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ANNUAL REPORT 1979



EUROPEAN SOUTHERN OBSERVATORY



Cover Photograph

This image is the result of computer analysis through the ESO image-processing system of the interacting pair of galaxies ESO273-IG04. The spiral arms are disturbed by tidal forces. One of the two spirals exhibits Seyfert characteristics. The original plate obtained at the prime focus of the 3.6 m telescope by S. Laustsen has been digitized with the new PDS machine in Geneva.

ANNUAL REPORT 1979

presented to the Council
by the Director-General, Prof. Dr. L. Woltjer

Organisation Européenne
pour des Recherches Astronomiques dans l'Hémisphère Austral

EUROPEAN SOUTHERN OBSERVATORY

TABLE OF CONTENTS

INTRODUCTION	5
RESEARCH	7
Schmidt Telescope; Sky Survey and Atlas Laboratory	8
Joint Research with Chilean Institutes	9
Conferences and Workshops	9
FACILITIES	
Telescopes	11
Instrumentation	12
Image Processing	13
Buildings and Grounds	15
FINANCIAL AND ORGANIZATIONAL MATTERS	17
APPENDIXES	
Appendix I – Use of Telescopes	22
Appendix II – Programmes	33
Appendix III – Publications	47
Appendix IV – Members of Council, Committees and Working Groups for 1980	55

INTRODUCTION

Several instruments were completed during the year, while others progressed well. Completed and sent to La Silla for installation were the 1.5 m Coudé Auxiliary Telescope (CAT), the reticon camera for near infrared spectroscopy, the infrared photometers for the 3.6 m telescope and the triplet adapter with provisions for wide-field photography and for small field electronographic imaging. The Coudé Echelle Scanner was nearly completed, and both it and the CAT are scheduled for installation at La Silla during 1980. Work on the Cassegrain Echelle Spectrograph progressed. A CCD camera system was ordered and design work continued on the Focal Reducer and the Cooled Grating Infrared Spectrograph. While some studies were made of the VLT (Very Large Telescope), much effort was devoted to bring the optics of the present La Silla telescopes into an optimal condition.

The new detectors and data-acquisition systems at La Silla make a much more sophisticated image processing necessary. The HP-computer-based system in Geneva was further expanded and increasingly used by Visiting Astronomers. At the same time, it became clear that to deal with the future two-dimensional data sets, a more powerful system will be needed. Accordingly, a VAX 11/780 computer was ordered to serve as a basis for such a system. Also photographic and electronographic plates continue to have an important role; to facilitate their analysis, a PDS measuring machine was installed in Geneva as an addition to the Grant and Optronics machines already in operation.

Preparations were made for the move of all ESO facilities in Europe to the new Headquarters building in Garching. The building was making satisfactory progress. Early in the year, the Headquarters Agreement between the Federal Republic of Germany and ESO was signed in Bonn. The move is foreseen for August 1980.

RESEARCH

It is becoming increasingly difficult to adequately summarize the very extensive research done by Visiting Astronomers and ESO staff. As a consequence, the format of this report is changed. Here only a very brief selection of some highlights is presented, while in appendix II a brief description is given of the observing programmes for which time was scheduled at the ESO telescopes (appendix I), and in appendix III a listing of the publications of Visiting Astronomers and ESO staff.

Perhaps the most noteworthy aspect of the evolution of the ESO research activities is the ever closer relationship with satellite-based work at ultraviolet and X-ray wavelengths, the former in particular in connection with the IUE satellite. A typical example is the collaboration of no fewer than twenty persons including ESO staff which studied the quasar 3C 273 which had also been scheduled for optical monitoring at La Silla. The list of references in appendix III shows several other examples of IUE related work.

In the area of X-ray source studies, several correlated optical and X-ray bursts were detected at La Silla in collaboration with satellite groups in the USA and in Japan. Such bursts are presumably due to thermonuclear explosions on the surface of neutron stars and should constitute a valuable tool for the exploration of such stars which are of much importance in physics and in astronomy. Because these bursts are elusive—none may occur in a source for 24 hours—little is known about them, and the ESO work has more than doubled the sample. Much other work on X-ray sources was done which led to the establishing of periodicities and period changes. Since most sources are faint, observations with the required time resolution require a large telescope—in most cases the 3.6 m.

New techniques applied at the La Silla telescopes led to interesting results. Several groups of Visiting Astronomers bringing their own equipment extended the use of the 3.6 m telescope into the submillimetre and millimetre wavelength range—thus moving ESO into a domain hitherto reserved for radio astronomers. Around 1 mm were observed dust in our own galaxy, nonthermal radiation from radio galaxies, the planets Uranus and Neptune, and CO molecules in several dark clouds in our galaxy. Visitor equipment also was used for observations of the 12.8 micron line of ionized neon in the galactic centre and elsewhere.

Another relatively new technique with broad applications appears to be “speckle” interferometry. Different groups observed long-period variable stars—finding that the diameter of Mira in the TiO bands changes from cycle to cycle—the asteroid Juno, and the central object of 30 Doradus in the Large Magellanic Cloud with resolutions of a few hundredths of an arc second. The new ESO infrared photometer was used to start a programme of one-dimensional speckle work in the IR.

Many problems in astronomy are essentially of a statistical nature and can only be solved by extensive programmes of careful observation of large well-defined samples of objects. Examples of such programmes include a study of the large-scale distribution of galaxies in some selected region of the universe, a study of a complete sample of a hundred Parkes radio galaxies at optical, infrared and radio wavelengths, a photometric survey of 200 quasars, and a study of a large sample of S0 galaxies. Such galaxies are supposed to be devoid of gas, but strong emission lines were nevertheless detected in a substantial part of the sample.

Among other results we mention the finding that the narrow-line X-ray galaxies NGC 1365 and 2992 are Seyfert 1 galaxies with the implication that all X-ray galaxies could be Seyfert 1 with faint broad hydrogen line components; the detection of numerous strong FeII emitters among quasars—in particular radio-quiet ones; the result that the large lenticular galaxy NGC 612 has a flat optical rotation curve out to 120,000 light-years from the centre, corresponding to a mass of more than 10^{12} times that of the sun; the detection of underlying structures (presumably galaxies) in several quasars; the detection of carbon stars in several dwarf galaxies with the new grism at the 3.6 m telescope with a limiting magnitude $I = 18$; the result that the iron deficiency in the Small Magellanic Cloud may not be more than a factor of two with respect to the sun.

Theoretical studies at Geneva included work on the stability of rotating galaxies, on the dynamics of HII regions, on the X-ray background and on several other topics.

Among the important functions of ESO is the fostering of European cooperation in astronomy. In this respect, the situation of the research publications of ESO staff is encouraging. A total of 97 (73 in 1978) publications involving ESO staff are listed in appendix III (excluding preprints). Of these 63 involved ESO staff (including fellows) and persons outside ESO with in 41 cases persons in the ESO countries involved. The fact that about 2/3 of all staff publications are co-authored by persons not at ESO shows the excellent level of cooperation in the community. In addition, 73 (74 in 1978) publications involved only Visiting Astronomers, of which 19 were authored by persons of more than one country.

Schmidt Telescope; Sky Survey and Atlas Laboratory

During 1979, a total of 387 plates was taken with the Schmidt telescope. The total includes 133 plates of 2 hours exposure for the red atlas, 203 plates for a variety of scientific programmes of Visiting Astronomers and ESO staff, and 33 plates of comets and minor planets.

By the end of 1979, 400 fields (out of a total of 1,212) of the ESO/SRC Atlas had each been produced in 150 copies. Only a few of these had not yet been sold, and it was considered to start the production of a second edition as soon as possible. The atlas is delivered in instalments of 50 fields each to customers in Europe (45%), North America (39%), South America (4%), Africa (2%), Asia (4%), and Australia (6%).

Some problems were encountered with the copying of the ESO(R) plates from La Silla. Due to the hardness of the surface of the IIIa-F plates, special precautions had to

be taken in order to avoid Newton rings when copying by contact printing. This problem took some time to solve, as a result of which only few ESO(R) plates have until now been copied for the ESO/SRC Atlas.

Work continued in the laboratory with reproduction of direct and spectral photos obtained at La Silla by visitors and ESO staff. A slide set with views from La Silla was released.

Joint Research with Chilean Institutes

The Danjon Astrolabe Project, a joint research programme between the University of Chile and ESO, continued during 1979 under the direction of F. Noël (Santiago). Regular observations for time and latitude as well as for the improvement of the fundamental reference system have been carried out normally during the year.

Cooperation also took place with the Maipú radio observatory of the University of Chile and with the "Institute for Astronomical Research Isaac Newton".

Conferences and Workshops

The following workshops and conferences were held during the year:

Astronomical Uses of the Space Telescope (jointly with ESA), Geneva, 12-14 February.

Software Techniques for the Reduction of Echelle Spectrograms, Geneva, 1-2 March.

Two Dimensional Photometry (jointly with Leiden Observatory), Noordwijkerhout (the Netherlands), 21-23 November.

F0000



η Carinae Nebula

One of the first plates obtained during the final optical adjustment of the triplet adaptor at the prime focus of the 3.6 m telescope in November 1979 (observer: M. Tarenghi). The 1° field around η Car is photographed here with the red corrector, with an exposure time of 40 minutes, on IIIa-F emulsion behind an RG630 filter. The print has been made by R. Saxby, making use of the masking technique.

FACILITIES

Telescopes

Much work was done on the optical quality, the pointing and the infrastructure of the telescope.

The 3.6 m Telescope

The optical system for prime focus and Cassegrain was completely realigned with highly satisfactory results. The main limitation on the image quality is now given by the effects of atmospheric turbulence. While of course the general atmospheric effects cannot be changed—and at La Silla are favourable compared to most other places in the world—a non negligible contribution to the image degradation seems to be made by turbulent flows inside the dome. This may be observed directly on many occasions, and it is also suggested by the differences in image quality at the 3.6 m telescope and at the Danish 1.5 m telescope which on some occasions may be quite substantial. It is intended during the coming few years to study these effects in detail and to make improvements.

The pointing still left much to be desired, as a result of various mechanical instabilities which showed up during the pointing tests. Most of these appear now to have been dealt with, and the full implementation of the pointing model should be possible in 1980.

A new cable twist was installed to improve the connection between instruments at the telescope and the control room. Also the new vacuum facilities, required for IR work, were installed. The dome rotation is being improved. This requires the replacement of all wheels, which is in progress.

Following tests in Geneva, the CAT was disassembled and shipped to La Silla where it arrived by the end of the year. Installation will take place during the first half of 1980.

*The Coudé
Auxiliary Telescope*

Both the Danish 1.5 m and the Dutch 0.9 m telescopes were fully completed and on 1 October went into normal operation with 50% of the observing time available to ESO users. The Danish 1.5 m at present is equipped with photometers for four-colour and H-beta photometry and also for direct photography. A camera for photography with the full one-degree field has been designed. The Dutch 0.9 m may be used with the Walraven five-colour photometer.

Other Telescopes

New drive motors arrived for the 1 m telescope, but the necessary mechanical adaptations remain to be made. Much effort was devoted to the improvement of the optical quality of the telescopes, in particular of the 1.5 m.

Some preliminary studies of a future Very Large Telescope were continued. Several possible designs for a 16 m telescope were studied. It is anticipated that more extensive studies will be undertaken following the move to Garching.

Instrumentation

Several new instruments were installed at the 3.6 m telescope.

The triplet adapter—intended for wide-field (1 degree) photography—consists of guiding and focussing facilities, a filter box and a plate changer, all of which are remote controlled. Either the blue or the red triplet correctors may be inserted. The filter/plate changer unit may be replaced by an electronographic McMullan camera with a field of 40 mm (13 arc minutes) and equipped with its own filter set. Work is in progress on an 80 mm McMullan camera. It is also foreseen to install a grism for very low dispersion spectroscopy over much of the one-degree field. Such a grism was installed during the year for use with the Gascoigne corrector.

