esa SPACE TELESCOPE
ESO European Coordinating Facility

ST–ECF Newsletter

No 4
December 1985

CONTENTS

The first Call for Observing Proposals

Robert Fosbury

The first Call for Proposals for scientific observations with the Hubble Space Telescope has now been issued by the Space Telescope Science Institute in Baltimore. The due date for the receipt, at the STScI, of completed proposal forms is March 31, 1986 (1 month later than announced in the Call). They will not be accepted after that date.

The mailing list for this distribution was derived primarily from the compilation of responses to the ST questionnaire sent out in 1983 — *it is different from this Newsletter mailing list.* If you have not received the package (you will know it if you have!) and wish to do so and to receive subsequent information, it is important to get onto the STScI list. You can do this directly by contacting Dr Neta Bahcall, chief of the General Observers Support Branch at STScI, or you can contact us and we will do it for you. We do have a limited number of spare proposal packages which can be sent immediately on request.

In the description of the ST–ECF Documentation Library in the last issue of our Newsletter, we mentioned the existence of the *ST–ECF User's Guide.* The first edition of this document is now available on request. It tells you about services offered by us in Europe; it does not give technical information about the HST. Users who plan to visit the ST–ECF as part of their ST interest should note that we are not able to provide financial support for individual's research projects.

In the last issue of the *STScI Newsletter* (*Vol. 2, No. 3, October 1985*) recent information about the status of the Scientific Instruments was reported. We reproduce below a copy of this report for the benefit of European astronomers who may not have seen it. In addition, in the **News** section on page 13, we give the status at the time of going to press.

Reprinted from STScI Newsletter Vol. 2, No. 3

2. INSTRUMENT NEWS

2.1 WIDE FIELD AND PLANETARY CAMERA (WF/PC)

The WF/PC was returned to JPL from Lockheed in August to be fitted with a means of flooding the CCDs with solar ultraviolet light, in order to eliminate the phenomenon known as "quantum efficiency hysteresis" (QEH).

It became apparent during thermal-vacuum testing of the WF/PC in 1983 and 1984 that the QE of the WF/PC CCDs depends on the history of previous exposure to light, especially in the corners of some of these devices. This "hysteresis" is a function of the wavelengths of the light in previous exposures, the flux rates and exposure times and the elapsed time since each exposure. The phenomenon arises from the presence at the illuminated CCD surface of a depletion layer in the silicon, extending $\lesssim 0.6$ μm below the surface, which results from the presence of "holes" (electron vacancies) at the interface between the silicon and the "native" oxide which grows over it.

Because the absorption length for ultraviolet and blue light in silicon is so small (< 100 Å for $1000 < \lambda < 3700$ Å, for example) the photoelectrons resulting from the absorption of light with $\lambda \lesssim 5000$Å will be collected at the back (illuminated) CCD surface where they will be trapped instead of being collected in the buried channel at the front of the CCD for transfer to the output. The timescales for release of such trapped electrons vary from seconds to months as a function of the energy level of the trap and the temperature of the CCD.

The measured QE of such a device will depend on the state of the depletion well at the start of the exposure, the extent to which the well becomes full during the exposure, and the length of time before read-out.

The depth of the backside depletion well also depends on the presence and depth of any "substrate" silicon overlying the sensitive "epitaxial" silicon which comprises the active volume of the device. The heavily-doped substrate is essentially "dead" to blue photons and reduces the depth of the depletion well.

The CCDs in the WF/PC have varying depths of substrate material on top of the epitaxial layer, and therefore vary greatly in their level of hysteresis. For a device with no remaining substrate (an "over-thinned" CCD), the QE can change by large factors in the blue, and by several percent in the far red. For a device with relatively thick substrate (under-thinned)

hysteresis may be only a few percent in the blue.

All WF/PC CCDs are coated with coronene, a down-converting phosphor which responds from Lyman α to ~3800 Å, greatly enhancing the QE of under-thinned CCDs and reducing the level of hysteresis for λ < 3800Å. The coronene re-emits around 5200 Å, where hysteresis is present in over-thinned devices.

