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JEM-X SDAST Meeting 22: March 26–27th 2002 at ISDC, Versoix

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1 Participants

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2 NJW: Instrument Status

FM1 status:

- FM1 Completed ground calibration at DSRI and Ferrrara Sept. 2001 and delivered to ESTEC Oct. 2001
- Anode section 4 failed after integration but unit used for ROT and payload calibrations Feb. 2002
- March 2002 FM1 withdrawn as flight model; degraded performance due to gas contamination, probably during short circuit
- Will not be refurbished as flight spare as previously thought due to lack of funds in Helsinki

FM2 status:

- Nov. 2001 Ground calibration, DSRI and Ferrara
- Dec. 2001 Delivered and integrated, ESTEC
- Feb. 2002 Payload system calibration.

The last flight model to be delivered goes under several different names: Flight Spare, Qualification Model (Refurbished) and Flight Model 3. FS, QMR, FM3 status:

- Feb. 2002 Ground calibration DSRI and Ferrara
- March 2002 Delivered and integrated, ESTEC. First exposure at ESTEC

NJW showed figures of the performance of the two integrated units which are working as designed, which is to say much better than FM1.

- Energy resolution is more or less as predicted, though somewhat better at low energies and somewhat worse at the high end. Theoretically FWHM= $0.47\sqrt{E(inkeV)}$ for gas detectors, but calibration results give FWHM= $0.40\sqrt{E(inKeV)}$
- Position resolution is within 1 mm between 3–30 KeV. Best resolution is closer to 0.5 mm near 20 KeV, though theoretical minimum should be closer to 10 KeV.

3 PK, SMN: ISDC System and Script status

- Version 2.2.0 just delivered. Functionality is the same but many little bugs have been fixed
- SMN having problems installing PK's developement scritpts at DSRI: PK couldn't re-install his own previous package! So installation and makefiles need some work
- SM having problems installing scripts in Helsinki since all ISSW packages must be installed separately first: also having trouble finding SWG data structures for testing
- N.B. Write-protected parameter files produce CFITSIO errors, because CFITSIO updates files on reading.
- To help SMN PK will set up a s/w environment for her under `jemx/dev/` where she can play with scripts, especially developement versions.
- PK and SMN need to complete first round of script improvements by end of April
- Everyone must have correct version of ROOT to get scripts to work
- RP3.0 is desperately obsolete, but release of RP4.0 is taking a long time due to stabilistation problems.
- New version of CFITSIO is still being developed and not yet stable—it can give core dumps!
- PK doesn't forsee any structural changes to scripts but errors returned from components aren't handled too well yet and GTIs based on data gaps haven't been tested yet due to lack of test packet data
- Bruce O'Neel still to set up ISDC analysis area containing all the latest working s/w

AI 22.1 **AI 22.1:** On PK: Write SPR on all JEM-X ISSW to change 'chatty' to 'chatter'. Due: April 2002

AI 22.2 **AI 22.2:** On PK: Set up s/w environment under jemx/dev/ for SMN. Due: April 2002

4 NJW, PK: Science Verification

- At last meeting we all agreed on the test cases and NJW has created a test sky that can be viewed in dithering patterns to simulate these cases. These simulations have been delivered to PK

- NJW also showed results of other simulations:

  - Plotting found flux against flux of the input simulated sources showed a linear slope of 0.8, indicating a 20% leakage of photons during detection and image reconstruction
  - This simulation done at 3–16 KeV where source finding is best
  - Plotting detection level (Peak/RMS noise) of false (ghost and spurious) found sources against off-axis angle shows a steady increase as angle increases, as expected
  - This could be due to strange peak shape on detector, which should be described in 'Algorithms and Limitations' section of the UM.
  - Ghost sources do appear in images and SCREW already written to remove these from the found source list. Ghosts are 8.3° from the real source
  - Plotting found source position deviation (arcmin.) against simulated source flux shows steady decrease from below 1.5' down to under 0.5' going from less than 1000 counts upto 10,000 counts. However results vary non-intuitively with azimuthal angle.
  - Plotting found source strength (erg/cm^2/sec) against exposure time shows that for typical GPS observation of 1000 s source strengths above 10^{-10} will be found by both units for on-axis sources. Lower limit is about 10^{-9} when including 500 mCrab of sources 2° off axis.
  - Limit for normal dither point exposure is between 10^{-11} and 10^{-10}

- Now up to PK to run science analysis on NJW's simulated sky and results must be analysed by ASTRONOMERS in SDAST

- Analysis should be finished by 2nd week of April and analysis of results must be done by wrap-up meeting on April 26th.