The reticon camera has extended the use of the B & C spectrograph into the near infrared to 1.0 and with lower sensitivity to 1.1 microns. A new B & C spectrograph for the 3.6 m telescope has been ordered with a number of additional remote control features; following its arrival late 1980 or early 1981, the present spectrograph will become available for use at other telescopes.

Two infrared photometers have been installed, the first for the 1–5 micron range with an InSb detector and the second with a bolometer for the 10–20 micron range. In addition to various filters, the InSb photometer also has a variable wavelength filter for spectroscopy with a resolution of about 100. Much of the extensive software needed for optimal use of the photometers was written, including some for their use in a one dimensional speckle mode.

Concerning future instrumentation, the situation is as follows:

The coudé echelle spectrometer (CES) has been fully tested in Geneva in the scanner mode. Some solar spectra demonstrate the high optical quality of the instrument at resolutions of 10^5 and more; also the throughput achieved by means of specially coated optics appears to be excellent. Because of problems with the manufacture of the digicons, a reticon system has been fabricated as a temporary solution. Following some further tests in Geneva, the instrument will be installed in 1980 at La Silla principally for use with the CAT.

The Cassegrain (cross-dispersed) echelle spectrograph (CASPEC) was under construction. Delivery of the optical components is scheduled for mid-1980. Unfortunately, this is too late for completion before ESO's move from Geneva to Garching, and consequently completion will be delayed.

Construction of the single-channel photometer at La Silla was completed, but owing to the pressure of other work, the software was not yet finished.

Design work was started on a cooled Grating Infrared Spectrograph (IRSPEC) intended for work at resolutions of 1000 in the 1–5 micron infrared. Interchangeability

of the camera/array detector unit is foreseen to allow for the incorporation of future detector developments and for the possibility of longer wavelength operation at a later stage.

The optical design for a Focal Reducer to change the F/8 Cassegrain beam to F/2 was completed. The design is optimized for use with a CCD. Two CCD cameras have been ordered—one for early use at La Silla and one for further developments in Garching.

A second IDS for use with the 1.5 m telescope was completed and sent to La Silla for installation. The preparations for installing the new EMI tubes at the B & C spectrograph were completed, and a first high-quality tube was received.

A high-precision clock system based on a caesium standard was installed at La Silla and connected to all domes via a new cable network.

A helium liquifier has been ordered for La Silla to deal with the problems created by the ever increasing use of liquid helium in infrared and millimetre or submillimetre work.

Image Processing

As detectors become more sophisticated in their performance and as photographic plates and the methods for their measurement improve, higher demands are placed on the quantitative analysis of images—of galaxies, nebulae, spectra, etc. The main tool for such analysis is the interactive image-processing system, which allows the experimenter to manipulate an image in a variety of ways—and to see the result immediately—in order to maximize the information extracted.

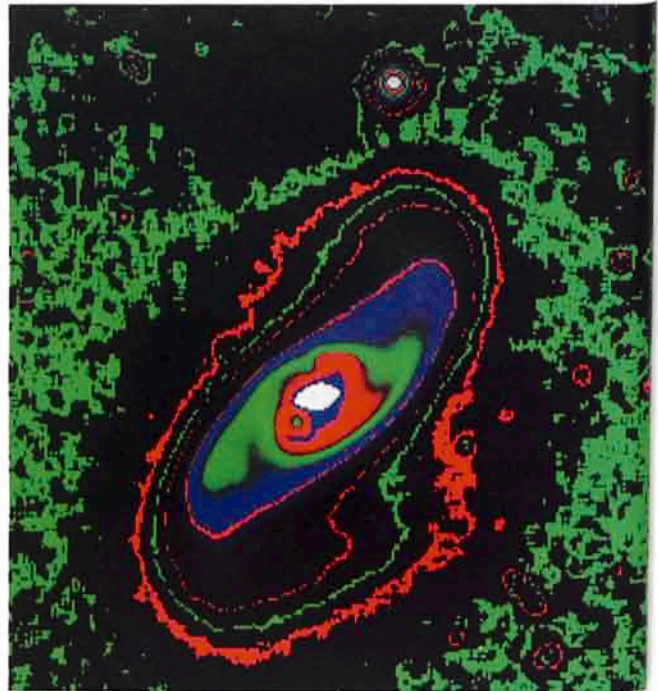
The heart of such a system is a computer, but equally important are the display terminals through which communication with the experimenter takes place. The computer is to be relatively powerful to allow the rapid manipulation of large data sets—a typical image might have $1,000 \times 1,000$ independent elements. Even a very simple operation like the subtraction of a uniform background then already involves a million arithmetical operations.

A first image processing system has been set up at ESO in Geneva, which is based on HP minicomputers. This system is currently being used by both staff and Visiting Astronomers. The capacity of the system, however, is inadequate for the rapidly increasing requirements. In view of this, a more powerful “midi” computer—the VAX 11/780—has been ordered for delivery in 1980 in Garching. Initially it is foreseen to have 6 terminals, each of which will have substantial computing power of its own, which would allow about five experimenters to work simultaneously with the system. Ultimately, the installation of some additional terminals and probably another VAX is envisaged. The present HP-based system being already one of the most advanced of its kind in Europe, it is expected that the new system will satisfy the ESO needs for several years to come.

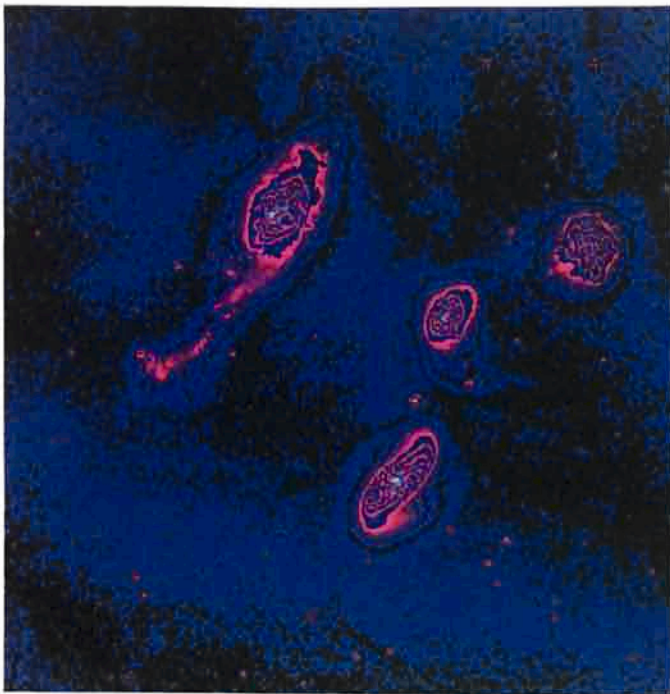
An illustration of how such an image processing system may be used is given in the accompanying figures.



NGC 87, 88, 89, 92 (ESO 194-G08, G10, G11, IG12). A system consisting of four galaxies, all of which have emission-line spectra. This IIIa-J plate + GG385 filter was obtained by S. Laustsen with the 3.6 m telescope in a 90-minute exposure.



An electronic zoom technique is used here to show one of the galaxies, NGC 89, in greater detail. Through this technique, making maximum use of the colour possibility, it is possible to show both the inner and outer intensity levels of galaxies.



Previous field as it appears on the colour display of the ESO image-processing system. The original plate has been scanned with the PDS machine. Each intensity level is shown here by a colour. This picture is shown in one of the almost infinite chromatic combinations, used to enhance a particular feature of the object under study. This technique is called pseudo-colour representation.



A "dramatic" picture of NGC 1365. The original plate obtained by S. Laustsen with the 3.6 m telescope (with IIIa-J + GG385) been exposed for 90 minutes. This colour picture, obtained through the image-processing system, shows clearly the complex structure, a number of HII regions along the spiral arms, as well as the extended envelope. A direct photograph of this galaxy is shown in the 1978 annual report on page 9.

Buildings and Grounds

In Europe, the construction of the new Headquarters building in Garching made further progress. It should be completed by 31 July 1980, and the transfer of most of ESO's Geneva facilities should take place during August. Extensive preparations needed for this move were made.

At La Silla, further improvements were made. These include the asphaltting of some parts of the air strip, the installation of additional crash barriers on the access road, improvements in the electrical network, installation of air conditioning in the 1.5 m telescope coudé. A tender for a solar energy based water heater was prepared, and various possible ways for putting the electricity supply on a more economical basis were studied. During the year, 1,935 MWh of electricity was generated, while the consumption of pure water averaged 60 m³/day.

In La Serena, a parcel of land of about 6 hectares was acquired, which is located adjacent to and above the present Office. Some minor modifications were made to the Office in connection with the transfer of the remaining parts of the library from Santiago to La Serena.

FINANCIAL AND ORGANIZATIONAL MATTERS

The Headquarters Agreement between the Federal Republic of Germany and ESO was signed in Bonn on 31 January by Staatssekretär Dr. P. Hermes and the Director-General of ESO in the presence of the President of Council and members of the German ESO delegation.

The joint ESO/EMBL Working Group on Remuneration Systems came to the recommendation that ESO should adopt the remuneration system and pension scheme of the Coordinated Organizations. At the end of 1979, the matter was, however, still under discussion in the ESO Finance Committee and Council, which early in 1980 reached a negative conclusion. As a consequence, ESO continues to apply a system based on the CERN system.

Concerning finance, Council maintained also for 1980 member states' contributions on the previous level of DM 32,500,000, which in view of general cost increases may have to be increased at some time in the future.

The external audit of ESO has, effective 1979, passed from the French Court of Auditors to the Belgian Court of Auditors.

In Chile, ESO acquired some land around the Pelicano airport, close to the Observatory, through a donation by the Chilean Government. In addition, ESO purchased in La Serena 6 hectares of land adjacent to the La Serena office to facilitate possible future developments in this area.

Budget Statement 1979

(in DM 1,000)

Expenditure

Budget Heading	Approved Budget	Expenditure (incl. commitments and uncommitted credits carried over to 1980)
1 Personnel	19,126	16,612
2 Operations	11,068	10,268
3 Capital outlays	6,619	8,285
4 Sky Survey Project	1,360	1,128
TOTAL EXPENDITURE	38,173	36,293
Reserve for cost variation	1,500	-
GRAND TOTAL EXPENDITURE	39,673	36,293

Income

Budget Sub-heading	Estimate	Actual (incl. receivables)
80 Contributions from member states	32,500	32,500
81 Unused appropriations from previous years	2,882	2,882
82 Sale of Sky Atlas	720	511
84 Internal tax	2,244	2,020
85-89 Miscellaneous	1,327	2,348
TOTAL	39,673	40,261

Budget for 1980

(in DM 1,000)

Expenditure

Budget Heading	Europe	Chile	Total
1 Personnel	11,496	8,435	19,931
2 Operations	5,741	6,884	12,625
3 Capital outlays	5,740	1,689	7,429
	22,977	17,008	39,985
RESERVES			
Reserve for cost variation (3,75%)			1,500
TOTAL EXPENDITURE			41,485

From 1980 onwards, expenditure in Europe is shown in one amount. The costs of the Sky Survey Project are included in budget headings 1-3.