The depletion well at the back of the Texas Instruments 3-phase CCDs can be collapsed and changed to an "accumulation" region by the presence of negative charge on the back (illuminated) CCD surface. Accumulation implies the presence of an electric field which accelerates photo-electrons towards the frontside buried channel. Such an electric field can result in greatly improved QE around 4000Å, with smaller improvements at other wavelengths.

The only method by which this can be effected in the packaged devices is to flood them with ultraviolet light (2100 < λ < 2900 Å). Photons within this wavelength range, if not absorbed by the coronene, produce photo-electrons within the silicon of sufficient energy to reach the conduction band in silicon dioxide, and thus be "conducted" to the CCD surface. Over-thinned devices are much more responsive to this effect because the presence of any substrate material will lead to recombination of the generated photo-electrons. Once such electrons reach the surface, they have an affinity for the trace oxygen contained within the package, and the negative oxygen ions thus formed will "stick" to a silicon or oxide surface. The mechanism by which this is achieved in the presence of coronene is not clear, but the method, though less effective, still works.

Coronene coated devices need to be exposed to ~10^{13} photons per pixel around 2500 Å to reach accumulation and to avoid hysteresis. Further UV flooding will eventually result in saturation or "pinning" of the QE, the preferential state for using the devices for astronomy. The process of "UV flooding" the CCDs is phonon-assisted and is much more effective with the CCDs warm, preferably close to 0°C, or at least as warm as -40°C, the "warm" temperature of the WF/PC CCDs when the thermo-electric coolers are "off."

Following UV flooding, the CCDs remain relatively warm for about an hour, in order to allow fast traps to be released and achieve stability at the CCD surface, and then the operating camera is cooled to -95°C where the surface charge has lowest mobility and the effects of UV flood have the greatest lifetime. For CCDs without coronene, it is known that relatively stable performance, i.e., a small change in absolute blue QE and no return of hysteresis, can be achieved for over a month. The corresponding timescale for the coronene-coated CCDs in the WF/PC is presently under investigation. The absolute QE of the CCDs is expected to fall before the re-appearance of any hysteresis.

The UV "light channel" presently being installed in the WF/PC allows solar UV to reach the WF/PC CCDs without involving the optical telescope assembly. A mirror is attached to the outside of the WF/PC radiator so that when the HST is pointed in the anti-solar direction, solar UV is reflected inside the WF/PC radial bay and, via a series of mirrors and lens elements, reaches the WF/PC pick-off mirror. There it is reflected to form an image of the sun on the WF/PC pyramid, thus illuminating all 4 CCDs of either the wide field or planetary camera. A thermal-vacuum test at the end of August indicated that the equivalent of ~10 orbits of solar UV flooding eliminated hysteresis in some PC CCDs and considerably reduced it in others. Similar results were obtained for the equivalent of 2 orbits of UV flooding for the WFC. These results were extremely encouraging for the potential elimination of QEH by UV flooding for $\gtrsim$ 15 orbits on the PC and $\gtrsim$ 5 orbits on the WFC.

The installation of the UV light channel into the WF/PC is presently scheduled for completion by the end of October 85, with testing in November. The testing will include a ~ ten day thermal-vacuum test to measure the stability of the enhanced QE and the extent to which QEH is eliminated.

The goal of the testing will be to establish that photometry at the 1% level will be possible with the WF/PC, between UV flooding at $\gtrsim$ 1 month intervals.

It should also be noted that, with the installation of the UV light-channel, the aperture "cork" used to seal the front entrance to the WF/PC will always remain in place. The "cork" is made of MgF_2 and results in loss of transmission below 1500Å, to approximately 60% at Lyman α.

The results of WF/PC thermal-vacuum test no. 5, to take place at JPL in November, will be reported in a future newsletter. For further information on the TI 3-phase CCD and UV flooding, see

"The future scientific CCD" by J. R. Janesick, T. Elliott, S. Collins, H. Marsh, M. M. Blouke and J. Freeman,

in Vol. 501 of SPIE Proceedings on "State-of-the-Art Imaging Arrays and their Applications," ed. K. N. Prettyjohns, pp. 2-33, 1984; and

"Backside Charging of the CCD" by J. Janesick, T. Elliott, T. Daud, J. McCarthy, and M. Blouke,

in Vol. 570 of SPIE Proceedings on "Solid State Imaging Arrays", eds. K. N. Prettyjohns and E. L. Dereniak, 1985.