- Science Validation Report (see below) must be written by April 24th. If all else fails, NJW's results can be used.

- NJW thinks more interesting spectra should be added to test cases

- No good bkg. model in the simulations; simply must note in SVR that certain things don't have a test case to work on.

AI 22.3: On NJW: SCREW: Source flux based on instrument model data. Due: April 2002 AI 22.3
AI 22.4: On PK: Do SA of NJW's simulated test cases and circulate results. Due: 5/04/02 AI 22.4
AI 22.5: On NJW, SL: Go over PK's SA results for test case simulations. Due: 19/4/02 AI 22.5
AI 22.6: On NJW: Complete SVR for wrap-up meeting 26/4/02. Due: 24/04/02 AI 22.6

5 NJW: Instrument model status

- The following data structures contain the flight-ready data: all attenuation data (from tabulated standard references), quantum efficiency, mask model, PHA and PI binning tables and JMXi-ENRG-MOD
- The following data structures contain realistic numbers but not the ones to be used during the mission: Collimator model, position resolution, vignetting, detector x-ray background and electronic calibration
- The following data structures contain perfect (null correction) values and still need to have realistic numbers put in: detector pixel map, boresight
- The following data structures contain rubbish to test correction mechanisms: CORX, CORY, DEAD and SPAG. The first three are actually going to change what they contain before the pre-flight consolidation (June 2002). CORX and CORY will contain absolute positions of pixel values in mm from detector centre. DEAD will contain deadtime *per event* at each trigger rate.

AI 22.7 **AI 22.7:** On CAO: Check ENRG, BORE and DXBS appear in documentation. Due: April 2002

6 ALL: Operational Activities

- ISDC needs a JEM-X Instrument Representative at ISDC for 2 years
- NL proposes a rotation of people mainly from DSRI to include: NJW, SM, Søren Brandt
- No clear plan for PV phase data for JEM-X. NL/SB will be at MOC and later NL will be at ISDC
- IT needs to firm up PV activities, personnel and strategi and prioritize activities. How to analyse PV data and what to do with the results? Methods for determining background?
- PV phase plan should be included in GSSR.
- SL wants to use variability of Crab to detemine light leakage into shadowed areas of detector.
- PK will be involved with PV phase activities of JEM-X to some extent, but not clear now how much time he'll have for this.
- PK to throw a party for SDAST if its s/w handles first onslaught of data without crashing
- Error handling and error messages in all ISSW must be improved: never just reflect back and error code from the support s/w (NJW uses `##3##` with RILlogMessage, but this actually requires being able to look into the source code to understand it, which not all users will be able to do.)

AI 22.8 **AI 22.8:** On NL, NJW: Make PV phase plan/strategi. Due: June 2002

7 SM, PK, SL, NJW: Background handling

- SM began by showing his scheme for background handling, as he understood it should be done from previous meetings, but the astronomers (PK, NJW, SL) soon indicated that they had other things in mind for this analysis
- This subject was discussed in considerable depth for 4 *hours*
- The results of this part of the meeting have already been summarized in an email from PK which is attached to this document, or can be downloaded from `http://www.dsri.dk/~oxborrow/sdast/sdast_forum.html`
- SM must write a detailed description of background handling ASAP and circulate it within SDAST. This will also be used in ADD 7.0

AI 22.9: On PK,NJW,SL,SM: Stay in close email contact regarding bkg.. Due: May 2002 AI 22.9

AI 22.10: On SM: Circulate *detailed* description of background handling. Due: 5/4/02 AI 22.10

