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<td>lieu de la réunion</td>
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<td>chairman</td>
<td>S. Sembay</td>
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<td>président</td>
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<td>Participant</td>
<td>Andy Read</td>
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<td>Eckhard Kendziorra</td>
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<td>Tony Abbey</td>
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<td>Darren Baskill</td>
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<td>Bruno Altieri</td>
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<td>Maria P. Esquej</td>
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<td>Leo Metcalfe</td>
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<td>Guillermo Buenadicha</td>
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<td>F. Jansen</td>
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MINUTES OF MEETING CAL 05_2 mallorca
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 % (Mn\(\alpha\))
  - pn: 0.3 % (Al), 0.2 % (Mn\(\alpha\))

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 \(\Rightarrow \) 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 (MSI)
• 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 puppis (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

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
2.13 Discussion

- 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: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