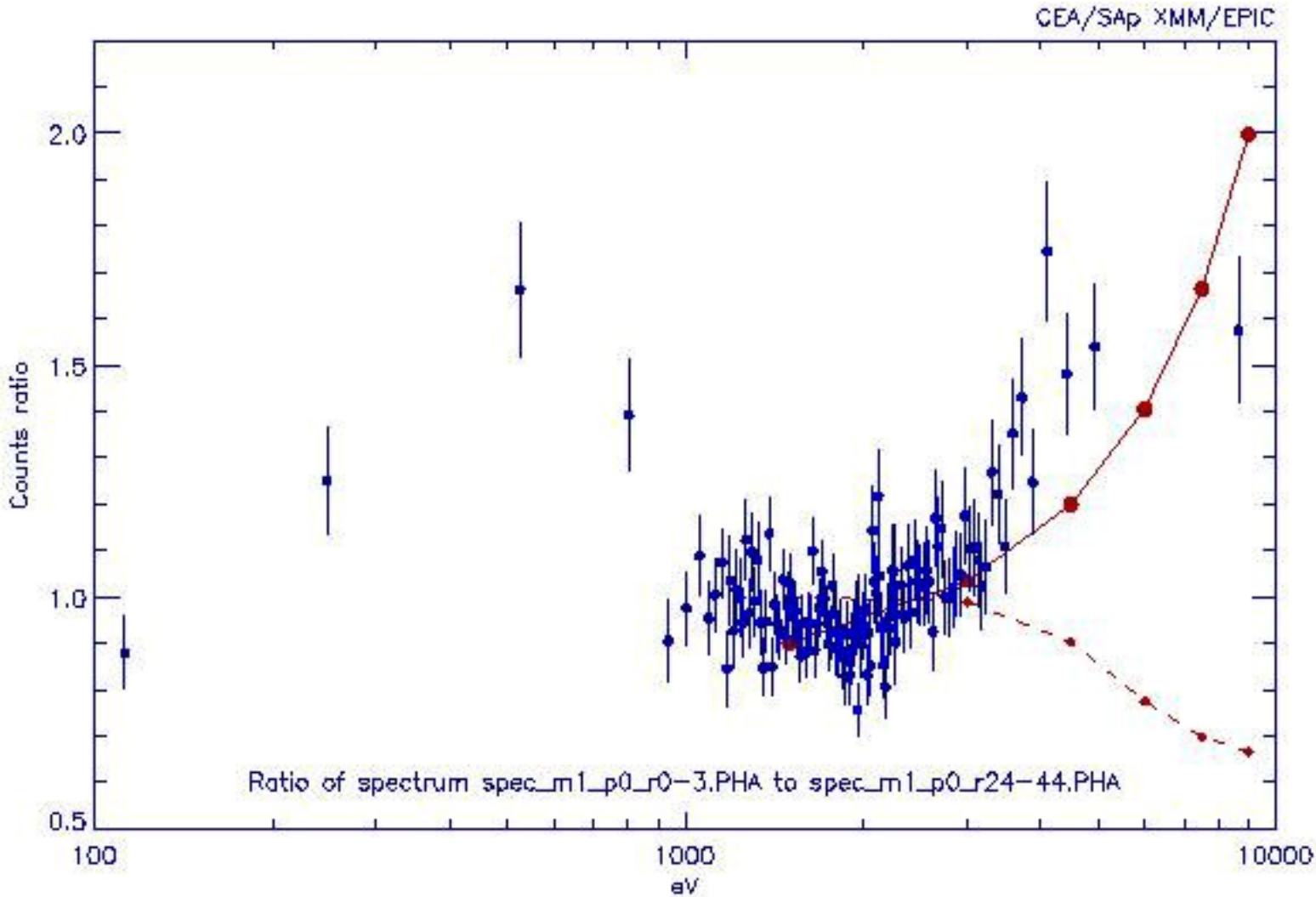
## Checking encircled energy by spectral fitting