Additional Note: While the WF/PC was at JPL during September, filters F225SP and F290SP (short-pass "blockers" which were to be used to separate first and second orders from the UV grism) were removed and replaced with a SII filter (F673N, central wavelength 6731Å, FWHM 50Å) and a neutral filter of density 3, F8ND providing attenuating by a factor of 10^3 or 7.5 mags. The neutral density filter is intended for use in obtaining flat-fields on the bright earth.

- Richard Griffiths

2.2 FAINT OBJECT CAMERA (FOC)

The FOC has successfully completed its Phase II functional tests. This means that the instrument performance in the HST is electrically and mechanically nominal and that no interface problems have surfaced. Further tests including a modal jitter followed by the acoustic and thermal vacuum/thermal balance tests are expected to be carried out later in the year or at the beginning of 1986.

Although all systems on the FOC are essentially ready for flight, there is increasing concern regarding the performance of the F/96 detector head unit. This degradation manifests itself principally in the absolute saturation level of the FOC. The saturation arises as a consequence of confusion in the Video Processing Unit (VPU). When too many events arrive within the VPU analysis range in a frame period, it is unable to distinguish between them and some counts are lost. Thus, the intensity transfer function, which is linear at low count rates, turns over to reach a plateau at high count rates (see F. Paresce, FOC Instrument Handbook, ST ScI, October, 1985).

Initially, in air the F/96 detector exhibited a saturation plateau situated at approximately 0.7 counts sec^{-1} $pixel^{-1}$ for uniform illumination, but this value has been dropping, almost linearly with time. These are indications that this deterioration does not occur in vacuum, since the FOC recovered to its better performance values in a two week long vacuum test in November, 1984. On this basis the instrument was delivered to Lockheed for functional testing.

More ominous however, is the recent finding that event sizes are definitely asymmetric and that the ratio of large to small events in the histogram mode is growing unacceptably large. All this seems to indicate that the detector is slowly, inexorably and inexplicably going out of focus. Attempts to refocus the camera have not been successful.

Consequently, ESA has proposed that this detector be replaced by a spare detector now undergoing final calibration in Europe. If approved, this change could occur as early as November, 1985 while the HST is undergoing its acoustic test. In this case, the FOC would be placed back in the HST for post acoustic verification. Clearly, a number of complex issues need

to be fully considered before such a move can be actually implemented.

