

## BASS: BASIC SCIENTIFIC SOFTWARE FOR SAX

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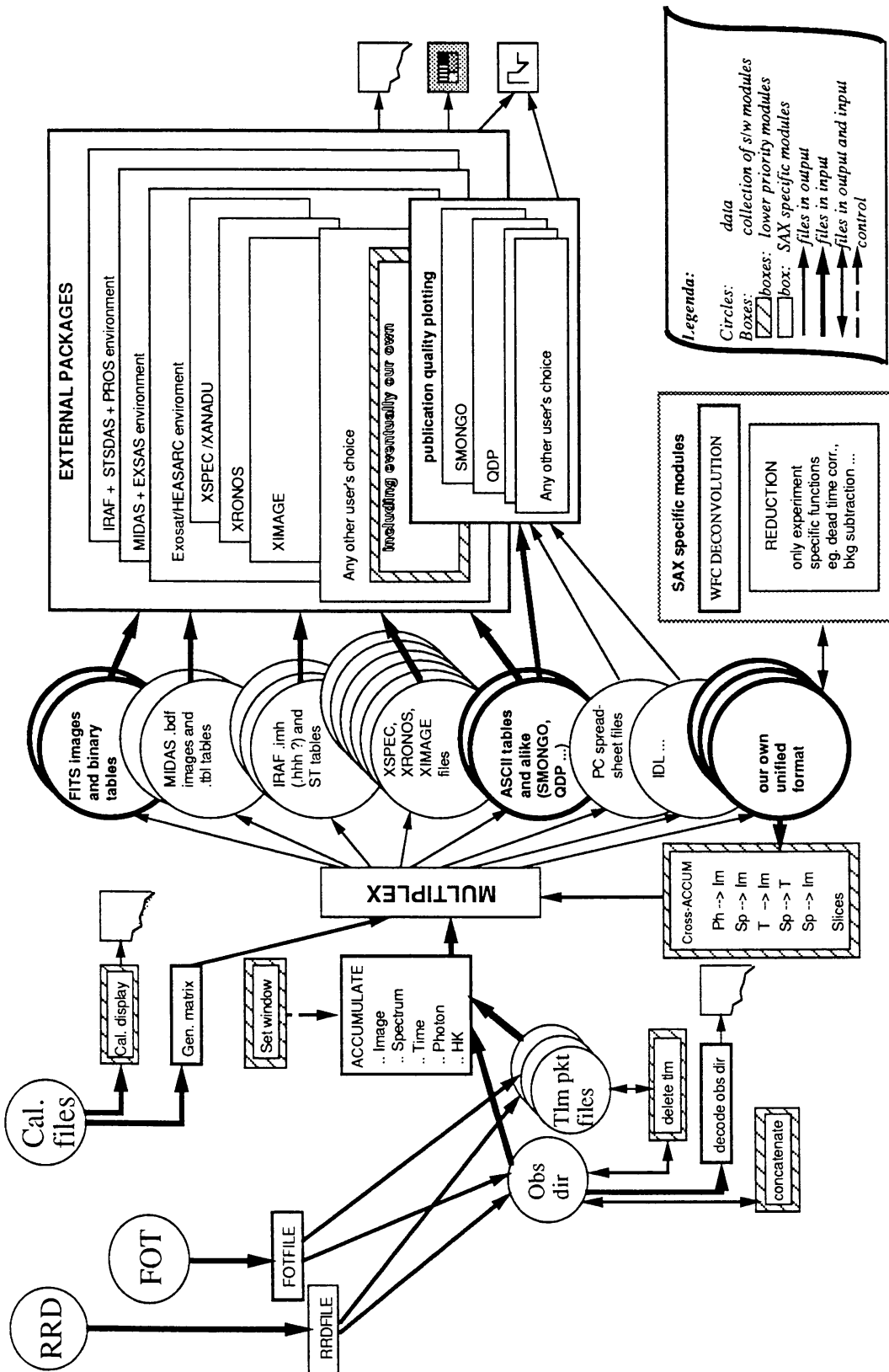
## INTRODUCTION

SAX (X-ray Astronomy Satellite) is a programme jointly developed by the Italian Space Agency (ASI) and the Netherland Agency for Aerospace Programs (NIVR) devoted to systematic, integrated, and comprehensive studies of galactic and extragalactic sources in the energy band 0.1-200 KeV.