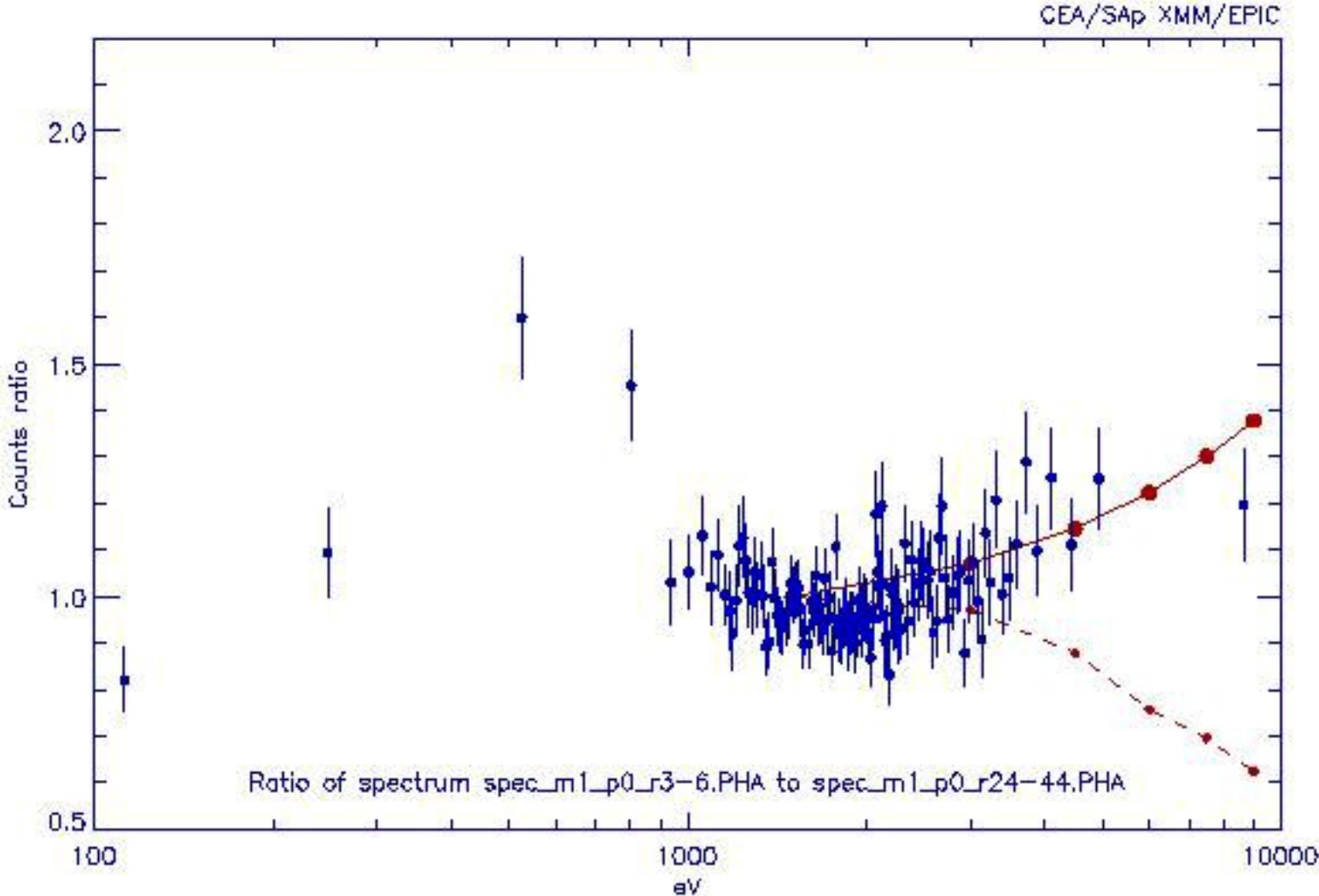
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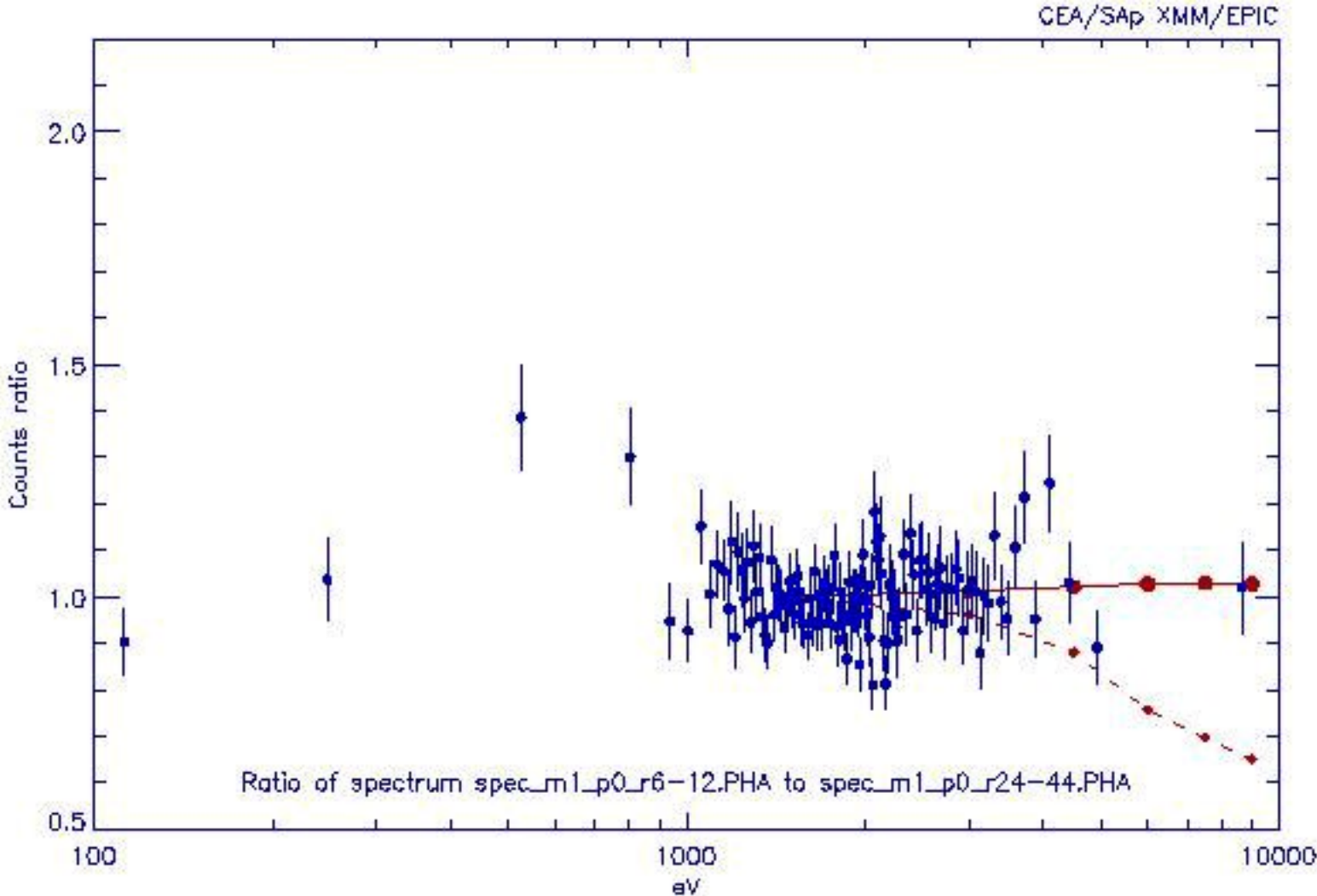
For MOS spectra and counts studied in concentric rings of inner - outer radii : [0-3], [3-6], [6-12], [12-24], [24-44] arcsec.