Income

Budget Sub-heading	Estimate
80 Contributions from member states	32.500
81 Unused appropriations from previous years	4.275
82 Sale of Sky Atlas	480
84 Internal tax	2.191
85-89 Miscellaneous	2.039
TOTAL INCOME	41.485

APPENDIXES

APPENDIX I – Use of Telescopes

Use of the 3.6 m Telescope during 1979

Period	Observer	Institute	Programme	Instrument
Jan. 1–7	T			
Jan. 7–8	<i>Borgman/Danks/Koornneef</i>	Groningen/ESO/Washburn	Properties of dust in the 30 Dor region	IDS
Jan. 8–21	T			
Jan. 21–23	Duerbeck/Seitter	Hoher List/Münster	Structure of nova envelopes	PF
Jan. 23–29	Pakull (3) <i>Manfroid/Melnick</i> (1½)	ESO Liège/ESO	X-ray sources Spectrophotometry of HII regions	IDS IDS
Jan. 29–Feb. 1	Lub (1½)	ESO	Abundances in evolved globular-cluster stars	IDS
Jan. 29–Feb. 1	Wlérick	Meudon	Variable quasars and galaxies	PF spectracon
Feb. 1–2	Wamsteker	ESO	Dust in galaxies	IDS
Feb. 2–3	Breysacher/Swings	ESO	Wolf-Rayet stars in the LMC	IDS
Feb. 3–5	<i>Knoechel/Vogt</i>	Hamburg/ESO	Polarization of cataclysmic binaries	4-ch.
Feb. 5–21	T			
Feb. 21–22	<i>Wlérick</i> (Bouchet)	Meudon	Variable quasars and galaxies	PF spectracon
Feb. 22–24	Adam	Lyon	Intraday variations in QSO	IDS
Feb. 24–26	<i>Ritter/Schroeder</i>	Hamburg	Cataclysmic variables	IDS
Feb. 26–March 1	Véron	ESO	Search for dwarf Seyfert 1 and BL Lac nuclei	PF
March 1–4	<i>Danziger/Fosbury/Goss/Ekers/Wall</i>	ESO/Groningen/ Cambridge	Survey of high frequency radio galaxies	IDS
March 4–10*	Courtin/Coron	Verrières	Submillimetre observations of Uranus and Neptune	Special
March 10–14*	Arnold/Sherwood	Bonn	Compact HII regions	Special at PF
March 14–15	T			
March 15–20*	de Vries/van der Wal	Roden	IR interferometer observations	Special
March 20–21	<i>Bergeron/Dennefeld/Kunth</i>	ESO	Emission-line galaxies and QSO	IDS
March 21–23	Wehinger	Heidelberg	Direct imagery of quasars	PF
March 23–25	Schnur/Sherwood	ESO/Bonn	S0 galaxies	IDS
March 25–27	<i>Bergeron/Dennefeld/Kunth</i>	ESO	Emission-line galaxies and QSO	IDS
March 27–31	Ulrich	ESO	Ionized gas in elliptical galaxies	IDS
March 31–April 1	Stenholm	Lund	Faint Wolf-Rayet stars	IDS
April 1–3	<i>Melnick/Quintana</i>	ESO	Velocities of galaxies in X-ray clusters	IDS
April 3–5	Kohoutek	Hamburg	Peculiar planetary nebulae and their nuclei	IDS

Period	Observer	Institute	Programme	Instrument
April 5-8	Schnur/Sherwood	ESO/Bonn	50 galaxies	IDS
April 8-16*	Gillespie/Martin	MPI Bonn	1.3-mm spectral line work	Special at PF
April 16-18	Vogt	ESO	Ultra-short period dwarf novae	IDS
April 18-20	Pakull	ESO	X-ray sources	IDS
April 20-22	Schnur	ESO	Redshifts of X-ray clusters	IDS
April 22-23	<i>Gammelgaard/Laustsen/Pedersen</i>	Aarhus/ESO	The NGC 5291 complex	IDS
April 23-26	Möllenhoff	Heidelberg	Emission nebulae in NGC 5128	IDS
April 26-28	<i>Balkowski/Guerin</i> (Perrier)	Meudon/Paris	Morphology of lenticular galaxies	PF
April 28-May 5	<i>Chevalier/Ilovaisky/Motch</i>	Meudon	Photometry of faint X-ray sources	Special
May 5-7	T			
May 7-13*	<i>Epchtein/Turon/Puget/Roucher/Wamsteker</i>	Meudon/ ESO	IR galactic and extragalactic H II regions	Special
May 13-15	van Dessel	Brussels	Cen X-3	IDS
	T (1)			
May 15-18	<i>Audouze/Thuan/Dennefeld/Kunth</i>	Paris/ESO	Abundances in compact emission-line galaxies	IDS
May 18-20	Zuiderwijk	ESO	Massive X-ray binaries	IDS
May 20-June 6	Bergeron/Boksenberg (3)	ESO/London	Evolution of nuclear activity in spirals	Special
	<i>Boksenberg/Caloi/</i>	London/Frascati/	Blue stars in the globular cluster NGC 6752	Special
	<i>Castellani/Cannon</i>	Edinburgh/		
	Danziger (2)	ESO		
	<i>Boksenberg/Danziger/</i>	London/ESO/	Absorption lines in QSO	Special
	<i>Fosbury/Goss</i> (3)	Groningen		
	<i>Boksenberg/Danziger/</i>	London/ESO/	Galaxies with active nuclei	Special
	<i>Fosbury/Bergeron/Goss</i> (3)	Groningen		
	<i>Boksenberg/Tarengi</i> (3)	London/ESO	BL Lac objects; NGC 5253	Special
	<i>Boksenberg/Ulrich</i> (3)	London/ESO	Ionized gas in elliptical galaxies	Special
June 6-18	T			
June 18-21	Terzan	Lyon	Photometry of globular clusters	PF
June 21-25	<i>van den Heuvel/van Paradijs</i>	Amsterdam	X-ray burst sources	IDS
June 25-27	<i>Wamsteker/Pedersen</i>	ESO	X-ray bursters	IDS
June 27-30	<i>Shaver/Danks/Pottasch</i>	ESO/Groningen	Temperatures and abundances in diffuse nebulae	IDS
June 30-July 2	<i>Alloin/Tenorio-Tagle</i>	ESO	Evolution of galactic H II regions	IDS
July 2-14	T			
July 14-17*	de Vries/van der Wal/ Provoost	Roden	IR interferometer observations	Special
July 17-19	<i>Wamsteker/Pedersen</i>	ESO	X-ray bursters	4-ch.
July 19-20	Lub	ESO	BVR sequences in Plaut's field 3	4-ch.

Use of the 3.6 m Telescope during 1979 (Continued)

Period	Observer	Institute	Programme	Instrument
July 20-22	Lyngå	Lund	Metal abundances in centre galaxy	PF + 4-ch.
July 22-24	Vogt	ESO	Ultra-short period dwarf novae	IDS
July 24-28	Adam	Lyon	UBV photometry of high z quasars	IDS
July 28-30	Phillips	CTIO	QSO with low-z absorption-line systems	IDS
July 30-Aug. 2	Alcaíno	Santiago	Main sequence photometry of globular clusters	PF
Aug. 2-14	T			
Aug. 14-17	Bergvall/ <i>Ekman/Lauberts</i>	Uppsala	Interacting galaxies	IDS
Aug. 17-20	Bergeron/ <i>Kunth</i>	ESO	QSO of low redshift	IDS
Aug. 20-23	Bertola/ <i>Hayli</i>	Padova/Lyon	Structure of elliptical galaxies	IDS
Aug. 23-24	Seggewiss	Hoher List	Wolf-Rayet stars in the Local Group	PF
Aug. 24-25	<i>Rahe/Schnur/Bouchet</i>	Bamberg/ESO	Comets at large heliocentric distances	IDS
Aug. 25-27	<i>West/Kurtanidze</i> (Perrier)	ESO/Abastumani	Rich clusters of galaxies	PF + IDS
Aug. 27-28	T			
Aug. 28-30	Bergvall/ <i>Ekman/Lauberts</i>	Uppsala	Interacting galaxies	IDS
Aug. 30-Sept. 7	T			
Sept. 7-12*	Sherwood/Kreysa	MPI Bonn	Submillimetre photometry of radio sources	Special at PF
Sept. 12-15	T			
Sept. 15-18	Wehinger	MPI Heidelberg	Imaging of quasars and radio galaxies	PF
Sept. 18-21	Nørgaard-Nielsen/ <i>Rasmussen</i>	Copenhagen	Stellar population content in ellipticals	IDS
Sept. 21-23	Véron, M.P./Véron, P.	Meudon/ESO	UBV photometry of quasars	IDS
Sept. 23-25	Danziger/Shaver/ <i>Goss</i>	ESO/Groningen	Survey of high-frequency radio galaxies	IDS
Sept. 25-28	Wamsteker/Danks	ESO	CaII absorption in QSO	IDS
Sept. 28-Oct. 8	T			
Oct. 8-11	Querci	Meudon	Speckle interferometry of carbon stars	Special at PF
Oct. 11-13	Foy/Bonneau	Meudon	Speckle interferometry of Mira and other objects	Special at PF
Oct. 13-15	Alcaíno	Santiago	Search for globular clusters in the Sculptor group	PF
Oct. 15-18	Westerlund	Uppsala	Red stars in nearby galaxies	PF
Oct. 18-22	<i>Lequeux/Laustsen/Schuster</i> /West (1½) <i>Biermann/Fricke</i> / Schleicher (2½)	Meudon/Aarhus/ ESO MPI Bonn/Göttingen	UBV in Sculptor Dwarf Irregular Galaxy (SDIG) Seyfert 1 galaxies	PF PF + IDS
Oct. 22-24	<i>Gyldenkerne</i> /Taylor/ <i>Axon</i>	Brorfelde/Hailsham/ Brighton	Hot-Spot galaxy NGC 1808	IDS
Oct. 24-27	Wamsteker/Danks	ESO	CaII absorption in QSO	IDS

Period	Observer	Institute	Programme	Instrument
Oct. 27-30	Hunger/ <i>Kudritzki</i>	Kiel	Quantitative analysis of faint blue stars	IDS
Oct. 30-Nov. 3	T			
Nov. 3-9*	Sibille/Perrier	Lyon/ESO	IR speckle interferometry	IR photometer
Nov. 9-18	van den Heuvel/ <i>van Paradijs/</i> <i>de Loore</i> (4)	Amsterdam/ Brussels	Massive X-ray binaries	IDS
	Grosbøl (2)	ESO	Spiral arms in NGC 300	IDS
	<i>Crane/Tarenghi/Materne/</i> <i>Chincarini</i> (3)	ESO/Berlin/ Oklahoma	Clustering of galaxies	IDS
Nov. 18-20	Röser	MPI Heidelberg	QSO in the direction of galaxies; PHL 5200	IDS
Nov. 20-22	Dennefeld	ESO	Ring-type objects and SNR in the MC	IDS
Nov. 22-26	Nørgaard-Nielsen/ <i>Niss</i>	Copenhagen	Stars in 47 Tucanae	IDS
Nov. 26-Dec. 11	T			
Dec. 11-12	Schnur (² / ₃)	ESO	Interactions between galaxies	PF
	<i>Reipurth/Wamsteker</i> (Schnur) (¹ / ₃)	Copenhagen/ESO	Small dark clouds in IC 2944	PF
Dec. 12-14	Wlérick	Meudon	Variable Seyfert galaxies	PF
Dec. 14-17	Ekman	Uppsala	Interacting galaxies	PF + IDS
Dec. 17-19	de Ruiter/Lub	ESO	Variation of emission lines in Seyfert nuclei	IDS
Dec. 19-21	<i>Pottasch/Piersma/Goss</i>	Groningen	Spectrophotometry in H II regions	IDS
Dec. 21-24	Danks/ <i>Shaver/Pottasch</i>	ESO/Groningen	Temperatures and abundances in diffuse nebulae	IDS
Dec. 24-27	Mundt	Heidelberg	Pre-main-sequence visual binaries	IDS
Dec. 27-Jan. 1	T			

* Programme with also day-time use of telescope

T Tests or other technical time

IDS Image Dissector Scanner + Boller and Chivens Spectrograph

PF Prime Focus

4-ch. 4-channel photometer

If more than one name is listed under "Observer", the names (in italics) include persons involved in the programme, but not observing. Names in parentheses are of persons who observed for the programme of someone else.