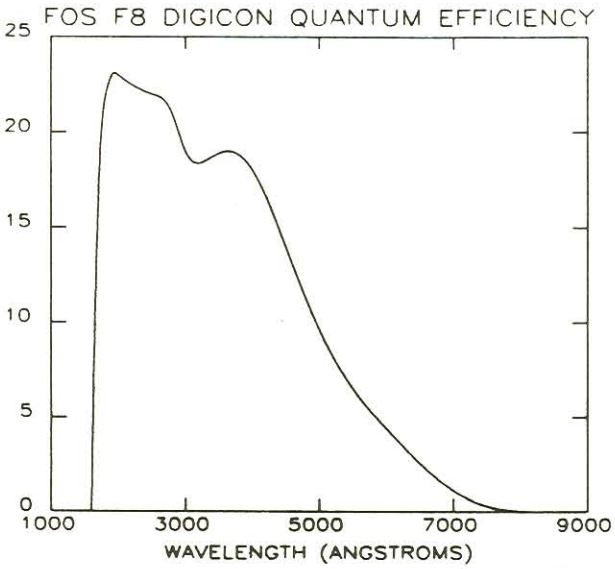
- Francesco Paresce

2.3 FAINT OBJECT SPECTROGRAPH (FOS)

In the June 1984 STScI Newsletter we reported that a design error in the Faint Object Spectrograph (FOS) high voltage power supply caused the two Digicons to be exposed to high light levels at approximately 600 volts for long periods of time during assembly at the Martin Marietta Corp., Denver. Both flight Digicons were returned to the manufacturer, for remeasurement of their quantum efficiencies. The bialkali Digicon's excellent Q.E. was unchanged shortward of 450 nm (Q.E. ~ 15% at 121 nm, ~ 20% at 300 nm, and ~ 10% at 400nm) and the apparently undamaged tube was reinstalled in the FOS. Recalibration of the trialkali Digicon showed that its red response had decreased by a factor of 2 at 600 nm, with an increasing loss of sensitivity at longer wavelenths. Because of the degraded sensitivity to red light, the red detector was replaced by our only good flight spare (designated F3). As noted in the June 1984 Newsletter, F3 appeared to be a good tube in all respects save one. That exception, which presaged the tube's demise, was a noticeable increase in the ion-induced background after the tube had been potted. Measurements made by Ed Beaver (UCSD) between June 1984 and July 1985 showed a secular increase in the ion count rate, with the inferred gas density inside the tube nearing the point which could allow a high voltage discharge between the photocathode and anode. The most plausible explanation for the increasing ion count rate is that the tube is leaking.

Because of the possibility of a catastrophic failure, and loss of irreplacable electronics, F3 was removed from the FOS in mid August. NASA has funded a continuing program to build flight spares for the FOS. As a result of this program, there are yet two more red flight spares (F8 and F9). The most likely replacement, F8, has been potted and installed in its permanent magnet focus assembly. The thermal background and ion count rate are within specification, and the tube shows no obvious problems. The measured QE of F8 is shown in the figure below. The QE is quite good in the ultraviolet, violet, and blue, and about half as good as its two predecessors at H-alpha.

Although the schedule for assembling F8 and installing it into the FOS is very tight, the tube is presently a few days ahead of schedule. In spite of the previous problems, there is good reason to believe the FOS will be flown with a respectable, if not outstanding, red detector.



- Holland Ford

2.4 HIGH RESOLUTION SPECTROMETER (HRS)

The HRS is undergoing testing at Lockheed. So far, no problems have been encountered. The instrument appears to be in good shape.

- Dennis Ebbets

2.5 HIGH SPEED PHOTOMETER (HSP)

The High Speed Photometer (HSP) is also currently undergoing testing at Lockheed. The HSP has successfully completed two phases of functional testing. Now a series of mechanical and acoustic tests is beginning.

Few problems have been discovered during the testing at Lockheed. There were some minor mechanical difficulties with fitting the HSP and the other instruments into their bays in the telescope structure. There have also been some problems in operating the entire ST system which have affected the HSP. Most of both the mechanical and functional difficulties have been found to be the result of problems not in the HSP but in other parts of the ST system.

The HSP does have one significant hardware problem: some of its high voltage power supplies (HVPS) have suffered from intermittent failures. An HVPS occasionally fails to turn on when commanded. (A second **On** command is usually successful.) This problem has persisted despite replacement of the HVPS which originally failed. After extensive testing at the University of Wisconsin, the problem has been attributed to stresses induced in the HVPS by the potting material which was used. Parts are being acquired for a complete set of replacement power supplies which will have no potting at all.

- Richard White

2.6 FINE GUIDANCE SYSTEM (FGS)

The final results of the thermal vacuum test program show that the performance of FGS astrometry does not meet the expected accuracy of 0.0016 arcsec for relative position determination of three stars in a 20 square arcmin field of view. The astrometry error budget update is 0.003 arcsec, but for stars as faint as visual magnitude 18. The origin of the performance degradation is:

(i) a systematic color offset of 0.0017 arcsec between position determination for stars of extreme surface temperature; and

(ii) a one-minute oscillation of 0.0007 arcsec due to a temperature control effect.

These figures are r.m.s. errors. Astrometric measurements with the "yellow" filter, which will reduce the color shift, and with the FGS, located in bay No. 2, which will improve the control of the roll of the spacecraft, are expected to reach an accuracy of 0.0027 arcsec.

In-flight tests will indicate the best mode of FGS observations.

