esa **MEETING**

Meeting date *date de la réunion*	**01.-03. 02. 2005**	ref./*réf.* XMM-SOC-CAL_EPIC-MIN-0014	page/*page* 1/7

Meeting place *lieu de la réunion*	**Palma de Mallorca**	chairman *présidant*	S. Sembay
Minute's date *dates de minute*	16.02. 2005	Participant	Andy Read Eckhard Kendziorra Frank Haberl Jean Ballet Konrad Dennerl Michael Freyberg Silvano Molendi Vadim Burwitz Wolfgang Pietsch Steve Sembay Ulrich Briel Marcus Kirsch Matthias Ehle Martin Stuhlinger Tony Abbey Darren Baskill Bruno Altieri Maria P. Esquej Leo Metcalfe Steve Snowden Herman Marshall Paul Plucinsky Richard Saxton Guillermo Buenadicha
Subject/*objet*	EPIC CAL Meeting 14	copy/*copi*	*F.Jansen*

1 Procedures and S/W

1.1 pn time jumps (MK)

- Frame times of Timing, Burst and SW mode ok
- Frame times of other modes need some small refinement (this does not effect timing accuracy only effective area will slightly change)
- When frame times are adjusted, tool can be used to detect time jumps for all available observations

1.2 pn Large window mode fast CTI correction (MJF)

- NRCO failed due to high BG and slightly wrong pointing
- Should be repeated

1.3 Result of the MIP OCR observation (MJF)

- Observation successful
- Try to understand bright intra CCD columns
- Not enough intra-gap MIPs to explain bright columns

1.4 Adjustment of spatial gain variations of the pn (KD)

- Gain variation of different columns have been refined
- Concept of CCD dependent additional offset is not continued
- Additional influence from spatial CTI in homogeneities (infrared patterns) and OOT events
- Different energy position behaviour of fore and backwards doubles
- Still not solved random changes in energy up to +/-5 eV

1.5 Energy Calibration refinement of pn eFF (MPEA)

- Energy determination in eFF mode will change by up to ~0.4% using the newest SAS (6.1.0) getting an accuracy of ~0.1% with respect to the FF mode
- Relative energy calibration pn (1-6 keV): pn: ~0.1% (0.4 SW)
- Relative energy calibration MOS (0.5-2 keV): MOS: ~ 0.5 %
- Absolute energy calibration
  MOS: 0.3 % (Al), 0.1 % (Mnα)
  pn: 0.3 % (Al), 0.2 % (Mnα)

1.6 A proposal for correct treatment of fast mode ARFs (MK)

- Arfgen now scales with extraction region Y-extent: Y/200(Timing), Y/180 (Burst)
- Arfgen corrects for Y-extent of extraction region, but still not for PSF (and Vignetting→ straight forward), 2 dim PSF needs to be integrated not averaged

1.7 Column rejection in the MOSs (JB)

- Some columns are shifted in energy

- Degradation of some columns stronger after cooling
- New algorithm removes columns but not the core (what happened before for soft sources)

1.8 A new column dependent CTI correction (DBL)

- MOS CTI correction used tailor expansion, might need in future full formula since CTI values are getting to high
- Probably column dep. CTI correction is not energy dependent
- Possible update of new gain constant offset for a couple of CCDs

1.9 Spatial Gain Calibration of MOS and pn: relevance to extended source study (SM)

- Accuracy of 5eV would allow to measure velocity variations of 250 km/s
- Phenomenological try to improve energy calibration by determining Cal source line energy position in annuli
- Correction function depending on sectors of the CCD
- This would improve the determination of velocity variation down to ~75 km/s
- Technique needs very high statistics

1.10 What can we do with pattern 31 (AMR)

- Pattern 31 can not be used currently for data analysis (11(4keV)-32(8keV) % depending in energy.
- Method of correcting pattern 31 events such that they might be used

