



ESTEC, 18+19 January 2012

Minutes from 07 February 2012

## Attendants

|                     |                      |      |
|---------------------|----------------------|------|
| Angela Bazzano      | INAF Roma            | AB   |
| Søren Brandt        | DTU Space            | SB   |
| Maurizio Falanga    | ISSI Bern            | MF   |
| Carlo Ferrigno      | ISDC                 | CF   |
| Sergei Grebenev     | IKI Moscow           | SG   |
| Wim Hermsen         | SRON                 | WH   |
| Margarita Hernanz   | IEEC-CSIC, Barcelona | MH   |
| Elisabeth Jourdain  | CESR Toulouse        | EJ   |
| Peter Kretschmar    | ESA, ESAC            | PK   |
| Erik Kuulkers       | ESA, ESAC            | EK   |
| Philippe Laurent    | CEA Saclay           | PL   |
| François Lebrun     | CEA Saclay           | FL   |
| Mark McConnell      | Univ. New Hampshire  | MMC  |
| Giorgio Palumbo     | Univ. Bologna        | GP   |
| Mikhail Revnivitsev | IKI Moscow           | MR   |
| Jean-Pierre Roques  | CESR Toulouse        | JPR  |
| Richard Southworth  | ESA, ESOC            | RS   |
| Pietro Ubertini     | INAF Roma            | PU   |
| Ed van den Heuvel   | Univ. Amsterdam      | EvdH |
| Jacco Vink          | Univ. Amsterdam      | JV   |
| Christoph Winkler   | ESA, ESTEC           | CW   |

## 1 Welcome, Agenda, Actions

AB presented herself and welcomed the new IUG members Mikhail Revnivitsev and Jacco Vink. IUG Membership will end for M. Hernanz, M. Falanga and M. McConnell in July 2012.

The agenda was accepted; the minutes of the last meeting were approved, without changes.

Action 11-1 on ISOC, closed

Action 11-2 on ISOC, closed

Action 11-3 on FL & ISOC, done see presentation

Action 11-4 on CF, ongoing

## 2 Archive Usage Statistics

PK briefly presented the statistics compiled by Marion Cadolle Bel at ISOC (see [viewgraphs](#)).

## 3 Mission Status

PK continued with news from the INTEGRAL mission (see [viewgraphs](#)). Fuel consumption was somewhat increased while SPI cooling plate was kept shadowed during perigee passages, but the fuel reserve is still very good. In the long run, the degradation of the solar

arrays due to high proton radiation may be more of a concern. See also contribution by R Southworth on day 2. PU noted that maybe some power could be saved, if needed.

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| <b>Action 12–1 on PK</b>  | <b>Due: next meeting</b> |
| <i>Provide IUG with presentation on radiation belt exit strategy.</i> |                          |

## 4 Project Scientist Status

CW reviewed the status (see [viewgraphs](#)) starting with an overview of scheduled observations, ToO programmes and the community response to AO-9 data right proposals.

Only 2 GRBs fell into the FOV in the last seven months. GCN are now also referring to weak triggers distributed by IBAS.

TOO observations of SN 2011fe have significantly affected the carry-over, also because the SN had similar visibility constraints as the Galactic Centre or Anti-Centre. Actions have been taken by CW and ISOC to try and reduce this, but still major carry-over is unavoidable. Several options were presented to address this, with two options left for IUG:

- A) No change, accepting negative impact on GC observations in future.
- B) First complete uncompleted AO-9 observations, reduce open time to 20 Ms in AO-10 instead of 24 Ms. But will also have little time available for GC.

After some discussion, IUG generally endorsed Option B, but asked that the TAC review to what extent new or continuing multi-year monitoring observations should be done to full extent given that they are being carried over. ISOC will inform TAC about new and existing monitoring programmes in AO-10.

CW presented a short list of especially interesting science results since June (see vgs); the publication rate is stable.

Outreach activities were reported, with a special focus on products for the 10<sup>th</sup> launch anniversary in 2012. From a list requested by CW, several items have been agreed by ESA, others not. PU volunteered to provide polo shirts and mouse pads. PK will contact PU.