Scientific objectives are: imaging (with moderate angular resolution of 1 arcmin) and broad band spectroscopy over the energy range from 0.1 to 10 KeV; spectral measurements, spectroscopy and timing on sources from 3 to 200 KeV; all sky monitoring (2-30 KeV) for the investigation of long time variability and localisation and study of transients.

The spacecraft has a total mass of 1200 Kg, is three axis stabilised, and it will be placed into a circular equatorial orbit at 600 Km with an inclination of 2 degrees, by an Atlas G-Centaur.

The payload includes: a low energy (0.1-10 KeV) concentrator/spectrometer, LECS; a medium energy (1-10 KeV) concentrator/spectrometer, MECS, consisting of three units; a high pressure gas scintillation proportional counter, HPGSPC,(3-120 KeV); a phoswich detector system, PDS, (15-200 KeV), all of which have narrow field of view with coaligned optical axis; and two wide field cameras, WFC, (2-30 KeV), field of view 20x20 degrees, which point in diametrically opposed directions perpendicular to the narrow instrument axis.



SAX, to be launched at the end of 1993, will have a minimum mission life of two years, extendable up to four years.

### THE BASIC SCIENTIFIC SOFTWARE FOR SAX

SAX-Data Analysis Working Group, DAWG, is one of the groups defined in the framework of the SAX mission. SAX-DAWG has been charged by the SAX Consortium to provide:

- definition of the software specifications for the SAX data scientific analysis,
- development and realization of the operating scientific software,
- participation and support to simulations and calibrations, essentially from the software point of view,
- support to the Observation Program Working Group for what concerns simulations and information on calibrations,
- contribution to the definition of the functional structure and activities concerning the SAX-Scientific Data Center, SDC.

Several data analysis software systems (IRAF, MIDAS, XSPEC, XIMAGE, ...) are today available to analyse high-energy astronomy data. The choice of one or more among these systems is depending on several elements, such as their availability and documentation, and/or the personal expertise and taste of the observer. In any case, DAWG considers as mandatory to have a basic scientific software, BASS, which, starting from the Final Observation Tapes, FOT, permits the observer to reduce data in spectra, images, and time profiles, to be analysed with the chosen external package. This basic scientific software is strictly specific of the mission and it can be developed only within the hardware institutes which have the necessary knowledge about the scientific performances of the payload. In this sense, the following tasks will be covered by BASS: read FOT, access to the calibration data, select data, perform background subtraction, accumulate spectra, sky images, and time series, provide specific modules (such as a WFC deconvolution).

As sketched in the figure, concerning the SAX data flow, it is to be noted that: i) data filing is from FOT or RRD to disk resident telemetry files and observation directories; ii) accumulation step is to decode observation directories, accumulate images, spectra, time profiles (including HK), and photon lists from telemetry files; and response matrices from calibration files; iii) cross-accumulation are possible (e.g. images from photon lists, or pseudo-images with counts as function of time and energy, etc.); iv) a dedicated format is likely required to support the small number of SAX specific reduction modules (grouped in the figure inside a dotted box); v) non-specific reduction, analysis and display may occur through a variety of existing external analysis and plotting packages. Therefore BASS will provide a variety of output files in order to be immediately compatible with the main external packages.

As a baseline, BASS will support both VMS and Ultrix platforms. BASS will be well-documented (programmers manuals, data file structure, user's guide) and it will be checked by an 'Acceptance' service before its official release.