1.11 New modes for the MOS detectors (AFA)

- Proposal of a new mode between SW (to small for BG determination) and LW (pile-up problem)

1.12 A new SAS BG tool (MSt)

- Work on a tool for SAS to automatically calculate BG for epic
- Still in evaluation phase of what is possible and would make sense

2 Observations and Comparisons

2.1 EPIC pn observation of zeta puppies (FH)

- Zeta puppis spectra give good possibility to check redistribution at 0.4-1 keV
- Redistribution in SAS 6.0 was modelled to strong
- Redistribution changed back to quasi laboratory values
- Optical loading shifts medium filter spectra to higher energies
- Pile-up in LW mode (count rate: medium 6-7, thin 9-8)
- Small pointing changes during observation can cause problems with not following offset table (optical loading causes low energy excess)
- Different single double ratios off axis

- Correct setting for future SW thick for pn

2.2 Temporal and spatial dependency of the MOS rmf I) (AR)

- Patch at boresight position that effects MOS spectra introducing flux excess at energies below 0.5 keV
- Shape of patch not completely known
- Possible that patch was already there at launch
- Also off patch flux excess evolving stronger in time than patch region, patch itself even show negligible evolving with time
- Effect happened earlier on MOS1 RMFs
- Possibility to go to new boresight or/and position dependent
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2.3 Temporal and spatial dependency of the MOS rmf II) (SFS)

- Intrinsic change in redistribution of central CCD: shift in the spectrum at low energies
- Significant change in redistribution function at low energies and smaller at high energies
- Flux is redistributed from 350-650 to 100-300, not total flux loss
- Evolution in fluxes 400-800 eV relative to pn for MOS and RGS
- New MOS rmf taking all the effects into account gives good fits (brings MOS in the 400-800 eV range up by ~ 4 %, still ~12 % missing with respect to pn

2.4 Results from Cross Calibration Studies (BA)

- MOS, RGS deficit with respect to EPIC pn developing with time at low energies (below 1 keV) up to 10 % apparently due to a loss of flux for MOS and RGS
- Why is Chandra agreeing better with MOSs than pn at any epoch
- For very soft sources pn shows strong excess

2.5 MOS pn cross calibration with a sample of galaxy clusters (SM)

- Analysis with SAS 6.0
- For hard bands temperatures agree
- Broad band analysis gives lower temperature for pn
- pn temperatures vary more than MOS
- 20% pn variation when going from 1.5-10 keV to 0.5-10 keV
- pn changes in 6.1 solve only part of the problem

2.6 Chandra effective Area (HM)

- Update ACIS chip locations and rotations
- Update MEG grating period expected soon
- QE BI vs FI uncertainty now down from 15 % to 5 %
- Si-K edge 6 % edge residual
- N-K edge in FI chips more important for LETG/ACIS
- ACIS OBF: C and O edges need update in modelling
- HETG efficiency: MEG/HEG ratio to be updated

- MEG very uncertain above 7 keV
- HRMA Ir-M edge jump about 10 %
- Most spectral edges and narrow features are fixed or fixable
- Hrma and acis EA require 2 more adjustments
  - Si;K , Ir-M edges
- MEG fix relative to HEG is still not right
  - Smoother spectra are possible

2.7 A comparison of spectral fit results of E0102 from the Chandra and XMM CCD (PC)

- Fitting data with multi-gaussian model from gratings fixing line position and sigma=0 allowing however normalization
- Acis data show better agreement with pn than with MOSs
- MOS/pn flux differences o ~10-15 %
- Discrepancies between the front and back illuminated ACIS chips

2.8 Data base of Chandra LETG spectra for cross calibration (VB)

- Generation of may spectra with configuration control of calibration files and SW
- Mean spectrum, source and bg light curves
- Low bg times are searched and second set of low bg spectra is produced