## 5 FINREF

PK presented an overview of the goals of the Financial Management Reform (FINREF) and the current status (see [viewgraphs](#)). At the moment it is not possible to specify the final impact of this on the mission extension. An extended discussion on possible effects on Integral and possible IUG reactions took place. CW was asked to contact the XMM-Newton Project Scientist, N. Schartel and ask for their reaction to FINREF, this was done within the day. The XMM UG has issued a recommendation (Recommendation 2011-05-19/07) in the [minutes of the XMM UG Meeting 12](#) that “ESA management should ensure that new accounting system does not jeopardise possible future extensions of XMM-Newton”. A letter to D/SRE was considered, but not written.

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| <b>Action 12–2 on WH &amp; JV</b>  | <b>Due: Mid Feb</b> |
| <i>Draft letter to D/SRE and circulate within IUG. The letter should be reviewed and sent within a week.</i> |                     |

## 6 ISOC difficulties with non-standard observations

EK presented the various difficulties, ISOC have been encountering to plan observations efficiently (see [viewgraphs](#)).

Observations of specific fixed durations make filling revolutions harder and lead to less efficient planning in general.

JPR emphasized that observing strategies should be well-tested by simulations before proposing special patterns. He also raised the issue of Hex pattern use in deep observations. Such observations are accumulating significant time, but no evaluation of the impact on archival science has been presented.

MR emphasized that some special patterns like the Galactic scans have turned out to be very important.

An extended discussion ensued in which various ideas were presented, e.g., to exclude carry-over for non-standard patterns or to raise the acceptance threshold for these.

It was pointed out that some of the scan patterns could be made in less time – and thus be easier to schedule – if the requirement to download PICsIT histograms were dropped which limits pointing times currently to  $>1800$  s. This was generally considered a good idea. Proposers with non-standard patterns should also be required to give a justification for their request. A note should be added to the AO documents to discourage special patterns and so to save planning and observing time.

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| <b>Action 12–3 on CW</b>  | <b>Due: TAC meeting</b> |
| <i>Raise awareness in TAC on impact of special patterns on the planning efficiency.</i> |                         |

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| <b>Action 12–4 on PU</b>  | <b>Due: mid Feb</b> |
| <i>Check With G. LaRosa if it is safe to operate IBIS with pointings <math>&lt;1800</math> s.</i> |                     |

IUG also endorsed that in general ISOC should have more freedom to modify accepted proposals in order to ease planning and that the TAC should be provided with visibility periods for submitted proposals.

## 7 Instrument & Calibration status, Science Ground Segment

### 7.1 OMC

PK presented the OMC status on behalf of Miguel Mas, who could not attend (see [viewgraphs](#)). The OMC team would like to do an improved FF Calibration during the Earth/CXB observations, which was generally acknowledged.

### 7.2 JEM-X

SB described the JEM-X status (see [viewgraphs](#)) and introduced the instrument to new IUG members. Having both instruments on helps not only by  $\sqrt{2}$ , but also by ability to cross-check results.

Both instruments are currently at  $\sim 3/4$  of the original effective area with slow losses. The gain continues to evolve, counteracted by lowering the high voltage. Solar particle events can introduce strong gain variations (see [vg](#)).

Science and gain calibration would be helped by a higher telemetry allocation for JEM-X.

The particle rate in JEM-X has decreased by  $\sim 20\%$  since October 2010.

The mosaic tool has been improved to allow large scale mosaics in different projections, examples were shown.

A new imaging method is being developed: “PIF weighted imaging” and is currently being tested. It could possibly be delivered to ISDC in April.

CF noted a bright, apparently spurious feature around 6–7 keV in JEM-X spectra of TOO observations on 4U 0115+63. This was also seen in other observations. The JEM-X team is aware of this issue and N.J. Westergaard is looking into this, but no results yet.

DTU Space will support an extension of Integral operations in 2015-2016.