Use of the 1.52 m Telescope during 1979

Period	Observer	Institute	Programme	Instrument
Jan. 1-2	Schnur	ESO	S0 galaxies	BC
Jan. 2-4	<i>Bastian/Mundt</i>	Heidelberg	T Tauri stars with UV excess	BC
Jan. 4-6	<i>Barbier/Swings</i>	Liège	Spectroscopy of stars with UV excess	BC
Jan. 6-8	Bouchet	ESO	Variable carbon stars	BC
Jan. 8-12	<i>Renson/Manfroid</i>	Liège	Ap stars	Coudé
Jan. 12-21	Duerbeck (4½)	Münster	Binaries among Be stars	Coudé
	Swings (4½)	ESO/Liège	Emission-line stars with IR excess	Coudé
Jan. 21-22	Bouchet	ESO	Variable carbon stars	Coudé
Jan. 22-28	<i>Hua/Doan</i>	Marseille/Lyon	Balmer continuum in WR and Of stars	Special
Jan. 28-Feb. 1	<i>Gahm/Andrews</i>	Stockholm/Armagh	Orion Nebula cluster	BC
Feb. 1-8	Danks	ESO	Interstellar lines in the MC	Echelec
Feb. 8-12	Bouchet	ESO	Variable carbon stars	Coudé
Feb. 12-14	Dachs	Bochum	Be stars	Coudé
Feb. 14-21	<i>Delmas/Gerbaldi</i>	Paris	Ap stars	Coudé
Feb. 21-27	Bastiaansen	Leiden	Circular spectropolarimetry	Special
Feb. 27-March 2	<i>Ritter/Schröder</i>	Hamburg	Cataclysmic variables	BC
March 2-6	Mauder	Tübingen	X-ray binaries	BC
March 6-8	Bouchet (1⅓)	ESO	Variable carbon stars	Coudé
	<i>Ablin</i> (Bouchet) (2/3)	Stockholm	HD 161387	Coudé
March 8-10	Haug	Hamburg	HD 80383 and stars in NGC 5617	RV Cass.
March 10-15*	de Vries/van der Wal	Roden	IR interferometry	Special
March 15-17	Haug	Hamburg	HD 80383 and stars in NGC 5617	RV Cass.
March 17-21	Mauder	Tübingen	X-ray binaries	BC
March 21-25	Stenholm	Lund	Faint Wolf-Rayet stars	BC
March 25-26	<i>Wramdemark</i> (Stenholm)	Lund	OB stars	BC
March 26-April 1	Schnur/Sherwood	ESO/MPI Bonn	Emission regions S0-galaxies	BC
April 1-6	Grosbøl	Copenhagen	Rotation curves for late-type galaxies	BC
April 6-13	<i>Lindblad/Lodén/Zentelis</i>	ESO/Stockholm	The local system of early-type stars	Coudé
April 13-14	Bouchet	ESO	Variable carbon stars	Coudé
April 14-15	<i>Ablin/Sundman</i> (Bouchet)	Lund	HD 161387	Coudé
April 15-21	Spite, M.	Meudon	Evolution effects in halo stars	Echelec
April 21-27	Ilovaisky/Chevalier/ <i>Motch</i>	Meudon	Photometry of X-ray sources	Special
April 27-28	Houziaux	Liège	V 348 Sgr	BC
April 28-May 1	Möllenhoff	Heidelberg	Emission nebulae in NGC 5128	BC

Period	Observer	Institute	Programme	Instrument
May 1-17	<i>de Loore</i> (van Dessel) (4½) Zuiderwijk (8) <i>Henrichs/van den Heuvel/ van Paradijs</i> (Zuiderwijk) (3½)	Brussels ESO Amsterdam	X-ray sources Massive X-ray binaries X-ray sources	Echelec Echelec/Coudé Coudé
May 17-20	van Dessel	Brussels	Radial velocities visual binaries	Coudé
May 20-23	<i>Drechsel/Rabe</i>	Bamberg	Mass flow in close binary systems	Coudé
May 23-24	<i>Ahlin/Sundman</i> (Pöllitsch)	Stockholm	HD 161387	Coudé
May 24-31	<i>Metz/Pöllitsch</i>	München	Simult. spectroscopy and photometry of Be stars	Coudé
May 31-June 7	<i>Appenzeller/Krautter/ Mundt</i>	Heidelberg	T Tauri stars	BC
June 7-10	T			
June 10-12	<i>Sterken/Vanbeveren</i>	Brussels	Spectrographic observations of β Cephei stars	Coudé
June 12-19	Imbert	Marseille	Eclipsing binaries	Coudé
June 19-21	Manfroid	Liège	Variations in Ap stars	Coudé
June 21-25	Manfroid/ <i>Heck</i>	Liège	Ap-stars classification criteria	Coudé
June 25-26	Bouchet	ESO	Variable carbon stars	Coudé
June 26-27	<i>Ahlin/Sundman</i> (Bouchet)	Stockholm	The eclipsing binary HD 161387	Coudé
June 27-July 6	Bouchet/ <i>Querci</i>	ESO/Meudon	Carbon variable stars	Coudé
July 6-13*	de Vries	Roden	IR interferometry	Special
July 13-17	<i>Arpigny</i> (Bouchet)	Liège	Metal-deficient stars	Coudé
July 17-24	Bastiaansen	Leiden	Circular spectropolarimetry	Special
July 24-30	Rosa	Heidelberg	HII regions in nearby galaxies	BC
July 30-Aug. 3	King	Berkeley	Velocity dispersions in globular clusters	Echelec
Aug. 3-5	Bouchet	ESO	Variable carbon stars	Coudé
Aug. 5-6	<i>Ahlin/Sundman</i> (Bouchet)	Stockholm	Eclipsing binary HD 161387	Coudé
Aug. 6-12	T			
Aug. 12-17	Häfner	München	HD 224113	Coudé
Aug. 17-22	Bergvall/ <i>Ekman/Lauberts</i>	Uppsala	Interacting galaxies	BC
Aug. 22-28	Schnur/ <i>Sherwood</i> (5) T (1)	ESO/MPI Bonn	Interacting and Seyfert galaxies	BC
Aug. 28-Sept. 3	<i>Loibl/Schulz</i>	MPI Heidelberg	New peculiar A and F stars	Coudé
Sept. 3-6	T			
Sept. 6-8	Bouchet	ESO	Variable carbon stars	Coudé
Sept. 8-9	Bruch	Münster	Dwarf novae	Echelec
Sept. 9-10	<i>Ahlin/Sundman</i> (Bouchet)	Stockholm	Eclipsing binary HD 161387	Coudé

Use of the 1.52 m Telescope during 1979 (Continued)

Period	Observer	Institute	Programme	Instrument
Sept. 10-11	Bouchet	ESO	Variable carbon stars	Coudé
Sept. 11-16	Macchetto	ESA-Noordwijk	IUE and ground-based observations of mass-loss	BC
Sept. 16-21	Bruch	Münster	Dwarf novae	BC
Sept. 21-27	Crane <i>Tarenghi/</i> <i>Materne/Chincarini</i>	ESO/ Berlin/Oklahoma	Clustering of galaxies	BC
Sept. 27-Oct. 1	Bouchet	ESO	Variable carbon stars	Coudé
Oct. 1-8	Holweger	Kiel	Late-type dwarfs	Coudé
Oct. 8-9	<i>Ahlin/Sundman</i> (Bouchet)	Stockholm	Eclipsing binary HD 161387	Coudé
Oct. 9-11	Bouchet	ESO	Variable carbon stars	Coudé
Oct. 11-15	Querci	Meudon	Variable cool stars	Coudé
Oct. 15-19	Foy	Meudon	Composition of the SMC	Echelec
Oct. 19-26	Spite	Meudon	Halo stars	Echelec
Oct. 26-Nov. 2	<i>Wolf/Sterken</i>	Heidelberg/Brussels	Mass-loss from OB stars in the LMC	Echelec
Nov. 2-6	T			
Nov. 6-11	<i>Thé/van Genderen/Kwee</i>	Amsterdam/Leiden	Variable Ae/Be-type stars	Coudé
Nov. 11-13	T			
Nov. 13-17	Grosbøl	ESO	Rotation curves for late-type spirals	BC
Nov. 17-24	<i>Crane/Tarenghi/Materne/</i> <i>Chincarini</i>	ESO/Berlin/ Oklahoma	Clustering of galaxies	BC
Nov. 24-26	Dennefeld	ESO	Ring-type objects and SNR in the MC	BC
Nov. 26-Dec. 3	van Dessel	Brussels	Radial velocities of visual binaries	Coudé
Dec. 3-7	Swings	ESO/Liège	Emission-line stars	Coudé
Dec. 7-15	Krautter	Heidelberg	YY Ori stars	BC
Dec. 15-19	Lauberts	Uppsala	Interacting and peculiar galaxies	BC
Dec. 19-26	Bastian	Heidelberg	UV-excess T Tauri stars	BC
Dec. 26-Jan. 1	Gahm	Stockholm	Lithium in very young stars	BC

Use of the 1 m Telescope during 1979

Period	Observer	Institute	Programme	Instrument
Jan. 1-5	Mianes	Toulouse	Supergiants in the LMC	P
Jan. 5-11	Pakull	ESO	X-ray sources	P
Jan. 11-18 ⁺	Wamsteker	ESO	Solar stars and HII regions	IRP
Jan. 18-20 ⁺	Bouchet	ESO	Variable carbon stars	IRP
Jan. 20-22	Lodén	Uppsala	Carina-Crux-Centaurus-Norma region	P
Jan. 22-29	Wlérick/Bouchet	Meudon/ESO	Variable quasars and galaxies	P
Jan. 29-Feb. 2	Melnick	ESO	Clusters in LMC	P
Feb. 2-8 ⁺	Salinari/ <i>Tarenghi</i> /Tanzi	ESO/Milano	Molecular masers and HII regions	IRP
Feb. 8-11 ⁺	Dachs	Bochum	Be stars	IRP
Feb. 11-16 ⁺	Salinari/Moorwood	ESO	Star-formation regions	IRP
Feb. 16-24 (5 ⁺)	Thé	Amsterdam	Extinction law in Carina	IRP + P
Feb. 24-March 5	Adam	Lyon	Search for optical intraday variations in QSO	P
March 5-6	Bouchet	ESO	Variable carbon stars	P
March 6-14	Mauder	Tübingen	T Tauri stars	P
March 14-22 ⁺	<i>Schultz</i> /Sherwood/Costa (4) Wamsteker (4)	Bonn/Santiago ESO	OH/IR sources IR calibration and HII regions	IRP IRP
March 22-25	Haug	Hamburg	Bright stars in NGC 5617	P
March 25-29	Bouchet/Wlérick	ESO/Meudon	Variable quasars and galaxies	P
March 29-April 2	Kohoutek	Hamburg	Planetary nebulae and their nuclei	P
April 2-10 ⁺	<i>Hunger</i> /Groote/Schultz (4) <i>Schmidt</i> /Engels/Schultz (4)	Kiel/Berlin/MPI Bonn Bonn/MPI Bonn	IR photometry of He variable B-stars IR photometry of variable OH/IR objects	IRP IRP
April 10-17 ⁺	Bensammar	Meudon	Star formation regions	IRP
April 17-20 ⁺	Bouchet	ESO	Variable carbon stars	IRP
April 20-23	Lundin	Uppsala	Polarimetry in Carina-Crux-Centaurus	Polarimeter
April 23-29	Pakull	ESO	X-ray sources	P
April 29-May 2	Pedersen (1½) Vogt (1½)	ESO ESO	X-ray pulsars Dwarf novae	P P
May 2-8 ⁺	Shaver/ <i>Danks</i> /Wamsteker	ESO	Regions of star formation	IRP
May 8-10 ⁺	Moorwood/Salinari	ESO	Star-formation regions	IRP
May 10-15 ⁺	Wamsteker/ <i>Weiss</i>	ESO/Vienna	IR flux of Ap and Am stars	IRP
May 15-18	Schnur	ESO	Centaurus cluster surface photometry	P
May 18-24	Wielebinski/Schnur/ <i>Mattila</i>	MPI Bonn/ESO/ Helsinki	Optical emission in clusters of galaxies	P
May 24-31	Metz/Pöllitsch	München	Be stars	Polarimeter