- Alain Fresneau

Using the HST Software Model

Michael Rosa

In fulfilling its task of acquiring and disseminating accurate and topical information about the scientific and technical performance of the HST and its instruments, the ST–ECF is faced with two major problems which are different from those prevailing at ground based observatories. The utility of HST and the instruments for a given scientific problem will (in general) not be easily judged from the technical details alone. Secondly, simple listings of the technical data describing the instruments will not be sufficient to judge the influence of varying parameters on the overall performance. Simulating the raw data obtained for realistic astronomical data through various HST instrument configurations can help to substitute for our lack of observational experience with HST and is a prerequisite for the testing of data reduction and analysis software.

The ST–ECF HST Models (*Newsletter No. 1, March 1985*) consist of a collection of special purpose programs that are embedded in a general application data analysis system (MIDAS running on VAX under VMS). They are accompanied by two large databases, technical data describing the instruments and a large astrophysical data library (see *Newsletter No. 3, September 1985*). The user is enabled to:

- Create and modify realistic astronomical targets, using artificial and/or real data, including the contamination from zodiacal and airglow light.
- "Observe" the targets with different instrument configurations (optical and electronic setups).
- Integrate and read out the data including the peculiarities of the detectors and various noise sources (e.g. cosmic-rays, readout noise).
- Utilize the general MIDAS environment to modify, analyze and hardcopy the data at any intermediate step and try out reduction programs with well defined *known* input.

The ST–ECF HST Models can be used like any other application program package in MIDAS designed for the reduction and the analysis of ground based data. Likewise, due to their modularity and flexibility, only those programs handling the instrument specific configuration (e.g. the optical path from aperture through filter, collimator and grating onto the detector) are supported by menus with fixed branching trees. A prospective user must be prepared to learn the use of the particular environment (MIDAS) and must have a fair understanding (handbook level) of the HST instrument under consideration and of the astrophysics involved.

In view of the above, and considering the uncertainty involved in the use of ground calibration data to generate inflight results, the ST–ECF is not intending to distribute the software and databases along with the regular MIDAS releases. Prospective users are however welcome to collaborate with ST–ECF staff at Garching and are encouraged to bring along addenda to the databases and the artificial data generation and data analysis software.

The current status of the Models is as follows:

Instruments/Modes covered

- HST-OTA point spread function (no spiders)
- WFPC imaging, Baum spot, CCD read out
- FOC imaging, ITF, geometric distortion
- FOS spectrophotometry
- HRS non-échelle spectrophotometry
- HSP (an exposure time calculator is available)

Artificial data generation

- Mapping of PSF (point sources)
- Convolution of extended objects with PSF
- Emission/absorption line spectra, continua
- Multiple (analytical) profiles, continua

- Extended point/axial symmetric sources
- 1D, 2D random data from various distributions
- Randomization of signals

Astronomical library

- Tables of MK colours
- Stellar spectra (low resolution) 1100 – 10000Å
- Spectra of galaxies (low resolution) 1100 – 10000Å
- High resolution UV spectra of stars
- Emission line lists for H II regions and planetary nebulæ
- Interstellar extinction curves

Under consideration

- HRS, échelle mode
- Slitless field spectroscopy
- Polarimetry (spectral, imaging)
- 2D long-slit spectroscopy with the FOC

MIDAS — The Munich Image Data Analysis System

Hans-Martin Adorf

Introduction

The ST–ECF has adopted the *Munich Image Data Analysis System* (MIDAS) as the system to be used for the analysis of HST data. The system has been developed since 1979 by the Image Processing Group at ESO with the aim of providing an 'open data reduction environment', which can easily incorporate new application software and utilities.

MIDAS has benefitted greatly from the experience gained at ESO using the Hewlett Packard based image processing system IHAP. Many of the internal design features such as "world coordinates" have been incorporated and the command language has been designed so as not to differ too much from the basic philosophy of IHAP. Currently the MIDAS system itself is VAX/VMS-based, the operating system which is used by about 80% of the European astronomical sites.

The MIDAS system can be run in both *interactive* and *batch* modes. The interactive user can also create batch jobs running in parallel with the interactive work.

