Data: 
- GRS1758-258
- Thin filters
- MOS 1 & 2 in Small Window ~ 22 cts/s ~ 6.6 cts/frame
- PN in Large Window ~ 52 cts/s ~ 2.5 cts/frame

Episode 1: June 2001 meeting (Leicester)
- « Spectral and spatial deformations on piled-up sources, “a one case study, of MOS data” »
- Big problems in spectral results as a function of extraction radius

Episode 2: November 2001 meeting (Milano)
- « Checking encircled energy by spectral fitting »
- Big problems solved thanks to new PSF: spectral results independent of extraction radius.
- but strong MOS excess at low and high energy
The problem left in Episode 2

MOS excess at low and high energy

Is this an effect of bad background correction?

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EPIC Cal-Ops Meeting / Schloß Ringberg / Apr. 2–5, 2002

Philippe Ferrando, CEA/SAp
Episode 3

Re-analysis of the GRS1758 piled-up source: all problems remain...
Analysis plan:

- take the latest emchain processing: developer SAS end of January
- stick to one exclusion radius: 6 arcsec for MOS
  source region: [6–45] arcsec MOS1, [6–41] arcsec MOS2
- use the latest matrices (q20 here)
- use the CCF corrections for the Encircled Energy
- background: from annulus [8.4–12] arc min (MOS2)

- since background far away from source region: separate the particle background correction (non vignetted, but with spatial dependence) and the diffuse background correction (vignetted).
Problem equations for « double background subtraction »

Source spectrum = Raw spectrum – source region diffuse bkgd
– source region particle bkgd

source region diffuse bkgd = annulus diffuse bkgd corrected for vignetting

• annulus diffuse bkgd = RAW annulus spectrum – annulus particle bkgd
• annulus particle bkgd = “Lumb” background in annulus region \( \times \) NORM

source region particle bkgd = “Lumb background” in source region \( \times \) NORM
Source spectrum and its diffuse and particle parts
Problem is not solved...
Some impact on fits however

Fitting above 0.9 keV, MOS 1 - PL + BB

Power law index: $4.18 \pm 0.11$ with simple annulus bkgd subtraction
$4.25 \pm 0.11$ with correct treatment

Rise of index as expected (vignetting increase of background substracted)
Conclusion of Episode 3

- Despite very careful background subtraction, MOS excess at high energy remains. Causes can be:
  i) problems with encircled energy?
  ii) problems with mono-pixel fraction (selected here) ?
  iii) residual pile-up effect ?

- MOS excess in the ~ 0.5–0.9 keV range still present. Causes can be ???

- Side result of this analysis:
  The MOS spectrum is steepened when proper vignetting effect is taken into account. Be careful if sources are in a strong diffuse emission environment.