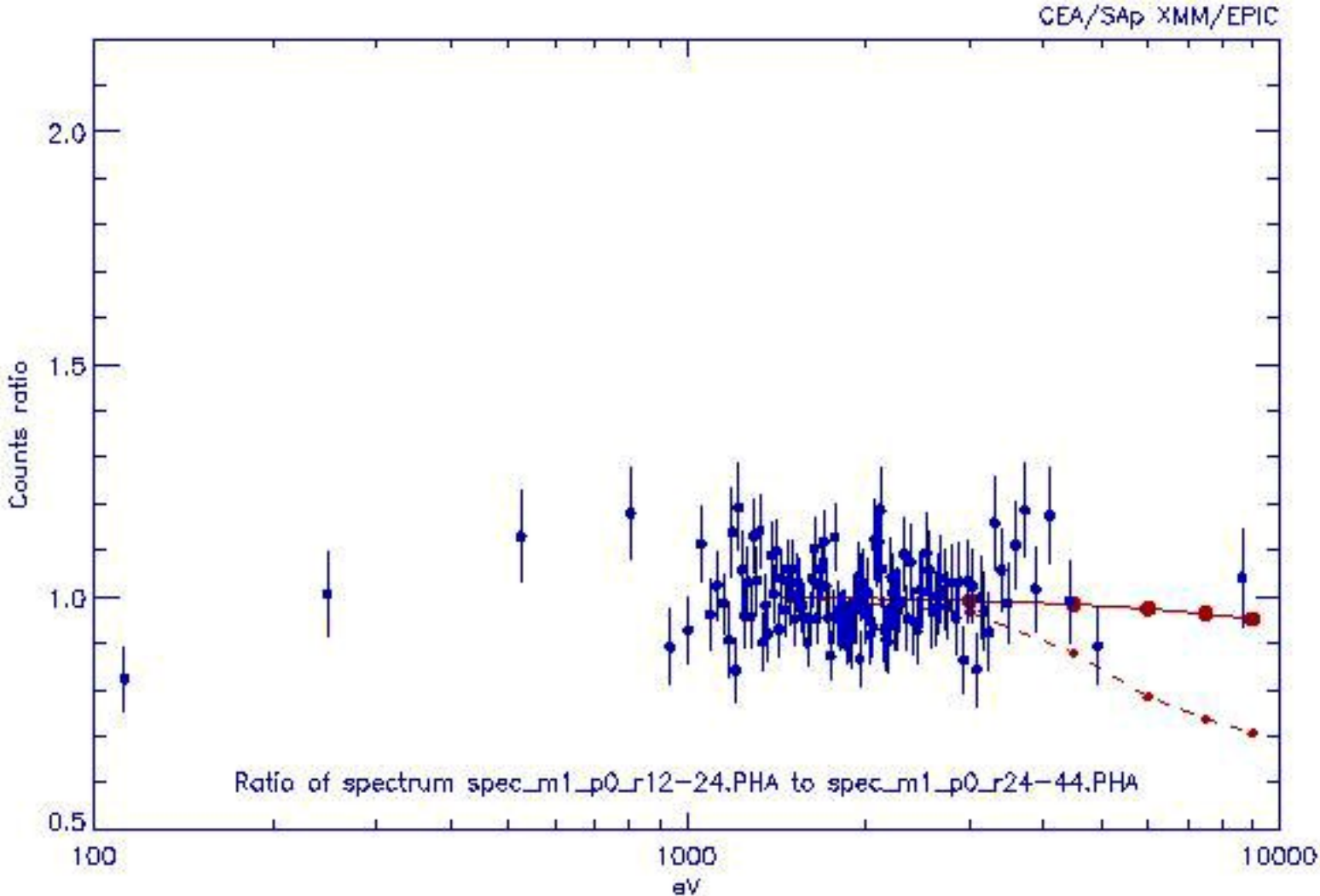












## Fits as a function of excision radius

Fitting above 0.9 keV, MOS 1 - PL + BB

Cut	c/s	Pattern 0-12					Pattern 0 only			
		nH	PhoIndex	kT	Abs.Flux1-10 (e-10)	Chi2	nH	PhoIndex	kT	Chi2
24	2.84	2.076	4.208	0.342	2.261	1.073	2.026	4.155	0.345	1.117
12	7.23	2.063	4.127	0.342	2.062	1.248	2.072	4.200	0.344	1.142
6	13.31	2.104	4.173	0.344	2.031	1.312	2.089	4.252	0.347	1.230
3	17.77	2.070	4.047	0.344	1.951	1.355	2.056	4.201	0.348	1.300
0	20.95	2.074	3.946	0.339	1.958	1.413	2.081	4.230	0.348	1.360

Errors (6 arcsec) :