MIDAS presently contains more than 250 astronomical application programs, including the FOC calibration software developed for ESA. Since 1982 MIDAS has been used for routine astronomical data analysis at ESO and it has been exported, free of charge, to about 30 other institutes.

MIDAS features as seen by the user

The system design was influenced by a number of considerations, among these:

- It should be compatible with other major astronomical image processing systems currently being developed, e.g. STARLINK from the UK.

- Visitors should find it easy to use.

- It should be modular with simple standard interfaces to its data structures, e.g. images and

tables, in order to facilitate the import of existing application software from other systems.

Thus MIDAS was implemented with the following features:

• It is a command driven system geared towards the interactive user. MIDAS commands have been modelled after the DEC Command Language, which drives the VAX/VMS operating system.

• Command sequences may be combined into and executed from a 'command procedure' file.

• The command language includes control features like conditional branching, nested looping, local/global variable substitutions and nested calls of procedure files.

• An extensive on-line help facility provides detailed descriptions of all commands and qualifiers.

MIDAS supports a variety of data structures:

Images, which contain a collection of data of the same physical significance, e.g. CCD images,

Masks, containing byte or bit masks which can be used to select an area of interest within an image,

Tables, containing data arranged in rows and columns and not necessarily of the same physical significance. Tables are extremely useful for storing and processing the results of data reduction.

Descriptors, containing the information which is to be physically associated with an image or a table, e.g. its name or the number of pixels on each axis, and

Keywords, which are global variables used to provide communication between MIDAS application programs.

The tape formats supported from MIDAS are FITS, DEC's BACKUP format and the IHAP format for input and FITS and BACKUP for output.

Basic capabilities

Presently MIDAS provides a comprehensive set of basic image processing functions. Amongst these are: (a) load images and masks, colour look-up tables (LUTs) and intensity transfer tables (ITTs) into the image display and read them back into VAX memory, (b) interactively modify the LUTs to enhance image features, (c) zoom and scroll images interactively or with fixed values, (d) view single images either in monochrome or with pseudo colours, (e) extract subimages interactively via cursor window or using preselected coordinates, (f) plot scan lines, contours and perspective views, (g) rotate, flip and rebin images, (h) execute arithmetic operations and the usual FORTRAN functions on images and tables, and (i) to filter and transform images and tables, e.g. median filtering or fast Fourier transformation (FFT).

Astronomical applications

Several application program packages have been developed within the MIDAS environment. Astronomical subject areas currently covered in this way are image detection and discrimination (e.g. star-galaxy separation), 2D photometry, 1D and 2D Cassegrain spectroscopy, and Echelle spectroscopy. Incorporation of a package for slitless spectroscopy is progressing.

The statistical capabilities of MIDAS have been increased considerably by the recent inclusion of a suite of multivariate statistical methods directly interfaced with the Table system.

The HST catalogue and archive will be equipped with interfaces to the MIDAS data structures (images and tables) such that the result of a query or retrieved data can immediately be fed into MIDAS.

Tutorials are provided for the newcomer and contributions to the applications software are always welcome.

All MIDAS input/output is channelled through a set of so-called 'Standard Interfaces', which have been implemented as a means to achieve

compatibility with the SDAS data analysis system developed at the STScI — at least on the application level. These program interfaces allow the same easy integration of application programs as the previous MIDAS interfaces, and they should also allow application programs written for the SDAS system to be run in the MIDAS environment and vice versa, i.e. a sharing of main programs and subroutines between MIDAS and SDAS.

In addition, 'Image Display Standard Interfaces' are currently being negotiated between STScI, ESO/ST–ECF and STARLINK. These should increase the adaptability of each analysis system to new or other image display hardware.

The ASTRONET Graphics Library, which is a mini-GKS and standardises the calling sequences for graphical output, is in the process of being included into MIDAS.

Documentation

The MIDAS Users Guide. This is the prime source of information on MIDAS as seen by the user. It describes the main features of the MIDAS system and how to use them. The manual includes descriptions of the data structures, detailed explanations of individual commands, and information on how to use the special purpose devices such as the Dicomed image recorder.