Use of the 1 m Telescope during 1979 (Continued)

Period	Observer	Institute	Programme	Instrument
May 31–June 8	Neckel	MPI Heidelberg	NGC 6334, NGC 6357, NGC 6302	Polarimeter + P
June 8–10	Bouchet	ESO	Variable carbon stars	P
June 10–16 ⁺	Tarengi/Tanzi	ESO/Milano	Of stars and extragalactic sources	IRP
June 16–21	Vogt	ESO	Dwarf novae	P
June 21–26	Schnur/ <i>Mattila</i>	ESO/Helsinki	Extragalactic background light	P
June 26–July 7	Gillet/ <i>Querci</i>	Meudon	Carbon variable stars	P
July 7–16 ⁺	Epchtein/Turon/ <i>Roucher/Guibert/Nguyen-Q-Rieu/Wamsteker/Bouchet</i>	Meudon/Paris/ESO	Mira variables and interstellar clouds	IRP
July 16–18	Lub	ESO	BVR sequences in Plaut's field 3	P
July 18–24	Adam	Lyon	UBV photometry of quasars	P
July 24–Aug. 2	Bernard	Lyon	UBV in the galactic centre	P
Aug. 2–8	T			
Aug. 8–15 ⁺	Thé/Wesselink	Amsterdam	Pre-main-sequence stars	IRP
Aug. 15–19 ⁺	Wamsteker/Bouchet/ <i>Weiss</i>	ESO/Vienna	Solar-, carbon variable-, Ap- and Am-stars	IRP
Aug. 19–22	Alcaíno	Santiago	Extragalactic globular clusters	P
Aug. 22–28	Bergvall/ <i>Ekman/Lauberts</i>	Uppsala	Interacting galaxies	P
Aug. 28–Sept. 1	Schober	Graz	Rotation rates of C-type asteroids	P
Sept. 1–9 ⁺	Wamsteker/Reipurth	ESO/Copenhagen	IR photometry in dark clouds	IRP
Sept. 9–15 (3 ⁺)	Bruch	Münster	Dwarf novae	IRP + P
Sept. 15–23	Danks/ <i>van Woerden</i>	ESO/Groningen	Bright galaxies	P
Sept. 23–30	Véron, M. P.	Meudon	UBV of Seyfert galaxies	P
Sept. 30–Oct. 10 ⁺	Wamsteker (5) <i>Schmidt/Engels/Schultz</i> (5)	ESO Bonn/MPI Bonn	Solar stars, HII regions and IR calibration Variable OH/IR objects	IRP IRP
Oct. 10–18 ⁺	Moorwood/Salinari	ESO	H ₂ O masers and radio galaxies	IRP
Oct. 18–26	<i>Azzopardi/Vigneau</i>	Toulouse	Interstellar absorption in the SMC	P
Oct. 26–Nov. 2	Nelles/Hänel/ <i>Geyer</i>	Hoher List	Kinematics of star clusters in the MC	Special
Nov. 2–6	Motch	ESO	X-ray binaries	P
Nov. 6–11 ⁻	<i>Thé/van Leeuwen/van Genderen/Kwee</i>	Amsterdam/Leiden	Ae/Be-type stars	IRP
Nov. 11–16	Motch	ESO	X-ray binaries	P
Nov. 16–20	Danks/ <i>van Woerden</i>	ESO/Groningen	Bright galaxies	P
Nov. 20–27	Schoembs	München	Dwarf novae	P + Polarimeter
Nov. 27–Dec. 1	Motch	ESO	X-ray binaries	P

Period	Observer	Institute	Programme	Instrument
Dec. 1-5	T			
Dec. 5-11+	Wamsteker/Weiss	ESO/Vienna	IR flux of selected Ap and Am stars	IRP
Dec. 11-14	Lauberts	Uppsala	Compact galaxies with faint extensions	P
Dec. 14-19	Wlérick/ <i>Bouchet</i>	Meudon/ESO	Variable Seyferts	P
Dec. 19-22	Ekman	Uppsala	Interacting galaxies	P
Dec. 22-25	<i>Gahm</i> /Lindroos	Stockholm	Early phases of stellar evolution	P
Dec. 25-Jan. 1	Hippelein/ <i>Münch</i> / <i>Melnick</i>	MPI Heidelberg/ESO	Coronal lines in supernova remnants	Special

P Standard ESO photometer

IRP Infrared photometer

Use of the 1.5 m Danish Telescope during 1979

Period	Observer	Institute	Programme	Instrument
Nov. 11-30	Röser	MPI Heidelberg	Survey for BL Lac objects; direct photography	Camera
Dec. 13-21	Nissen	Aarhus	Helium abundances in distant star clusters	Photometer
Dec. 21-29	Weigelt	Erlangen	Speckle interferometry and holography	Special

Use of the 92 cm Dutch Telescope during 1979

Period	Observer	Institute	Programme	Instrument
Oct. 1-16	van der Linden	Amsterdam	Variability in OB-runaways	Photometer
Oct. 16-31	Thé/van Genderen/Kwee	Amsterdam/Leiden	Variable Ae/Be-type stars	Photometer
Dec. 11-25	de Ruiter/Lub	ESO	Variations in emission lines in Seyfert nuclei	Photometer

The ESO 50 cm telescope was used throughout the year. In addition, 87 nights on the Danish 50 cm telescope, and 161 nights on the Bochum 61 cm telescope were scheduled for ESO users. The GPO was scheduled for 145 nights. Infrared work was scheduled at the 1 m telescope for 133 days.

APPENDIX II – Programmes

Galaxies

- J. Audouze (Paris)/M. Dennefeld/D. Kunth (ESO)/T.X. Thuan (Paris): Detailed spectrophotometric study of compact blue dwarf galaxies for the determination of abundances (3.6 m).
- C. Balkowski (Meudon)/P. Guerin (Paris): Morphology of lenticular galaxies (3.6 m).
- J. Bergeron (ESO)/A. Boksenberg (London): Observational effects of the evolution of nuclear activity in spiral galaxies. Coupled optical, CO and 21 cm emissions of disks of spiral galaxies altered by nuclear outbursts for both on and off nuclear activity phases (3.6 m).
- J. Bergeron/M. Dennefeld (ESO): Spectroscopy of diffuse emission-line galaxies. Determination of the heavy element abundances and of the rate of star formation in these galaxies (3.6 m).
- N.Å.S. Bergvall/A.B.G. Ekman/A. Lauberts (Uppsala): Interacting galaxies in different stages of merging (3.6 m).
- N.Å.S. Bergvall/A.B.G. Ekman/A. Lauberts (Uppsala): Spectroscopic and photometric investigation of interacting galaxies found on ESO (B) plates (1.5 m, 1 m).
- A. Boksenberg (London)/I.J. Danziger/R.A.E. Fosbury (ESO)/W.M. Goss (Groningen)/J. Bergeron (ESO): Two-dimensional spectroscopy of galaxies with active nuclei. To study the spatial distribution and extent of lines of different excitation in active and radio galaxies. Dynamical differences among different emission lines. Absorption lines formed in broad-line regions of active nuclei (3.6 m).
- A. Boksenberg (London)/M. Tarengi (ESO): (a) BL Lac objects and cluster of galaxies; (b) NGC 5253; (c) A peculiar radio galaxy. To obtain optical information to be combined with X-ray, ultraviolet and radio observations of the same objects (3.6 m).
- P. Crane/J. Materne/M. Tarengi (ESO)/G. Chincarini (Oklahoma): Studies of clustering of galaxies and the large-scale structure of the universe. To continue the study of the large-scale structure of galaxy clusters in the Horologium region and specifically to extend the depth and area to which the sample is complete (3.6 m, 1.5 m).
- A. Ekman (Uppsala): Interacting galaxies in different stages of merging (3.6 m, 1 m).
- P. Gammelgard/S. Laustsen (Aarhus)/H. Pedersen (ESO): A study of the NGC 5291 complex. To determine the motion and nature of some of the brighter knots around NGC 5291, of NGC 5291 itself, and of its interacting companion (3.6 m).
- P. Grosbøl (Copenhagen): Rotation curves for late-type spiral galaxies. To obtain the rotation curves of 8 late-type spiral galaxies for which surface photometry will be available and to use these in a comparison between the observed spiral structure of the galaxies and that predicted by the density wave theory (1.5 m).
- P. Grosbøl (Copenhagen): Stellar composition and velocity field of the spiral arms of the spiral galaxy NGC 300. To investigate the change of stellar composition across a spiral arm in

order to determine the rate of star formation as a function of distance from a galactic shock front. Furthermore, the velocity field of newly born stars and HII regions should be compared with the theoretical shock calculations (3.6 m).

- K. Gyldenkerne (Copenhagen)/K. Taylor (Hailsham)/D.J. Axon (Brighton): A spectrophotometric investigation of the compact components and the disk of the "Hot-Spot" galaxy NGC 1808 (3.6 m).
- A. Hayli (Lyon): The structure of elliptical galaxies (3.6 m).
- D. Kunth (ESO)/W.L.W. Sargent (Caltech): Spectrophotometry of compact emission-line galaxies. Abundance determination of heavy elements and search for primordial helium (3.6 m).
- A. Lauberts (Uppsala): Photometry of compact galaxies with faint extensions. Relation between UBVR colours and star formation and nuclear activity in compact galaxies (1 m).
- A. Lauberts (Uppsala): Spectroscopic investigation of interacting and peculiar galaxies found on the ESO (B) plates (1.5 m).
- J. Lequeux (Meudon)/R.M. West/H.E. Schuster (ESO)/S. Laustsen (Aarhus): UVB photographic photometry of the brightest stars in the Sculptor Dwarf Irregular Galaxy (SDIG). Building the upper HR diagram in this dwarf irregular galaxy for comparison of the rate of massive star formation with other galaxies (3.6 m).
- K. Mattila (Helsinki)/G.F.O. Schnur/H. Pedersen (ESO): Extragalactic background light (1 m, 50 cm).
- J. Melnick (ESO)/H. Quintana (NRAO): Velocities of galaxies in X-ray clusters. Population synthesis in globular cluster cores (3.6 m).
- U. Nørgaard-Nielsen/P.K. Rasmussen (Copenhagen): Stellar population content and abundance gradients in elliptical and S0 galaxies (3.6 m).
- M.R. Rosa (Heidelberg): HII Regions in nearby galaxies. The electron temperatures, chemical abundances, internal absorption by dust and the stellar content of giant HII regions (1.5 m).
- G.F.O. Schnur (ESO): Interaction between pairs and groups of early-type galaxies. The search of deeply exposed prime focus plates for indications of interaction between pairs and groups of early-type galaxies that have been observed before with the IDS system and show some peculiar spectroscopic relation (3.6 m).
- G.F.O. Schnur (ESO)/K. Mattila (Helsinki): Centaurus cluster surface photometry (1 m, 50 cm).
- G.F.O. Schnur (ESO)/W. Sherwood (MPI Bonn): Spectrophotometry of S0 galaxies containing HI and HII (3.6 m).
- W. Seggewiss (Daun): Search for Wolf-Rayet stars in irregular dwarf members of the Local Group (3.6 m).
- M.-H. Ulrich (ESO): Ionized gas in elliptical galaxies (3.6 m).
- M.-H. Ulrich (ESO)/A. Boksenberg (London): Ionized gas in elliptical galaxies (3.6 m).
- W. Wamsteker (ESO): Clusters of galaxies. To study the presence of emission-line galaxies in clusters (Schmidt).
- W. Wamsteker (ESO): Dust in galaxies (3.6 m).