$\pm 0.06$   $\pm 0.12$   $\pm 0.002$

- Pattern 0 results less sensitive to excision radius
- Absorbed flux variation is by 15 % max, despite pile-up in the core
- In non piled-up regions 10 % variation of absolute flux for cut between 6 and 24 arcsec



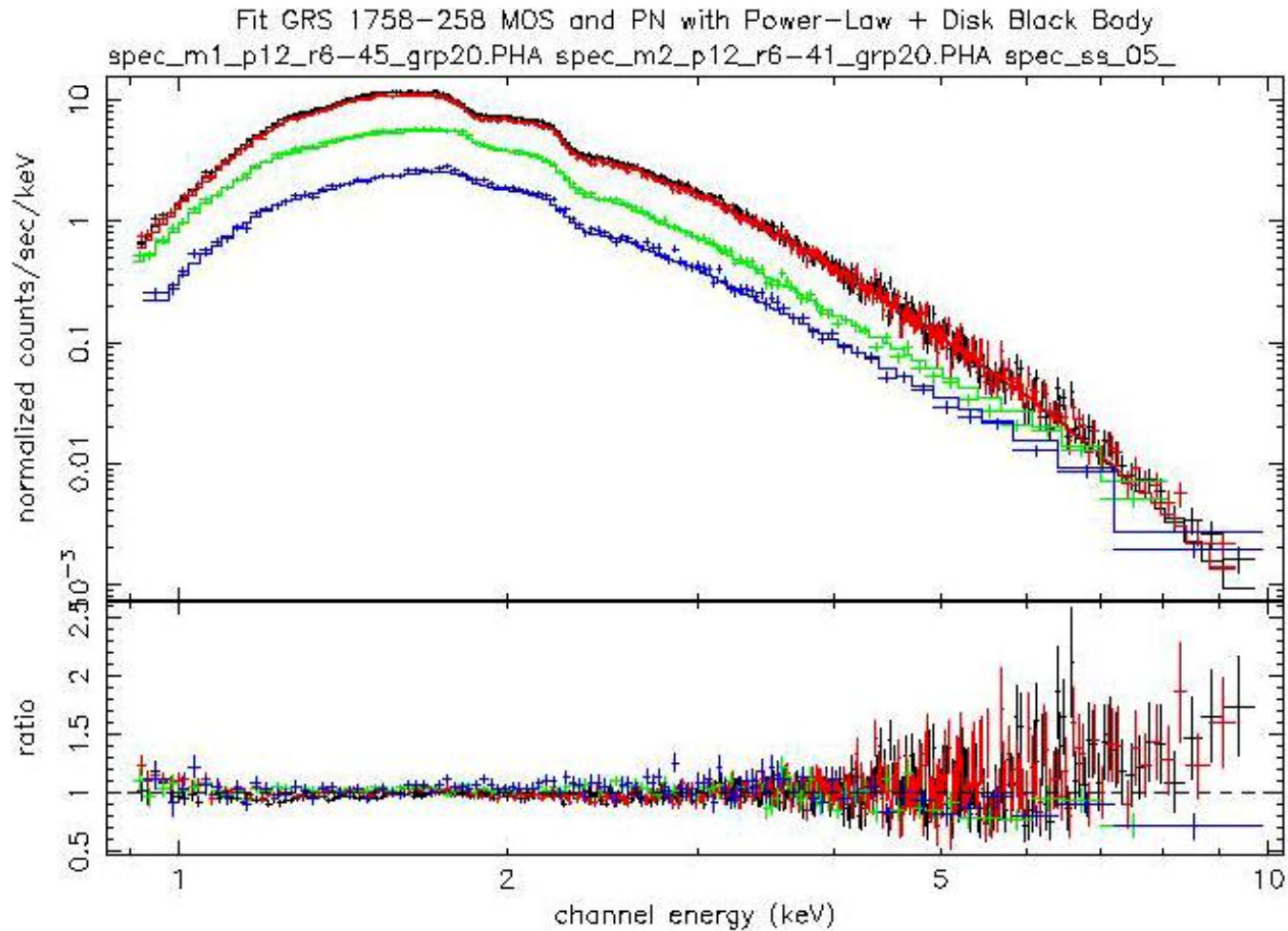
## MOS versus PN : overall fit results

- PL + DBB model - MOS1&2 excised 6 arcsec, PN 20 arcsec
- Fit for  $E > 0.9$  keV