MIDAS Installation Guide and *MIDAS system description.* These documents exist in rudimentary form and are of concern only to those who want to install and/or maintain a MIDAS system.

The MIDAS Environment. This document is an application programmer's guide and will prove useful to those who wish to generate special purpose commands for their own particular application. In particular, it describes the 'Standard Interfaces' and the 'Table Interfaces'. Example programs are also provided.

The Software Library

Fionn Murtagh

One of the objectives of the ST–ECF is to ensure the production of and ready access to astronomically relevant software. A software library is currently being set up, and this article will summarize the structure of this library and how it can be accessed. It is seen both as an information service and as the location of software. To facilitate access to it, and its maintenance, it will be as far as possible in machine readable form, in a directory named `ESOB::SWLIB` on ESO's computer system. Such a software library will only be useful if it is found to fulfil a real rôle. Any thoughts or suggestions on it would therefore be appreciated.

At present, the ST–ECF software library consists of three levels: the most basic level is brief information about software items (ranging from subroutines to packages). A user can log onto the VAX computer system at ESO, and read these descriptions. Suggestions for the addition of new items can be made by sending `MAIL` to `SWLIB`. This software list is to be found in subdirectory `LIST` of directory `SWLIB` (use: `SET DEF ECF$DISK:[SWLIB.LIST]`, having logged into some account on ESO's system).

If possible, the relevant programs themselves are available in another subdirectory (this is

[SWLIB.BANK]), and this constitutes the second level of the software library.

The third level (in [SWLIB.STANDARD]) consists of subroutines which are well documented and verified. What is aimed at, in this third level, is a set of subroutines of high algorithmic content, independent of input/output, which can be incorporated into any image processing host system without undue difficulty. At present, VAX-11 Fortran is employed, but it is recommended that the more restrictive Fortran 77 standard be used if possible.

Access to this software library, including the copying out of source code, is possible over public packet switching networks or modem. If you have useful routines which you think would be of wide relevance, why not consider having copies included in the ST–ECF software library?

Report on the Paris AGN meeting

Danielle Alloin

Meudon

&

Thierry Courvoisier

A workshop was held in Paris on the first and second of October to discuss HST proposals to observe Active Galactic Nuclei. Approximately 40 people participated actively in the definition of projects covering many aspects of current AGN research. The approach of a common workshop allowed the European astronomers working in this field to commence the preparation of a set of complementary proposals. It also presented the opportunity to form groups of scientists geared towards collecting HST data relevant to specific questions rather than groups sharing the same prejudices on the possible answers, as is often the case. The diverse interests of the participants should ensure that as many as possible of the questions that a set of data can answer will actually be addressed. It also provided for lively discussions.

The time available was shared between plenary sessions, during which a wide theme (e.g. the central compact source) was presented by a member of the organising committee, followed by splinter sessions to discuss individual questions in detail. The plenary sessions served to set the broad objectives of different projects (e.g. low levels of nuclear activity), whereas splinter sessions were used for each of these sub-areas to define how an HST proposal could best be designed. A brief report was given at the end of the two days of work on all of the studies which had been envisaged.

The conduct of the discussions on AGN studies presupposed a division of the subject into tractable sub-areas. This division was examined from several different viewpoints but it was always felt to be somewhat arbitrary, already showing how intimately all aspects of research in this area are linked. The fact that the division was made in plenary sessions should ensure, however, that the links between the different subject areas are properly taken into account.

Several of the groups formed around specific ideas left with the firm intention of continuing the collaboration and making observing propos-

als. From subsequent communications, we know that this is actually happening.

The following is a list of the projects envisaged, together with the name of the person nominated as coordinator.

Low Levels of Nuclear Activity: A sample of galaxies will be defined to cover the appropriate parameter space (e.g. using [NII]/H_α as a criterion) and typical galaxies for each subclass will be proposed. The HST observations will be imaging and long-slit spectroscopy. The contact person is Thierry Courvoisier.