- R.M. West (ESO)/O. Kurtanidze (Abastumani): A study of selected, southern, very distant, rich clusters of galaxies. To determine morphological types of individual galaxies and to obtain the luminosity functions of very distant clusters of galaxies, with the aim of detecting evolutionary effects (3.6 m).
- R. Wielebinski (MPI Bonn)/K. Mattila (Helsinki): Optical emission in clusters of galaxies with extended radio emission (1 m, 50 cm).
- H. van Woerden (Groningen)/A.C. Danks (ESO): Brightness and colour distributions of bright southern galaxies. Determination of luminosity, colour, and composition ("population") and of their distributions in a large number of galaxies as part of an optical and radio study of integral properties of bright southern galaxies (1 m).
- G. Adam (Lyon): UVB photometry of quasars at high z . Study of the spatial density and of the cosmological evolution of optically selected quasars by UVB measurements of a complete sample (3.6 m).
- G. Adam (Lyon): UVB photometry of quasars and quasar candidates (1 m).
- J. Bergeron/D. Kunth (ESO): Spectroscopy of radio quiet QSOs of low redshift. Investigation of the continuity of the FeII emission from Seyfert type 1 galaxies to radio quiet QSOs (3.6 m).
- A. Boksenberg (London)/I.J. Danziger/R.A.E. Fosbury (ESO)/W.M. Goss (Groningen): Absorption lines in QSOs. (1) To study the origin of the narrow absorption line systems in QSOs; (2) to search for absorption line features in spectra of QSOs resulting from the halos of intervening galaxies (3.6 m).
- I.J. Danziger/R.A.E. Fosbury (ESO)/W.M. Goss/R.D. Ekers (Groningen)/J.V. Wall (Cambridge): Optical spectroscopic survey of high frequency radio galaxies (3.6 m).
- K.J. Fricke/H. Schleicher (Göttingen)/P. Biermann (MPI Bonn): Seyfert 1 galaxies. Optical spectrophotometry complementary to IUE observations; spectrophotometry of selected Sy 1s; deep large-scale photography of Sy 1 Mrk 335 to establish its morphological type (3.6 m).
- C. Möllenhoff (Heidelberg): Spectroscopy of emission nebulae in NGC 5128 (Cen A). Investigation of the chemical and physical properties of the emission nebulae in the dust belt of NGC 5128. Clarification of the nature of the bright blue emission knots (3.6 m, 1.5 m).
- M.M. Phillips (C.T.I.O.): Spectrophotometry of QSOs with low- z absorption-line systems. To obtain relatively high-dispersion spectrophotometry of MgII and FeII absorption lines in several Parkes Survey QSOs. An attempt to detect CaII H and K absorption. To further test the intervening galaxy hypothesis for the origin of low- z absorption-line systems (3.6 m).
- H.-J. Röser (MPI Heidelberg): Spectroscopy of QSOs in the direction of galaxies and clusters of galaxies. Spectroscopy of the broad absorption line QSO PHL 5200 (3.6 m).
- H.-J. Röser (MPI Heidelberg): Survey for BL Lacertae objects. Photographic polarimetry is to be employed to detect BL Lacertae objects as highly polarized objects in order to get an unbiased sample of objects in this class (1.5 m).
- H.R. de Ruiter/J. Lub (ESO): Variation of emission-line intensities in Seyfert nuclei (3.6 m, 90 cm*).
- M.P. Véron (Meudon): UVB photometry with variable diaphragms of Seyfert galaxies (1 m).

* 90 cm = Dutch 90 cm telescope.

- P. Véron (ESO): A search for dwarf Seyfert 1 and BL Lac nuclei (3.6 m).
- P. Véron (ESO): UBV photometry of quasars (3.6 m).
- W. Wamsteker/A.C. Danks (ESO): CaII absorption in QSO. To find the interstellar CaII H + K lines in absorption at redshifts of foreground galaxies near to the QSO (3.6 m).
- P.A. Wehinger (MPI Heidelberg): Direct imaging of quasars and radio galaxies. To detect the following: (1) cluster galaxies and underlying structure associated with low z quasars; (2) Lyman- α haloes around high z quasars; (3) structure and orientation of radio galaxies in optical region with respect to their radio structure (3.6 m).
- G. Wlérick (Meudon): Photometric, polarimetric and morphological study of radio sources (3.6 m).
- G. Wlérick (Meudon)/P. Bouchet (ESO): Study of the variable component in the optical of Seyfert galaxies with X-ray emission. To see if the continuum, as in 3C 120, may be interpreted as the sum of two components (3.6 m, 1 m).

Magellanic Clouds

- M. Azzopardi/J. Vigneau (Toulouse): Determination of the interstellar absorption in the bar of the SMC (1 m, GPO).
- J. Borgman (Roden): Spectroscopy of stars in the 30 Doradus region. To remove ambiguity of interpretation of previously obtained surface photometry in the UV (ANS satellite) and in ubvy (La Silla) (3.6 m, 1.5 m).
- J. Breysacher (ESO): Spectrographic observations of known and newly discovered Wolf-Rayet stars in the Large Magellanic Cloud (3.6 m).
- A.C. Danks (ESO): Observations of interstellar lines in the LMC/SMC (1.5 m).
- M. Dennefeld (ESO)/A. Boksenberg (London): Investigation of ring-type objects and SNR in the Magellanic Clouds. To determine the nature of these ring-type objects by detailed spectroscopy, and spatial variations of some selected lines. To establish the contribution of shock excitation. To determine the type of some of the central stars (3.6 m, 1.5 m).
- R. Foy (Meudon): Chemical composition of the SMC. Determination of the spatial gradient of the chemical composition in the SMC through the detailed analysis of stellar spectra at high dispersion (1.5 m).
- E.H. Geyer (Daun): Pre-surface photometry of populous young and old clusters in the LMC. Comparison of the spatial brightness and colour distribution of "red" and "blue" populous clusters of the LMC (50 cm).
- E.H. Geyer/A. Hänel/B. Nelles (Daun): Kinematical studies of stellar associations in the Magellanic Clouds. Derivation of velocity gradients and dispersions of aggregate stars and of the gas in which they are embedded (1 m).
- F. Macchetto (ESTEC): Correlated IUE and ground-based observations of mass-loss from stars. To study mass-loss processes in early-type stars in the Magellanic Clouds (1.5 m, 50 cm).
- E. Maurice (Marseille): Spectral classification of supergiants in the Small Magellanic Cloud (Schmidt).
- J. Melnick (ESO): Clusters in the LMC (1 m).
- P. Mianes (Toulouse): Photoelectric photometry of M supergiants and of Mira variables in the LMC (1 m).

- L. Prévot (Marseille): Spectral classification in the Large Magellanic Cloud. Determination of luminosities and absolute magnitudes of supergiants (Schmidt).
- Th. Schmidt-Kaler (Bochum): Spectral classifications in the Large Magellanic Cloud (Schmidt).
- C. Sterken (Brussels)/M. Jerzykiewicz (Wrocław): Search for β Cephei stars in the Small Magellanic Cloud (61 cm*).
- B.E. Westerlund (Uppsala): The luminosity function and the initial mass function in various parts of the Magellanic Clouds (3.6 m).
- B. Wolf (Heidelberg)/C. Sterken (Brussels): Mass loss from OB stars in the LMC. Simultaneous spectroscopic ground based and satellite UV (with the IUE) observations of OB stars of the LMC in order to determine the mass loss rates of very massive stars (with well known distances) as a function of evolutionary stage (1.5 m).
- S. Bensammar (Meudon): Study of regions of star formation. Infrared mapping of HII regions (1 m, GPO).
- N. Epchtein/P. Turon/P. Roucher/J. Guibert/Nguyen-Q-Rieu (Meudon)/W. Wamsteker/P. Bouchet (ESO): Infrared photometry of Mira variables. This project consists of observing 2 samples of Miras, those which exhibit OH maser emission and those which do not, in order to investigate the physical properties of the circumstellar envelope and the pumping mechanisms of the OH maser emission (1 m).
- N. Epchtein (Meudon)/P. Turon/J.-L. Puget (Paris)/W. Wamsteker (ESO): IR observations of galactic and extragalactic HII regions. Study of the distribution of dust and hot young stars in a few galaxies. Comparison with far infrared observations (3.6 m).
- A.R. Gillespie (MPI Bonn): Molecular line observations of the 1.3 mm CO transitions in the Magellanic Clouds and southern galactic molecular clouds. It is also hoped to detect the $J = 3-2$ transition of formaldehyde (3.6 m).
- K. Hunger (Kiel)/D. Groote (Berlin)/G.V. Schultz (MPI Bonn): IR photometry of the variable B-stars. Observation of variability and phase dependence of the IR excess with the aim of deriving a model of σ Ori E and other helium variables (1 m).
- A.F.M. Moorwood/P. Salinari (ESO): Infrared observations of possible star formation regions. Discovery of pre-main-sequence objects and investigation of their association with molecular masers (1 m).
- A. Moorwood/P. Salinari (ESO): Infrared survey of H₂O masers. To continue the survey of a statistically representative sample of H₂O masers for associated IR objects with the aim of testing the hypothesis that these masers are formed primarily in protostellar dust shells (1 m, Schmidt).
- L. Nordh (Stockholm): Deep photographs in H α and the nearby red continuum of star formation regions associated with strong far-IR emission (Schmidt).
- C. Perrier (ESO)/F. Sibille (Lyon): Angular diameters of compact sources by speckle interferometry in one dimension in the infrared between 1.5 and 5 microns (3.6 m).
- B. Reipurth (Copenhagen)/W. Wamsteker (ESO): IR-photometry in dark clouds and near Herbig-Haro objects (1 m).

Infrared

* 61 cm = Bochum 61 cm telescope.

- P. Salinari (ESO)/E. Tanzi (Milano)/M. Tarengi (ESO): IR study of molecular masers and HII regions (1 m, Schmidt).
- H. Schmidt/D. Engels (Bonn)/G.V. Schultz (MPI Bonn): IR photometry of variable OH/IR objects. Determination of the energy distribution between 1–30 μm at different phases of variation of OH/IR objects in order to study the physical properties of their circumstellar shells (1 m).
- G.V. Schultz (MPI Bonn)/E. Costa (Santiago): OH/IR sources (1 m).
- G.V. Schultz/E. Kreysa (MPI Bonn): Compact HII regions. Determination of the integrated flux of southern HII regions using sub-mm photometric and radio data (3.6 m).
- P.A. Shaver/A.C. Danks/W. Wamsteker (ESO): Infrared study of southern regions of star formation. To study the infrared emission from regions of active star formation, such as HII and CII regions, and OH/H₂O maser sources. The IR data will be combined with radio data to study the evolutionary sequence and physical and chemical mechanisms involved in star formation (1 m, Schmidt).
- W.A. Sherwood/E. Kreysa (MPI Bonn): Sub-millimetre investigations of radio sources. To determine the spatial extent and energy distribution of objects observed at Effelsberg (3.6 m).
- M. Tarengi (ESO)/E. Tanzi (Milano): IR observations of early-type supergiant and Of stars and of active extragalactic sources (1 m).
- J.S. De Vries (Roden): Study of the 12.8 μm -line of Ne⁺ in galactic and extragalactic sources (3.6 m, 1.5 m).
- W. Wamsteker (ESO): IR Calibration. To establish a calibrated system of infrared standard stars for the wavelengths 1, 2, 3.5, 5, 10, 20 and 30 micron (1 m).
- W. Wamsteker (ESO): Solar stars. To establish the position of the sun in a stellar log g-T_{eff} diagram (1 m).
- W. Wamsteker (ESO)/W.W. Weiss (Vienna): Observations of the IR flux of selected Ap and Am stars, determination of the diameter of these stars by comparing the observed flux with model atmospheres (1 m).

