esa **MEETING**

Meeting date *date de la réunion*	02.-05.04.2002	ref./*réf.*	XMM-SAS-VILSPA/2002-73/Mn	page/*page*	1 / 9
Meeting place *lieu de la réunion*	Schloss Ringberg	chairman *président*	U. Briel/ P. Ferrando		
minute's date *dates de minute*	10.04.02	participants *participants*	Andrea de Luca , Bruno Altieri, Claus Reppin, Damien Texier, Dirk Grupe, Doris Neumann, Eckhard Kendziorra, Elmar Pfeffermann, Frank Haberl, Gareth Griffiths, Guillermo Buenadicha, Jakob Engelhauser, Jan Willem den Herder, Kolja Giedke, Konrad Dennerl, Marcus Kirsch, Martin Stuhlinger, Martin Turner, Matthias Ehle, Mauro Casale, Michael Freyberg, Michael Smith, Nicola La Palombara, Norbert Meidinger, Paul Bennie, Philippe Ferrando, Philippe Marty, Richard Saxton , Sabrina deGrande, Silvano Molendi, Simona Ghizzardi, Slava Zavlin, Stephane Rives, Steve Sembay, Steve Snowden, Tony Abbey, Ulrich Briel, Uwe Lammers, Wolfgang Pietsch, Yasushi Ikebe		
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Calibration related issues from the OBS meeting: • Set up Vela SNR as a routine calibration target (MK) • BL Lac objects should be monitored regularly (MS1299.2+6430 (3C273 or Mkn 421) (MK)	AI_I_3.3_1	
• Fixed offset tables for MOS SW mode to be determined (BA)	AI_I_4.2_1	
• Pointing accuracy is good to +- 5arcsec		

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CAL MEETING PART of Ringberg Meeting

II. EPIC Mirror Issues

II.1 Simona Ghizzardi – pn PSF investigations

Same algorithm used as for the MOS.
Still scatter in the inner PSF region (4'') and differences between SW and FF Mode.

II.2 Gareth Griffiths - On axis PSF of EPIC

Investigation in different Modes and for different sources for the MOS and combining them. Sometimes due to pile up parts of the image could not be used in FF mode.
Results:

- EEF only weakly energy dependent
- MOS1 and 2 very similar
- PN PSF not as sharp as MOS
- Small differences between found EEF and analytical EEF currently in the CCF: spectral index is flatter for G. work, but CCF is doing the better job

III. Cross-calibration

III.1 MOS/pn cross-calibration

III.1.1 Gareth Griffith - High energy cross calibration

Difference of MOS and pn at high energies (3-10 keV) even after new vignetting correction (DL correction related to bore-sight optical axis misalignment, photon index MOS/PN 10 % (MOS flatter)
Difference could be due to QE or mirror error or wrong long term CTI correction.

III.1.2 Steve Sembay – Broad band MOS vs PN calibration

Broad band analysis of MS0737, PKS2155, Mrk 421 MOS 1 thick filter calibration is incorrect
Q21 residuals better than Q20 in 2-3 keV band
Systematic broad band difference which is independent of MODE/Filter/Extraction

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III.1.3 Bruno Altieri – N132D Cas A N132D LW: MOS1/pn 20 eV CASA: SW: MOS1/pn 20 –50 (@6600) eV Expected line positions should be checked		
• Cas A line determination and comparison cross calibration with Chandra (MK, BA, SZ, FH, MJF)	AI_III.1.3_1	
III.1.4. Doris Neumann – MOD PSF investigation PSF can be used to measure source extents of distant clusters		
III.1.5. Silvano Molendi – M87 MOS vs. pn 107 different source regions fitted with temperature models 2T provide evidence of a 0.6 –0.9 keV pn/MOS excess Si abundance measurement gives hint to inconsistency in gold edge treatment		
III.1.6 Mauro Dadina - Simultaneous XMM SAX observation of Seyfert 1 NGC 3516 Good pn MECS agreement for the shape (Photon index) pn 3-10 keV ~91% of MECS flux in the same energy band		
III.2 EPIC/RGS cross calibration		
III.2.1 Jan-Willem den Herder - PKS2155 Strong indication that source can not be described by a single powerlaw over the full range (above 3 keV and below 0.4 keV) XMM instruments agree within the expected calibration accuracy: some systematic variations observed which can be corrected Chandra instruments show some not yet understood differences between the instruments. Needs further investigation. MOS2 thick filter problems.		
III.2.2 Frank Haberl pn/RGS PKS2155 similar residuals as Sembay around 0.6 keV In Timing Mode under corrections around gold edge Variable in intensity and powerlaw index Not only single powerlaw		

