EINSTEIN DATA FOR THE 21ST CENTURY

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EINSTEIN PROJECT SUMMARY

- EINSTEIN (HEAO-B) launched Nov 1978
- First imaging mission, first big study in soft band
- IPC, HRI, SSS, FPCS
- Switched off Apr 1981
- At bottom of ocean 1982
- IPC Rev 1B Reprocessing 1984
- EOSCAT released 1990
- Einstein Data Center to close 1994

RECENT ARCHIVE ACHIEVEMENTS

- Completed IPC and HRI Level 1 Port to Sparcs; all Einstein reprocessing now done on Sparcs, many minor M600 bugs found and fixed. Documentation work still to be done.
- Copied PTAPE ('Raw' Production Data Tapes) to DAT
- Copied MERGE (Standard Level 1 Processing Output) tapes to CD-ROM
- Cleaned up databases - resolved many processing errors (Mispointed HUTs, bad HV values, etc; also new master production tape index)
- Cataloged documents, scanned important ones; XMOSAIC work
- Released Screened Data Event FITS files to community on CD-ROM
- Created Unscreened Data FITS archive for CD-ROM

SCIENCE WITH THE NEW ARCHIVE

- Improved catalogs of the data to locate observations of interest, EINFIND program
- Extra exposure time and area
- Flexible screening of data with PROS
- Level 1 PHA files readable by PROS
- 7.8 Gbyte of FITS files (128 Sparc-hours of processing)
- 4099 IPC sequences, 11349 HUTS, 237 Million Photons.

STATISTICS

- Total Photons: 237 million
- Good Photons: 64 million
- Inner Region Photons in Bad Time: 58 million
  - Bright Earth: 21 million
  - Aspect: 12 million
  - High background: 9 million
  - Bad HV value: 1 million
  - Other reasons: 14 million
- Good Time Photons in Outer Region: 75 million
- Bad Time Photons in Outer Region: 39 million

EVENT FILES

- All data from HUT XPR files: includes bad aspect, high background, calibration flag, etc. Also includes outer regions of detector.
- RDF FORMAT - ROSAT Compatible
- Sky pixel, linearized detector, and raw electrical coordinates; PHA and corrected PI for each photon.
- TGR $\rightarrow$ TSI, GTI
  - Temporal Status Intervals: coded bytes (aspect status, viewing geometry, high voltage level) broken out into separate quantities so you can screen on them. TSI fully documented in header, including standard screening criteria.
  - Good Time Intervals: simple time ranges for screening.
- Sequence Time $\rightarrow$ Mission Time

  All times converted to Mission Time counted in seconds from Dec 31, 1977. Easy to compare times between sequences.
- Extended BLT data

Gain and aspect data for all time intervals, not just good times. Also experimental WCS representation of aspect.

- Improved internal documentation

  Historical information such as processing tape ID, original PI and proposal, name of target. Observation table with data on each component HUT from MHDR file.

ANCILLARY FILES

- ASCII LEVEL 1 .OUT FILES
- TIMING AND EPHEMERIS FILE contains ephemeris info for observation, and barycenter correction data. Also contains special table for direct input to PROS apply_bary task.
- SOURCE DATA FILE contains tables derived from Level 1 SDF file, including source list with cross-IDs to 2E catalog and optical IDs. Also extracted PHA spectra from every source in approved GSFC HEASARC format, readable by PROS and XSPEC.
- BACKGROUND FACTORS FILE contains information needed to reconstruct the old Level 1 background map for comparison purposes.

CALIBRATION FILES

- New BEMAP and DSMAP - resolved in PI channel to allow users to select their own bands. Corrected PI values.
- Response matrices in HEASARC approved format.
- FITS images of Chris Mauche's PSF library.
- New FITS versions of all calibration data - PIMAP, DGNI, PSGNI, Al Filter response,
- Mission history databases: BAL (IPCREC) database, DCAL, HV, MAG, EPH, QT.

ASCII SUPPORTING FILES

- MOP database: 1 line per focal plane instrument change
- DOP database: 1 line per stable pointing
- HUT database: 1 line per HUT, PRD archive info
- QT database (FITS): 1 line per major frame, pointing quaternions
- SEQUENCE database: 1 line per sequence, replaces OCAT
- SOURCES list: List of sources and (some) identifications for IPC, HRI, FPCS, SSS, OGS, including HEAO/UHURU counterparts and 2E cross-id to EMSS and Slew Survey.
- IPCSPECS in XMOSAIC format

PROS EINSTEIN TOOLS

- EINTOOLS: support the Unscreened Data and EINCDROM: make CD-ROM use easy
- RBKMAP_MAKE: Task for making rotated background maps for arbitrarily screened data from new BE and DS maps. BEDS_ROTATE to reconstruct old level 1 map.
- EXP_MAKE for exposure maps
- QPGET, FITSGET: Retrieve any QP file from HRI, IPC or Slew Event CDs; Retrieve any FITS files from any of the CDs event or image
- QPLIST, HKFILTER, QPSPEC etc support the new files. Let you do your own screening (e.g. HV=4).