Interstellar Matter

- D. Alloin/G. Tenorio-Tagle (ESO)/J. Boulesteix/L. Deharveng (Marseille): Evolution of galactic HII regions (3.6 m).
- P. Bastiaansen (Leiden): Circular spectropolarimetry and multicolour linear polarimetry. Nature and composition of interstellar grains; galactic magnetic field structure. (1.5 m, 50 cm).
- P.A. Bastiaansen (Leiden): Interstellar extinction curves. Nature and composition of interstellar grains (50 cm).
- W. Celnick (Bochum): H _{α} surface photometry of Rosette nebula. The dependence of emission, dust absorption and excitation on the distance from the existing stars for the construction of a model nebula (61 cm).
- H. Hippelein/G. Münch (MPI Heidelberg)/J. Melnick (ESO): Coronal lines in supernova remnant spectra. Mapping of coronal [Fe] line emission in supernova remnants, measurement of line fluxes and study of kinematical conditions by resolving the lines (1 m).
- L. Kohoutek (Hamburg): Study of peculiar planetary nebulae and their nuclei. Spectroscopic, photographic and photoelectric investigation of objects having the following peculiarities:

morphology, binary or variable central stars, possible association with X-ray sources (3.6 m, 50 cm).

K. Mattila (Helsinki)/G.F.O. Schnur (ESO): Surface brightness and extinction of high galactic latitude dark nebulae. (1) To measure the distribution of scattered light in dark nebulae in several colours in order to obtain information on the ambient radiation field and the scattering properties of the dust grains; (2) to make starcounts in several colours in order to obtain the extinction distribution (Schmidt).

J. Melnick (ESO)/J. Manfroid (Liège): Spectrophotometry of HII regions (3.6 m).

S.R. Pottasch/Th. R. Piersma/W.M. Goss (Groningen): Spectrophotometry of faint forbidden emission lines in some HII regions, supernova remnants, planetary nebulae, and Herbig-Haro objects. To obtain high-quality spectrophotometric data on a sample of different kinds of objects, which have a very large number of faint lines in their visual spectrum. The theoretical implications for the physical conditions (electron density and electron temperature), the chemical composition and the unknown collision strengths of the lower stages of ionization of iron (3.6 m).

B. Reipurth (Copenhagen)/W. Wamstecker (ESO): (1) Small dark clouds in IC 2944; (2) shock waves in Herbig-Haro objects (3.6 m).

P.A. Shaver/A.C. Danks (ESO)/S.R. Pottasch (Groningen): Temperature and abundances in diffuse nebulae (3.6 m).

J.-P. Sivan (Marseille): Large-scale spectrophotometry of regions with galactic emission (special telescope).

P.S. Thé (Amsterdam): The extinction law in the Carina nebula (1 m).

G. Alcaíno (Santiago): Search for globular clusters in the galaxies of the Sculptor group: NGC 55, NGC 253, NGC 300 and NGC 7793 (3.6 m).

*Clusters and
Galactic Structure*

G. Alcaíno (Santiago): Search and photometry of extragalactic globular clusters (1 m).

G. Alcaíno (Santiago): UBV main-sequence photometry for the globular clusters (NGC): 6121 – 6397 – 6809 – 7099 (3.6 m).

A. Ardeberg (Lund)/B. Gustafsson (Uppsala): A systematic search for red horizontal-branch stars in the solar neighbourhood (50 cm D^o).

A. Bernard (Lyon): Photoelectric UBV photometry in the direction of the galactic centre (clusters and stars with large proper motion) (1 m).

A. Boksenberg (London)/V. Caloi (Frascati)/R. Cannon (Edinburgh)/V. Castellani (Frascati)/I.J. Danziger (ESO): Spectroscopy of blue stars in the globular cluster NGC 6752. Moderate resolution spectroscopy of blue stars will provide (1) Helium and some element abundances, (2) Rotation, (3) Information on a sequence extending from horizontal branch to 3 magnitudes fainter, (4) Evolutionary interpretation of this sequence (3.6 m).

G. Gahm (Stockholm)/D. Andrews (Armagh): Spectral and photometric investigation of the faint members with extremely anomalous colours of the Orion nebula cluster (1.5 m, GPO).

I.R. King (Berkeley): Velocity dispersions in globular clusters (1.5 m).

S. Leandersson (Uppsala): Photometry of red stars of the southern Milky Way, covering the region $l = 330^\circ - 350^\circ$, $b = +3^\circ - -3^\circ$ (61 cm).

- P.O. Lindblad/K. Lodén (Stockholm): The local system of early-type stars. Age distribution and kinematics of the local system of stars and interstellar matter in relation to the density wave theory (1.5 m).
- L.O. Lodén (Uppsala): Photometry of stars in a selection of suspected open clusters in the Carina-Crux-Centaurus-Norma region (50 cm).
- J. Lub (ESO): BVR sequences in Plaut's field 3. Measurement of a standard sequence and zeropoint stars for BV photometry on (newly taken) Schmidt plates of Plaut's field 3 ($\alpha_{1950} 18^{\text{h}}24 \delta_{1950} -34^{\circ}$) (3.6 m, 1 m).
- J. Lub (ESO): "Heavy Element" abundances in evolved globular cluster stars (3.6 m).
- L. Lundin (Uppsala): Polarimetry of stars in a selection of open clusters in the Carina-Crux-Centaurus region (1 m, 50 cm).
- L. P. Lundvall (Uppsala): Study of galactic structure. Surface and space distribution of O- and B-type stars in a region in Norma and Scorpius (50 cm).
- G. Lyngå (Lund): Metal abundance in central regions of our galaxy. Photometric study of distant stars in the galactic windows at $l = 311^{\circ}$ (Circinus window) and $l = 1^{\circ}$ (Baade window) to determine whether there is a gradient in metallicity with galactocentric radius (3.6 m).
- T. Neckel (MPI Heidelberg): Photometric and polarimetric observations in NGC 6334, NGC 6357 and NGC 6302 (1 m).
- P.E. Nissen (Aarhus): Helium abundance in distant star clusters. To determine the helium abundance of B main-sequence stars in the outmost regions of our galaxy, to give new information on the primordial helium abundance and helium abundance gradients in our galaxy (1.5 m D*).
- H.U. Nørgaard-Nielsen/B. Niss (Copenhagen): Four-colour and H-beta photometry of stars near the turnoff point in 47 Tucanae. Determination of a possible spread in chemical composition among the cluster stars. Establishment of four-colour calibrations of stellar parameters for intermediate population II. Determination of the interstellar extinction of 47 Tuc (3.6 m).
- B. Stenholm (Lund): Spectrography of faint Wolf-Rayet stars and related objects (3.6 m, 1.5 m).
- A. Terzan (Lyon): Photometric study of the bright cloud B in Sagittarius (50 cm, Schmidt).
- A. Terzan (Lyon): Photographic B and V photometry of star clusters. Photometric study of the bright cloud B in Sagittarius: (a) Photographic B and V photometry of the star clusters OHP1, Terzan 1, 2, 3, 4, 5; (b) Construction of H-R diagrams and their discussion (3.6 m).
- S. Wramdemark (Lund): UB $V\beta$ photometry of southern OB stars. Spectroscopy of OB stars in Carina. A study of the spiral structure in the third and fourth quadrant (1.5 m, 50 cm).
- X-ray Sources*
- C. Chevalier/S. Ilovaisky/C. Motch (Meudon): Photometric studies of faint optical counterparts of southern X-ray sources. High-speed and UB V photometry of the X-ray pulsar 4U 1626-67 and the X-ray bursters MXB 1636-59, MXB 1659-29 and MXB 1735-44. Simultaneous X-ray observations with the SAS-3 satellite. Search for optical pulsations from Cen X-3 (3.6 m).

*1.5 m D = Danish 1.5 m telescope.

- H. Henrichs/E.P.J. van den Heuvel/J. van Paradijs (Amsterdam): High-dispersion spectroscopy of bright optical counterparts of X-ray sources, and suspected X-ray sources. Detection of apsidal motion of the orbit of Vela X-1; study of flow of matter in V861 Sco (possible black-hole candidate); discovery of spectroscopic orbit in suspected X-ray sources (1.5 m).
- E.P.J. van den Heuvel/J. van Paradijs (Amsterdam): Photometry and spectroscopy of optical counterparts of X-ray burst sources. Study of the nature of X-ray burst sources (are they binaries) by means of correlated X-ray/optical photometry (optical bursts) and study of the optical spectra (variation of line strengths) (3.6 m).
- E.P.J. van den Heuvel/J. van Paradijs (Amsterdam)/C. de Loore (Brussels): Spectroscopic study of accretion processes in massive X-ray binaries. A study of the H α profile variations of X-ray binaries throughout the orbital cycle to estimate the contribution of an accretion disk to the profile (3.6 m).
- S. Ilovaisky/C. Chevalier/C. Motch (Meudon): Photometry of southern X-ray source counterparts. Study of optical pulsations in Wray 977 (4U 1223-62) and HD 102567 (4U 1145-61). Study of the light curve of the optical counterpart for 4U 1538-62 (1.5 m).
- C. de Loore (Brussels): Spectroscopic observations of Krzeminski's star (optical component of the X-ray source Cen X-3) (3.6 m).
- C. de Loore (Brussels): Spectroscopic observations of southern galactic X-ray sources. Detailed study of spectrum variations (especially radial velocity variations) of WRA 877 (3U 1223-62), HEN 715 (3U 1145-61) and Krzeminski's star (Cen X-3). Mass determination of the components in these binary systems (1.5 m).
- H. Mauder (Tübingen): X-ray binaries (1.5 m).
- C. Motch (Meudon): Light curves with ellipsoidal effects of X-ray binaries (1 m, 50 cm).
- M. Pakull (ESO): Observation of galactic X-ray sources. Collaboration with the HEAO-B programme to observe galactic X-ray sources. Photometry on massive X-ray binaries (3.6 m, 1 m).
- M. Pakull (ESO): Observations of X-ray sources in the Magellanic Clouds and the Galaxy. Collaboration with the HEAO-B programme to observe the Magellanic Clouds (3.6 m, 1 m, 61 cm).
- J. van Paradijs (Amsterdam): Polarimetry of optical counterparts of massive X-ray binaries (50 cm).
- H. Pedersen (ESO): Optical pulsations of X-ray pulsars. Search in the optical counterpart of GX 304-1 and confirmation of those of GX 301-2 (1 m).
- W. Wamsteker/H. Pedersen (ESO): Optical bursts from X-ray bursters. To observe simultaneously the optical counterparts of X-ray bursters with the SAS 3 satellite to obtain colour information on the lately discovered bursts of visual radiation, which accompany the X-ray bursts (3.6 m).
- E. Zuiderwijk (ESO): Spectroscopy of massive X-ray binaries. The detection of Balmer emission lines, originating in accretion disks near the secondary in massive X-ray binaries (3.6 m).
- E. Zuiderwijk (ESO): Spectroscopy of massive X-ray binaries and candidate stars. The determination of the radial-velocity orbits of the sources Cen X-3, Wray 977 and V861 Sco = HR 6283 and the orbit of the candidate star CD-3312119 (1.5 m).