2.9 The XMM-Newton slew survey (RS)

- For MOS data not useful
- Pn data can be used
- Bright optical stars create wrong detections, but positions are well know and can be vetoed
- In 139 detections ~ 50 new sources
- Deepest 2-10 keV all sky survey to date at 2.2x10E-12
- Only use FF, EFF, LW data

2.10 Update of the RGS Quantum efficiency calibration (MK)

- Low wavelength adjusted high still to be done

2.11 Summary status of the EPIC calibration (MK)

- Solved topics
- Ongoing topics (straight forward to solve)
- Ongoing challenging topics

2.12 The long term EPIC in orbit calibration plan (MK)

- Slew calclosed data needs to be evaluated
- Proposal of a fixed set of calibration observations for the future

2.13Discussion

- Perform joint simultaneous H1426 observation Chandra, XMM, FuSE and determine breaking point for spectra in all cameras

3 Splinter meeting on future cal plan

- IF SLEW DATA can be used: CALCLOSED
  - every 2 month CALCLOSED
    - pn: FF:eFF :CLOSED FF:CLOSED eFF=3:1:1:1
    - MOS: CALCLOSED_FF:CLOSED_FF 5:1
- Diagnostics:
  - MOS: diagnostics proposal to provide by Tony
  - pn: 2 times per year ff noise, could be in parallel with MOS diagnostics

- Fixed cal targets:
  - 1E0102 (2/year 30 ks) (SW thin, SW medium)
  - N132D (1/year 30 ks):
    SW thin, re-center to SW pn, MOS in LW
  - Vela FF thin 60 ks (1/year)
  - Tycho 1 per year TBC 30 ks

    (SNRs always same Roll angle, same time of the year)

  - RXJ1856 (2/year 35 ks): SW thin

  - Zeta puppis SW thick(RGS target)

  - Crab (2/year 15 ks):
    Burst/Timing/Burst thick filter

  - PKS2155 SW medium (1/year 30 ks)

→ 310ks observations + 130 overhead < 2 % XMM available time per year
(XMM available time per year =135s per revolution*365/2= 2.46375e+07 s)

4 Actions items

AI_EPIC_CAL_14_1: Additional time column wit other 0 point for ODF (RD, MK, MJF)
AI_EPIC_CAL_14_2: MK to update frame times according to analysis presented in 1.1
AI_EPIC_CAL_14_3: MK to implement time jump in a Qcheck type procedure in the long term
AI_EPIC_CAL_14_4: KD to provide new gain values for refinement of the column dep. pn gain correction
AI_EPIC_CAL_14_5: MS to implement KDs values into CCF
AI_EPIC_CAL_14_6: MK to put warning on energy accuracy in for doubles with input from KD
AI_EPIC_CAL_14_7: MK open new NRCO for pn LW CTI determination with N132D, request low BG time
AI_EPIC_CAL_14_8: SS to provide RS with newest RMF parameters to be implemented in CCF (SS, RS)
AI_EPIC_CAL_14_9: AA to provide diagnostics proposal

5 Open old action items

AI_EPIC_CAL_11_5: Frank, Marcus to verify pn QE with the Crab

6 Closed old action items in period of last Cal_meeting to this CAL-meeting

AI_EPIC_CAL_13_1: Steve and RS to put new MOS redistribution into DT
AI_EPIC_CAL_13_2: FH estimate uncertainties due to pn redistribution
AI_EPIC_CAL_13_3: Bruno to provide slew statistics and to send a long slew to MJF.
AI_EPIC_CAL_13_4: MK to change pn long term CTI in CCF
AI_EPIC_CAL_13_5: RS implement CTI tuning functionality for pn eFF in CAL
AI_EPIC_CAL_13_6: MK to update pn CTI CCF for eFF CTI tuning
AI_EPIC_CAL_13_7: RS to enable the OAL the determine the PN offset maps (ODI)
AI_EPIC_CAL_12_5: TA to provide VILSPA with new sequences with old BS