### 7.3 SPI

The update on the SPI status (see [viewgraphs](#)) was presented by JPR. The background has been stable for last 6 months.

The 18<sup>th</sup> annealing was successful, as good or slightly better than in last annealing. But there was an anomaly for detectors 8 and 11 during the outgassing of the coldbox, which was stopped. After annealing both detectors were nominal.

The SPI team would like to test one revolution with SPI HV lowered to 2.5 keV; if successful, this could become the new baseline. A suitable time needs to be identified.

A brief overview of Crab results was given. The next step is the use of multiple events for scientific analysis, because of low background, higher sensitivity at high energies and possibility of polarization studies. Longer Crab observations using the standard  $5 \times 5$  pattern are needed to better calibrate at high energies.

Polarization studies are ongoing, but need new simulations, as errors found in existing simulations. This is a project for several months of computations on a grid.

The SPI Web site at CESR has been updated including standard scientific products (see [vg](#)). A data analysis tool available for test.

### 7.4 IBIS

PU presented news on the support provided by the IBIS team at IAPS and under ASI contract and on the calibration status (see [viewgraphs](#)). No update of the calibration files has been taken place since last IUG meeting. Issues are still being discussed between Rome and Saclay.

### 7.5 IBIS calibration

FL explained the situation at Saclay. Four people currently employed have to leave because of employment rules and the number of FTEs will probably decrease to three (see [viewgraphs](#)).

The work on spectral calibration was explained in some detail. A simple line fit to fix the gain is not possible as one needs to integrate over  $\sim 15$  revolutions.

A linear gain drift is now assumed instead of a prediction based on IREM counters. The offset is now fit by quadratic function which improves matters for recent data. With all this, the energy drift appears to be under control. and an OSA 10 delivery is imminent to ISDC.

Following this, still new ARFs need to be created and the NOMEX correction to be settled. The low threshold is now on average at  $\sim 25$  keV.

PU proposed meeting to discuss the full calibration, FL preferred to have this only if really needed. MR and FL discussed the question of rise time corrections.

FL went on to explain the mask calibration status. Checking which data fulfills quality criteria, the exposure of some corners drops by about a factor of two!

Cygnus calibration has added more exposure, but Cygnus images are more noisy. Also had to discard a lot of data because Cyg X-1 was in low state.

The ISGRI team is planning a new tool, “fantomask”, to be developed and delivered this year.

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| <b>Action 12–5 on FL &amp; EK</b> | <b>Due: mid Feb</b> |
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| <i>Look into feasibility of using Cygnus field for dedicated mask calibration observations.</i> |
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MR raised the question if improving the mask calibration further was really worthwhile. In his opinion, other issues, e.g., cross-talk between sources in deconvolution is larger. Calibrating low-threshold effects is according to CF and MR as important as mask transparency. PU commented that the major improvement in recent years was due to the improved mask calibration in OSA 9.

## 7.6 IBIS calibration source

FL proposes to switch off IBIS calibration source. General agreement, but needs to be verified, if possible.

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| <b>Action 12–6 on AB</b> | <b>Due: end March</b> |
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| <i>Verify if the IBIS calibration source can be switched off.</i> |
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## 7.7 ISDC

CF presented news from the ISDC (see [viewgraphs](#)). There have been changes in manpower allocation, but the level of support for Integral is good. Some details of the operational performance were presented.

ISDC switch to delivery of DVDs from MOC instead of CDs which should help keeping distribution delay low.

The data download in 2011 was very variable, but overall higher than in the previous year.

The high-level archival data interface HEAVENS is being used from outside and extended further.

## 7.8 ISOC

PK gave a brief overview of the ISOC status (see [viewgraphs](#)).

## 8 AO-9 and Long-Term Legacy

RD discussed the legacy goals as formulated in the 2010 mission extension request and what has been achieved for these (see [viewgraphs](#)).

For the study of the morphology of annihilation emission, observations outside the GC region would be helpful. The question is how much would be needed.