Study of the Lyman Continuum in Seyfert 1's: A set of Seyfert 1 galaxies with $z > 0.5$ will be selected and observed. The contact person is Jean Clavel (Vilspa).

Profile of Continuum Source: The continuum source may have a profile which depends on wavelength. Nearby Seyfert galaxies will be observed in the continuum at several wavelengths to test this hypothesis. The contact person is Klaus Fricke (Göttingen).

Polarimetry and Rapid Variability in Blazars and BL LAC's: Broad band polarimetric studies of the rapid variations ($< 1000 sec$) seen in BL LAC's are envisaged. The contact person is Laura Maraschi (Milan).

The 3000 Å Bump: A comparative study of the spectropolarimetric properties of AGN's with and without a broad spectral "bump" between 2000 and 4000 Å is proposed. The contact person is Marie-Hélène Ulrich (ESO, Garching).

Variability: No proposals are envisaged for the specific study of variability in the UV emission of AGN's. Interested persons should still contact Danielle Alloin.

Gravitational Lenses: A study of the most luminous quasars is envisaged to test whether these objects owe their very high luminosity in part to gravitational lensing. A signature of this would probably be the appearance of split images at the sub arcsecond level. The contact person is Jean Surdej (Liège).

Jets and Radio Lobes: Five objects have been selected to conduct the study. The proposals will be coordinated but made separately for each object. The contact person is Hermann-Josef Röser (Heidelberg).

Extended Narrow Line Regions: A study of the morphology and kinematics of the extended narrow line region is envisaged. The contact person is Gerd Weigelt (Erlangen).

LINERS: A detailed study of individual objects was considered. The sources proposed are NGC 1052, NGC 7213 and M81. The contact person is Luc Binette (ESO, Garching).

Extended Nebulosity: A study of the extended emission line nebulosity seen around many active galaxies and quasars is proposed. The contact person is Jacqueline Bergeron (Paris).

News

Latest News on the HST

A one month delay in the deadline for the receipt of completed proposals for the first round General Observer proposals has been announced by the STScI. The date is now March 31, 1986. Letters have been sent to all those who received the Call for Proposals.

Further information about the status of the instruments will be published in the next issue of the *STScI Newsletter*. Although we have taken the step of reproducing here the instrument news from the October issue of their Newsletter, we believe that there is little point in making such copies in the future. If you want to receive the *STScI Newsletter*, write to the editor, Dr George Miley in Baltimore.

The catalogue of the Guaranteed Time Observer programme, which was distributed in a booklet as part of the Call for Proposals, is also available on magnetic tape in a format suitable for VAX computers. We shall be happy to supply a copy to institutes with a genuine interest in using the data.

Piero Benvenuti

MAIL service with STARLINK

Users of the STARLINK network in the UK can now communicate with the ST–ECF by sending `MAIL` to `RLVAD::ECFMAIL` (or, for those without access to a STARLINK computer, by using `POST` to the account `ECFMAIL` on `RLVS`). Messages will be collected by our secretary, Britt Sjöberg, first thing in the morning and distributed to the appropriate person. Replies will be sent directly to the source of the message. This channel of communication is similar to that operating between STARLINK and the Anglo-Australian Observatory except that, in our case, the ST–ECF will take the responsibility for distributing the replies.

Robert Fosbury

We should like this Newsletter to reach as wide an audience of European astronomers as possible. If you are not on the mailing list but would like to receive future issues, please write to the editor stating your affiliation (Ed).

Contacts at ST–ECF

Head:	P. Benvenuti Tel.: +49–89–320 06 290 Computer ESOB::PIERO
Science Data and Software:	R. Albrecht Tel.: +49–89–320 06 287 Computer ESOB::RUDI
Science Instrument Information:	R.A.E. Fosbury Tel.: +49–89–320 06 235 Computer ESOB::BOB

Editor: Robert Fosbury
Published by the Space Telescope – European Coordinating Facility
European Southern Observatory
Karl-Schwarzschild-Str. 2, D–8046 Garching bei München, FR Germany
Telephone: +49–89–320 06 291 Telex: 528 282 22 EO D Telefax: +49–89–320 23 62
Typeset with TEX.