8 CAO: ADD/GSSR/SVR status

- No contentious changes proposed. So only need to update component descriptions as suggested. Everyone to complete their updates by Friday April 5th.
- Some AD issues clarified: j_data_preparation doesn't appear in revolution file pipeline; j_calib_auto no longer exists
- CAO already completed most general/overview corrections
- ADD 7.0 to be made public in first week of April 2002
- PK and Tim Lock have agreed that in the case of software changes due to a SPR or SCREW the corresponding ADD update is covered automatically by this SPR/SCREW. For other changes, a speficic SCREW is to be written in order to involve the CCB. These SCREWs can be quite general and need not detail all changes.
- Roland Walter has requested that SDAST provide two more documents to be ready in time for the JEM-X wrap-up meeting on April 26th:
  - A JEM-X-specific chapter to be part of the Ground Segment Software Report, to document the status and readiness of the JEM-X ISSW
  - Science Validataion Report (SVR) to contain procedures, plans and results of scientific validation of the software
- NJW to take responsiblity for Science Verification Report and fill it with results of our SV tests. CAO to send him skeleton files of the document in the format that RW requested.
- CAO to take responsiblity for the GSSR chapter for which a skeleton document is already written. All of SDAST to send her input on the status of their software.

AI 22.11: On CAO: Complete GSSR chapter. Due: 24/4/02 AI 22.11

9 ALL: RA/DEC conversion tool

- All support s/w libraries now handled by James Peachey and Bruce O'Neel, including DAL3JEMX, but PK doesn't want to touch these libraries
- NJW already has prototype tool tool that could form basis of a library package that could include jemx.h
- NJW to make tool, CAO to supply latest jemx.h

10 SM, CAO: V3 tools status

- SM shows design of performance table generation tool. This will generate master table of performance parameters and standard visualisation tools will be used to study these.
- Sole input is an ascii file detailing HK parameters you want to appear in the table. PK will investigate to what extent IOSM can be used to do this
- This tool is already coded since no real need for nice GUI
- Proposed schedule for CAO's V3 first deliveries:
  - j_ical_frss end May
  - j_ical_gain end June
  - j_ical_collimator end August
  - j_ical_dead end September
- Next meeting should include discussion on interactive background handling including periferal tools for visualisation and index handling

AI 22.12 **AI 22.12:** On PK: Run IOSM on SM's performance master table for visualisation. Due: 5/4/02

11 ALL: V1/V2 Status

- A complete overview of CAO's V1/V2 components can be found in the attached PostScript file. CAO still has to write SCREWs/SPRs to cover the points mentioned.
- Everyone can expect a list of SCREW/SPRs as a result of the Technical Data Flow Test which is currently ongoing
- NJW still to include error images and residual images. Currently IROS only produces residual shadowgrams. IROS is actually V3.
- SL: SL has no more V2 components since lightcurve binning has been moved to V3
- PK: Still has to set some keywords in his components, but no outstanding SPRs

AI 22.13 **AI 22.13:** On CAO: Write SCREW/SPRs for V1/V2 components. Due: April 2002

12 NJW: Imaging Seminar

- A single image from the test sky, with one strong source in PCFOV shows both ghost sources, spurious sources and ripple structure due to background.
- With six 100 mCrab sources can find 5 out of 6 without using IROS. Using IROS can find last source very clearly from image of residual shadowgram, but also re-discover the most poorly determined of the previously found sources. Indicates that found-source subtraction is not perfect.
- IROS method is Iterative Removal of Sources, and starts by finding and removing from the shadowgram the strongest source first.
- This code already exists but is not an integrated part of the j_imaging package and is not delivered.
- farith from ftools can be used to manipulate and visualise different images and shadowgrams
- IROS component should be ready for delivery by end of May 2002.

13 Next Meeting

Next meeting will be held in Helsinki: 4th and 5th June 2002

14 Old Action Items

- AI19_9 Was cancelled: SMN is helping with scripts now
- AI20.4 is closed: 4.9 KeV peak is Xenon
- AI20.18 has new due date: 5/4/02
- AI21.2 is closed: jemx.h to be delivered with RA/DEC tool
- AI020314_1 is closed
- AI020314_2 is closed: draft documents presented at meeting
- AI020321_1 is closed: ADD update procedure agreed at meeting

15 Action Items

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