For  $^{26}\text{Al}$  it is important where exposure is added, not just adding exposure in arbitrary points. The velocity profile in the inner Galaxy can be explained by including Galactic bar in modeling.

Preliminary results of the SN 2011fe observations were presented. At the moment it seems only upper limits can be given. PU noted that in this energy range PICsIT should have the best sensitivity for broad lines, this should be explored further.

PU presented a review of results obtained on extragalactic sources (see [viewgraphs](#)). Several of the goals described in the 2010 extension request have been reached, for others the work must continue.

A discussion around the needs, uniqueness of INTEGRAL, role of NuSTAR, etc., ensued. WH pointed out that with the upcoming missions the remaining strong point of INTEGRAL is the energy range  $>100\text{ keV}$ , for which it is very important to resolve the SPI/IBIS cross-calibration question. In JPR's view there is enough calibration data up to 200 keV, but beyond that it becomes difficult.

## 9 Comparison SPI vs Compton Mode

PL presented a comparison of results obtained with the IBIS Compton Mode versus SPI results, explaining the details of the IBIS analysis (see [viewgraphs](#)).

There is no discrepancy between SPI & IBIS Compton Mode for polarization, but the spectra obtained differ. This might be caused by source variability. Analysis of Sco X-1 shows no strong systematic effects due to spurious events. For the Crab, SPI & IBIS Compton mode agree, except for normalization (0.44). There is a discrepancy for the hard tail in Cyg X-1.

EJ continued with a description of the SPI analysis method. The method has been tested on the Crab between 20 keV and 5 MeV. Cyg X-1 shows clear spectral and flux variability. EJ has combined spectra with source at similar hardness (spectral state). Does not find emission above 1 MeV in any of these spectra. Presented detailed comparison (see vgs) of data covering similar time ranges – this reduces the discrepancy, but some discrepancy remains. More work is needed by both teams to investigate this.

A discussion ensued on adding time for Crab and Cygnus region observations and the relevance of mask calibration versus spectral calibration.

## 10 Earth/CXB Observations

PK presented a brief summary of the plans so far (see [viewgraphs](#)). The procedure has been settled and five suitable revolutions have been identified. Detailed work on planning will start in coming weeks. Some TM could be obtained from SPI or JEM-X to help OMC calibration as requested by the OMC team.

**Action 12-7 on AB**

**Due: end March**

*Check if instrument teams want to be present at MOC during the first observations.*

## 11 Preparation mission extension

CW explained the mission extension process (see [viewgraphs](#)). He discussed the AWG recommendation of 2010 and spelled out ideas for the 2012 extension case, drawing attention to the presentation of T. Maccarone at the Chia Laguna Workshop. A probable timeline of the extension request was presented.

A discussion followed on the contents and structure of the extension case. It was agreed to in general keep the three sections of the scientific justification, but to summarize in the introduction the results obtained since 2010, compared to the last request. RD, MR and PU agreed to act as “godfathers” for the three sections. IUG members will participate in working groups led by the respective godfather in the editing of the science case for mission extension.

RS presented changes of the technical spacecraft status since the MEOR 2010 (see [viewgraphs](#)). There are no major issues, but various items, e.g., the solar array degradation will need to be addressed. At the end of 2014 a gap in the coverage from Redu will appear which may need to be covered from other stations, if available.

PK briefly presented ideas for cost savings, mostly similar to what has been discussed in the past. Without information on the impact of FINREF on the extension budget IUG was not ready to discuss any of these options.

## 12 INTEGRAL Workshop 2012

The current plans for the 2012 INTEGRAL Workshop were presented by FL (see [viewgraphs](#)). The LOC is actively preparing the meeting. The abstract deadline will be 1 June 2012.

## 13 New scientific results

SG presented results on INTEGRAL observations of the SN remnant of SN1987A with a publication submitted to Nature. Another presentation by WH was not continued due to lack of time.

## 14 Next Meeting

The dates of 20–22 June have been agreed for another IUG meeting, focussed on the preparation of the mission extension. The MEOR is now foreseen to be in the week after this.