Epoch dependant MOS QE and RMF and Cross-calibration with the PN
Significant change in spectrum between Rev 78 and 533/534
Significant change in spectrum between Rev 78 and 533/534
RXJ 0720 MOS1 Thin Filter

0078 (Black) 0533 (Red) 0534 (Yellow) 0622 (Blue)

normalized counts/sec/keV

channel energy (keV)

Steve Sembay (sse@star.le.ac.uk)
EPIC Calibration Meeting
Saclay 24/09/03
Measure “Carbon” edge:

- Best guess at redistribution
- Fit $\text{phabs*bb*edge}(E=0.28\text{ keV})$ model to simultaneous
  - 0078, 0533, 0534, 0622, Thin Filter
  - 0175, 0622 Medium Filter
  - 0175, 0622 Open
- $\text{Nh, kT, Normalisation, tied}$
- Edge Energy fixed
- Edge optical depth free
RXJ0720 MOS1

RXJ0720 MOS2

Steve Sembay (sse@star.le.ac.uk)
EPIC Calibration Meeting
Saclay 24/09/03
Systematic Study of AGN with “smooth” continua

- 3C 273 10 Obs
- PKS 2155-304 2  Obs (low state)
- Mkn 421 1  Obs (low state)
- MS 0797 1  Obs
- Mkn 180 1  Obs
- MS 1229 1  Obs
- Mkn 509 2  Obs
- TON S180 2  Obs
- S5 0836 1  Obs

PN:  Pattern 0 spectra, “0-40” arcsec radius

MOS:  Pattern 0 spectra, pile-up corrected (Molendi & Sembay), 0-40 arcsec radius
- Avoids problem with core extraction method for dealing with pile-up
Current QE/RMF

Photon Index: Cam1-Cam2

Circle: Window Mode
Square: Timing Mode
Current QE/RMF

Photon Index: Cam1-Cam2

Circle: Window Mode
Square: Timing Mode
PKS2155–304 MOS1 Revolution 450

Old QE (Black) New QE with Tau(Oxygen) = 0.27 (Red)

normalized counts/sec/keV

ratio

channel energy (keV)
Measure Oxygen Edge in all sources:

- Fit phabs*po*edge(0.532 keV) to
- 0.4-1.0 keV narrow band spectra
- Model assumes “smooth” continuum across edge
- Nh fixed at Galactic value
- Edge energy fixed
- Photon Index, Normalisation, optical depth free
MOS1

Revolution

MOS2

Revolution

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EPIC Calibration Meeting
Saclay 24/09/03
Chandra ACIS-S Contamination

Figure 10. a) (Left) The O-K edge optical depth as a function of time for 71 observations of essentially featureless sources observed with the LEPTGS and ACIS. The solid line is a linear regression that is not forced to go through zero, while the dashed line is a model with similar asymptotic behavior that is forced to zero at ACIS door opening. b) (Right) O-K edge measurements as a function of year compared to the model for the time dependence of the O-K optical depth. The model assumes that the O-K optical depth scales with the C-K edge and is forced to go through the best data point (Mr 421, in late 2002). In general, the trend given by the model is matched by the data: the O-K edge is detected only in the last year or so and in smaller in the first year. In particular, the possibility that the O-K edge is nearly constant after 2000.0 seems to be ruled out.
Evidence for Intrinsic “Oxygen Edge” in PN spectrum of 3C 273
Conclusions:

• Both MOS cameras show evolution in QE at “carbon” and oxygen
• PN seems unaffected
• Carbon/Oxygen ratio and difference in epoch dependency not consistent with a single compound
• Both MOS cameras show evolution in low energy redistribution