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III.2.3 Steve Snowden XMM/Chandra GX21,1EO102.2-7219,MS1054.4-0312 Relative Flux summary, pn/MOS in good agreement NGC 3516, residuals above 5.5 keV, NGC3516 differences between RGS and EPIC **IV Calibration of individual instruments** **IV.1 pn separate issues** **IV.1.1 Michael Smith/Eckhard Kendziorra-Offset investigation** General variability dominated by common mode variation Variability at boresight mainly due to x-ray pile-up Local enhanced variability due to strong optical loading Problems: Xray loading Optical loading only for few sources OFM fairly stable EK go for “constant OFM” Possible implementation: calculated OFM with closed filter at beginning of orbit **IV.1.2 Konrad Dennerl- CTI long term degradation** Improvement from 5.2 to 5.3 long term CTI correction is now y-dependent, this would have caused an over correction for 5.2) Vela SNR is ideal target for energy calibration issues, should be used in the future for routine calibration target Still problems with SW for energies below 0.7, which is improved and will be implemented in the 5.3 **IV.1.3 Konrad Dennerl- New CTI/Gain investigations** No evidence for additional CCD offsets in Vela SNR observation, but perhaps necessity of additional CTE correction in FF Mode below 1 keV. After that also temperature corrections could be applied. This is not done in SAS 5.3		

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IV.1.4 Konrad Dennerl-double problematic in FF Different number of splits in different directions (vertical, horizontal, shift direction etc…), changes of correction SW would be needed, but without changing of interface for SAS. Everything could be done in already existing code. This has been tested already by MJF, **IV.1.5 Frank Haberl – single double problematic in TM** Single double fraction is varying from one to the other observations. For spectra singles and doubles should be used together **IV.1.6 Frank Haberl – status of pn-drm** Drms for all Modes (FF, SW, LW, Timing, Burst) will be available with the SAS 5.3 Additional information Timing: For conservative data reduction data below 0.5 keV should not be used. Additional energy scales around the gold edges of about 1% would be needed, this is also long term dependent. Additional information Burst For conservative data reduction data below 0.4 keV should not be used. Additional energy scales around the gold edges of about 0.1-0.5 % would be needed. Residuals around 0.4-1.5 **IV.1.7 Marcus Kirsch- pn Burst Mode** Relative pulse resolved spectral analysis is possible with the high timing resolution of pn-burst mode (7 micro seconds) **IV.1.8 Eckhard Kendziorra – Latest results on the timing** Bug in barycen found; accuracy now dP/P 10E-9 for Crab observation in pn-Burst Mode **IV.1.9 Michael Freyberg – SAS 5.3 and what is possible** All global pn energy corrections implemented except new CTE correction for SW and LW mode. Y dependent long term correction is per default deactivated TBD: Special double event treatment TBD: SAS/CCF interface Back ground issues: for CLOSED observations the epatplot model curves do		

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not match with the data, for physical reasons. Some changes in epevents concerning the Pattern definition (Documentation) **IV.1.9 Michael Freyberg – Out of time events** out of time events FF: 6.3 % EFF: 2.3 % SW 1.1% LW 0.16% Use of LW mode for PSF and Vignetting calibration observations recommended, if pile up is no point of concern. **IV.1.11 Slava Zavlin – cross cal imaging modes /TM** Proper CTI model for FF mode Special corrections for Window modes by using energy dependent fudge functions Still problems below 0.7 keV, shown on SNR N132D and SNR 1ESO0102-72 **IV.2 MOS separate issues** **IV.2.1 Bruno Altieri-New CTE correction** New algorithm taking the long term degradation properly into account will be implemented in SAS 5.3. Still small undercorrections (10/20 eV for MOS1/2 at Mn). This algorithm is also not doing the correction adequately on the same CAL CLOSED data. This was interpreted later as an indication that not only the CTI (the only thing measured by the algorithm) but also the gain changes with time.Ways to implement gain changes in the SAS will have to be found. This should be stated on VILSPA homepage Temperature-gain has to be checked Energy resolution decreased by 20 % by rev500 **IV.2.2 Bruno Altieri - Plate scale** New (opticsx, opticsy) will not be in the 5.3, boresight CCF has to be recalculated to make this possible **IV.2.3 Paul Bennie- The MOS energy scale** Putting fixed lines into N132D spectra and locking at the residuals shows: All residuals at all epochs < 5 %	AI_IV.1_1	