<u>Param</u>	<u>MOS</u>	<u>PN</u>
nH	$1.978 \pm 0.039$	$1.978 \pm 0.09$
kTin	$0.433 \pm 0.005$	$0.446 \pm 0.005$
PhoIndex	$3.549 (-0.18,+0.07)$	$3.75 \pm 0.34$
Abs Flux (1-10)	2.062	2.118
Chi2	1.34	1.01

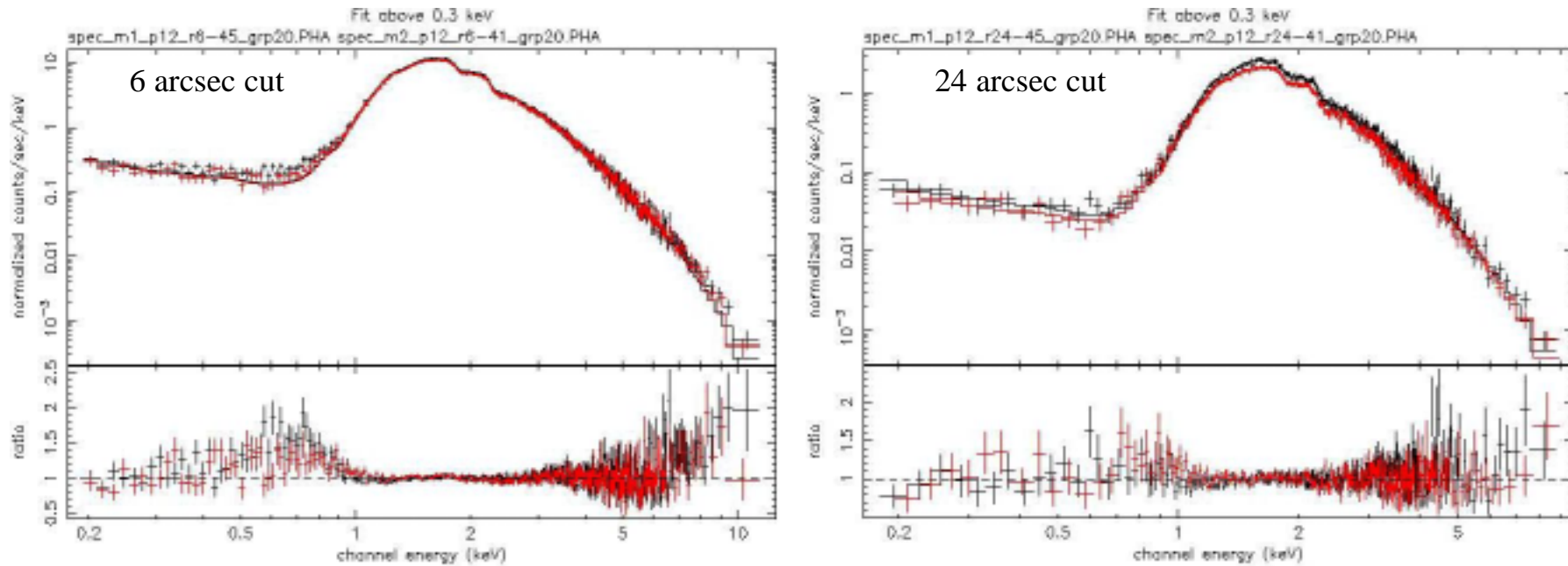
- Agreement within errors of all parameters.
- Absolute flux : ratio PN/MOS = 1.027  
value within 10 % of Chandra value of  $1.8e-10$

**MOS versus PN : Problem at high energy “MOS excess”**



goldwurm 16-Oct-2001 16:35

MOS excess at low energy



Effect strongly present within core, less if any in the wings

## Overall Conclusion

- Using Encircled Energy Function (July version) gives now consistent results within 10 % when excision radius is varied.
- MOS / PN consistency within errors, with MOS in SW and PN in LW
- MOS excess at high energy not understood
- MOS excess in “redistribution” part, in the core, not understood