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IV.2.4 Paul Bennie- Time dependent RMF
Evidence for excess broadening, undervalued in RMF since day zero
First steps to parameterise this with time dependent RMFs are done.

IV.2.5 Philippe Ferrando –Re analysis of GRS1758 piled up source
Despite very careful bg subtraction still excess at high energies and in the 0.5–0.9 keV range.
MOS spectra I steepened when proper vignetting effect is taken into account

V EPIC – SAS issues

V.1 Richard Saxton – drm calculation in the SAS
Major Changes in SAS5.3:

- All event patterns supported
- Observing mode dependencies for RMS/ARF
- All boxes shapes handled by *arfgen & backscale*
- pn CCD gaps handled correctly
- pn Out Off Time events exposure correction
- Accurate encircled energy correction for annuli
- *Rmfgen* makes variable format RMFs to save space
- CAL changes produce faster processing

MOS: wiggles over all the energy range are at 1% rather than 2% between SAS rmf and LUX matrices.
Pn: Differences above 12 keV between SAS rmf and MPE matrices up to 10%

V.2 Matthias Ehle – Short report on User Group comments on the SAS
Criticism on documentation: incomplete in parts & not very helpful to users
SAS Performance

VI. EPIC Background

VI.1 Andrea De Luca – Background investigations
SP and pattern distribution:

- Ration pattern 1,3 / 0 increases during flares
- Ration pattern 2,4 / 0 decreases during flares
- MOS pattern 1 & 3 are more sensitive to identify soft proton flares.

Closed bkg secular variations:

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• Light curves: Constant within 12 % (0.5-3 keV) 8%(2-12 keV), some scattering ~ 20 % higher than average • Radial profile: substantially unchanged, higher anisotropy at lower energies • Spectral analysis: variations in intensity below 1 keV and in fluorescence lines		
Andrea to provide VILSPA with his merged EVENTS files of the BG in order to make this public	VI.1_1	
VI.2 Doris Neumann - Different BG components: Sophisticated double background subtraction can be used for extended sources (cluster of galaxies). Interest to get this implemented in SAS		
VI.4 Wolfgang Pietsch – variability of the EPIC bkgd during orbits : Spatial distribution and flow of soft protons in the magnetosphere could explain background variation. Further investigation on this could give possibility to prevent high background by limitation of telescope observation angles.		
VI.4 Yasushi Ikebe – pn bkgd investigations: • Studied for FF mode with thin and medium filter • Spectral/Spatial fluctuations: 8 % • Count rate of out of FOV events is a good parameter for bg estimation; reducing the fluctuations to 3 % if only 2-7 keV is considered • Long term variation about 20 % (CALCLOSED)		
VI.5 Discussion and how to combine efforts **Cross calibration:** 2 splinter meetings were held: • JWH will draft plan for RGS EPIC crosscalibration • Silvano will coordinate calibration efforts with a tracking history • In 1-2 moth time we will have a 1 week cross calibration working meeting CTI correction for MOS: • problems in CTI under-correction done by Bruno could be related to non		

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linearity of MOS channel to Energy conversion. SAS updates: • We already know, that SAS5.3 has not the newest calibration status. Would it be possible to issue on a very short timescale a version with the newest calibration in or something like a patch to update only specific parts of the SAS. • Transparency of calibration: An official ESA document should be made public, where the current status of calibration is described, with the highlighting of current problems, that are not covered by the available SAS. Monthly telecons should be hold on specific cal topics, in order not to put more pressure on our self. Silvano will organise the telecons. **NEXT MEETING 2-4. July in VILSPA**	AI_VI_5_1 (MK)	