Binaries

- P. Ahlin/A. Sundman (Stockholm): Further investigation of the eclipsing binary HD 161387. Determination of spectroscopic orbit necessary for May 2, 1980 eclipse (1.5 m).
- R. Barbier (Liège): Photometric survey of stars with ultraviolet excess: search for binary systems. The presence of a hot subdwarf companion will be searched for on the basis of photometric variability of a selection of objects whose visible and ultraviolet classifications appear to be incompatible (50 cm).
- E. van Dessel (Brussels): Radial velocities of visual binaries. Obtaining spectroscopic data for visual binaries for which an astrometric orbit exists for the determination of masses (1.5 m).
- F. Gieseeking (Daun): Study of spectroscopic binaries and the general radial velocities of the stars in the region of open star clusters and OB associations (GPO).
- R. Häfner (München): Photometric and spectroscopic observations of HD 224113 (1.5 m, 50 cm).
- M. Imbert (Marseille): Eclipsing binaries (1.5 m).
- R. Mundt (Heidelberg): Spectroscopic studies of mass inflow and outflow in pre-main-sequence visual binaries. Tests of the hydrodynamic models of low mass protostars. Especially tests of the co-eval formation of binaries. Investigation of the occurrence of stellar winds in pre-main-sequence objects as a function of mass (3.6 m).
- J. Rahe (Bamberg): Mass flow in close binary systems. Study of mass flow events in the visible spectral region in order to complement our recent ultraviolet satellite spectra of those systems, obtained with COPERNICUS and IUE (1.5 m).

Stars

- I. Appenzeller/J. Krautter/R. Mundt (Heidelberg): Spectroscopy of T Tauri stars and related emission line objects. To learn more about the formation and early evolution of low mass ($M \approx 3M_{\odot}$) stars (1.5 m).
- C. Arpigny (Liège): A study of very metal-deficient stars (1.5 m).
- R. Barbier/J.P. Swings (Liège): Spectroscopy of stars with UV-excess (1.5 m).
- U. Bastian (Heidelberg): Spectroscopic observations of UV-excess T Tauri stars at medium resolution. The nature of a recently discovered new subclass of the T Tauri stars will be further investigated. Many of the brighter members of this new class are known YY Orionis stars. To determine whether all members of the new photometrically derived subgroup of the T Tauri stars show evidence for mass infall (1.5 m).
- U. Bastian/R. Mundt (Heidelberg): UBV observations of southern T Tauri, YY Orionis stars and related objects (1.5 m, 61 cm).
- P. Bouchet (ESO): Study of diatomic and polyatomic molecules in the visible and infrared spectrum of variable carbon stars. Spectral, infrared and other photometric variations during their period (1.5 m, 1 m, 50 cm).
- M. Büscher/A. Bruch (Münster): Statistical investigation of dwarf novae (1.5 m, 1 m).
- J. Dachs (Bochum): Spectroscopy and infrared photometry of Be stars (1.5 m, 1 m).
- L. Divan/J. Zorec (Paris): Calibration of the parameters λ_1 and D with effective temperature and absolute magnitude for B stars (50 cm).
- H. Drechsel (Bamberg)/D. Grootte (Berlin): Photoelectric observations of helium stars. Search for and study of brightness variations (50 cm).

- E.W. Elst (Uccle): Investigation of the TPA relation for Cepheid variable stars (61 cm).
- R. Foy (Meudon): Observations of Mira variables, extragalactic objects and globular clusters by speckle interferometry. Variation of the diameter of miras as a function of phase for different wavelengths; attempt to resolve quasars and Seyfert nuclei; effects of the atmospheric parameters on the variation of the diameter with wavelength for the cool giants (3.6 m).
- G. Gahm/L. Hultqvist/R. Liseau (Stockholm): Lithium in very young stars. To derive lithium abundances in cool secondary components in very young visual doublets (1.5 m).
- G. Gahm/P. Lindroos (Stockholm): Investigation of stars in early phases of evolution. Derivation of the location in the HR-diagram and the atmospheric properties of young stars as a function of age. Selected are secondary binary components suspected to be pre-main-sequence or zero-age main-sequence objects (1 m, 50 cm).
- M. Gerbaldi (Paris): Spectroscopic observations of hot Ap stars (1.5 m, 50 cm).
- U. Haug (Hamburg): (a) Radial velocity variation of the β Cep star HD 80383; (b) Spectroscopy and photometry of bright stars in NGC 5617 (1.5 m, 1 m, 50 cm).
- A. Heck (ESA)/J. Manfroid (Liège): Improvement of Ap-star classification criteria (1.5 m).
- H. Holweger (Kiel): High-resolution spectroscopy of late-type dwarfs. Chemical composition of unevolved stars of different age and metallicity (1.5 m).
- L. Houziaux (Liège): Photometry of variable stars with emission and of 419 Aurelia (50 cm).
- L. Houziaux (Liège): Spectroscopy of V348 Sgr. Study of the physical conditions in the envelope near to maximum light (1.5 m).
- C.-T. Hua (Marseille)/D. Nguyen (Lyon): Absolute measurements in the Balmer continuum of (a) Wolf-Rayet and Of stars, (b) Planetary nebulae (1.5 m).
- K. Hunger/R.P. Kudritzki (Kiel): Quantitative spectroscopic analysis of faint blue stars. Evolutionary status of Sd-O stars and related objects (3.6 m).
- G. Knoechel (Hamburg)/N. Vogt (ESO): Polarization of cataclysmic binaries. Search for circular and linear polarization in short-periodic cataclysmic binaries with high time resolution (3.6 m).
- J. Krautter (Heidelberg): Spectroscopy of protostars with infalling envelope (YY Orionis stars). The objective is to get medium dispersion spectrograms of YY Ori stars in order to learn more about the formation and early evolution of low mass ($M \lesssim 3 M_{\odot}$) protostars (1.5 m).
- B. Loibl/H. Schulz (MPI Heidelberg): New peculiar A and F stars (1.5 m, 50 cm).
- C. de Loore (Brussels)/E.P.J. van den Heuvel/J. van Paradijs (Amsterdam): Variability of the radial velocity and periodicity of OB-runaways. Observations of relatively bright runaway OB stars to search for variation in radial velocity and possibly determination of orbital parameters (90 cm).
- H.M. Maitzen (Vienna)/H. Hensberge (Brussels): Photometry of selected peculiar A stars. Search for periodicity in Ap stars and detection of Ap stars in star clusters by photometry (50 cm).
- H. Mauder (Tübingen): T Tauri stars. Study of quasi-cyclic behaviour of three T Tauri stars in the Chamaeleon Association (1 m).
- K. Metz (München): Simultaneous polarimetric and spectroscopic observations of Be stars. Determination of geometry, dimension and density of envelopes of Be stars (1 m, 50 cm).

- F. Querci (Meudon)/P. Bouchet (ESO): Carbon variable stars. Study of the microvariations in long-period carbon stars through photoelectric photometry and spectroscopy (1.5 m, 1 m).
- F. Querci (Meudon): Observations of absorption and emission lines in the envelopes of variable carbon stars. Study of the variation of the profiles of the lines as a function of the phase (1.5 m).
- F. Querci (Meudon): Observations of giant and supergiant carbon stars by speckle interferometry. Study of the variation of the diameter of carbon stars at different phases for some characteristic wavelengths: H_α, CN, C₂, Na (3.6 m).
- H. Ritter/R. Schröder (Hamburg): Photometry and spectroscopy of cataclysmic variables: (1) Determination of the masses of both components; (2) Search for orbital periods of cataclysmic variables not yet known to be binaries (3.6 m, 1.5 m).
- P. Renson (Liège): Study of periodical spectral and photometric variations of Ap stars (1.5 m, 50 cm D*).
- R. Schoembs (München): Photometry, polarimetry and spectroscopy of dwarf novae (1 m).
- W.C. Seitter (Münster)/H.W. Duerbeck (Daun): Structure of nova envelopes (3.6 m).
- M. Spite (Meudon): Evolution effects in halo stars. Observations of mass loss in evolved halo field stars and comparison with similar effects in globular cluster stars. Abundance of CNO in halo stars (1.5 m).
- F. Spite (Meudon): Spectroscopic and photometric analysis of halo stars. To ascertain the relative abundances of light (CNO) elements and heavy (s-process) elements in order to check the theories of element enrichment of the Galaxy (1.5 m, 50 cm).
- C. Sterken (Brussels): Spectrographic observations of Beta Cephei stars. To determine the radial velocity curves (1.5 m).
- J.P. Swings/M. Klutz (Liège)/J. Surdej/A. Surdej (ESO): Spectroscopy of peculiar emission-line stars with IR excess. Study of the profiles of the Balmer lines and of permitted and forbidden emission lines, and of their variations (1.5 m).
- P.S. Thé (Amsterdam)/A.M. van Genderen/K.K. Kwee (Leiden): Simultaneous spectral and photometric observations of variable Ae/Be-type stars and extreme supergiants, and photometry of population I cepheids. To deduce from the simultaneously obtained data physical parameters for the study of the extended atmosphere and evolution of Ae/Be stars and extreme supergiants. To determine precisely the underabundance ratio of metals in the Magellanic Clouds and in our galaxy (1.5 m, 1 m, 90 cm).
- N. Vogt (ESO): Dwarf nova identifications. Complete atlas of finding charts for all dwarf novae down to the limit of $\sim 14^m 5$ at maximum light (GPO).
- N. Vogt (ESO): Periodic variations in the light-curve structure of the dwarf nova EX Hya. Investigation of an apparent 48-h cycle of the light-curve shape of EX Hya: Simultaneous photoelectric observations at three observatories with different longitudes (50 cm).
- N. Vogt (ESO): Photometry of dwarf novae. UBV and high-speed photometry of selected dwarf novae in different outburst stages and during quiescence (3.6 m, 1 m).
- G. Weigelt (Erlangen): Speckle interferometry and speckle holography. Interferometric measurements of galactic nuclei, spectroscopic binaries and other important objects with 0.03 arc sec resolution (1.5 m D).

*50 cm D = Danish 50 cm telescope.

W. Zeuge (Hamburg): H_{α} , H_{β} , H_{γ} observations of OB Be stars in young open cluster and associations. Information of the emission of these stars, to calculate absolute magnitudes even for individual emission-line stars (61 cm).

R. Courtin (Verrières): Sub-millimetre and millimetre photometry of Uranus and Neptune (3.6 m).

Solar System

H. Debehogne (Brussels): Observations of asteroids, comets, major planets and their satellites (GPO).

H. Debehogne (Brussels): Photometry of asteroids and of V348 Sgr (50 cm).

C.-I. Lagerkvist (Uppsala): Photographic and photoelectric photometry of asteroids (Schmidt, 61 cm).

J. Rahe (Bamberg)/G.F.O. Schnur/P. Bouchet (ESO): Spectrophotometry of comets at large heliocentric distances (3.6 m, Schmidt).

H.J. Schober (Graz): Rotation rates of C-type asteroids (1 m, 50 cm).

APPENDIX III – Publications

Visiting
Astronomers

- Alcaíno, G.: The Globular Cluster NGC 6541. *AA Suppl.*, **35**, 233–239.
- Alcaíno, G.: The Globular Cluster NGC 1261. *AA Suppl.*, **38**, 61–67.
- Alcaíno, G.: Basic Morphological Data for Galactic Globular Clusters. *Vistas in Astronomy*, **23**, 1–43.
- Alcaíno, G.: The Metal Rich Globular Cluster NGC 5927. *Acta Astron.*, **29**, 281.
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Technical Report No. 10: Design of the Coudé Echelle Spectrometer for the ESO 3.6 m and CAT Telescopes. By D. Enard.

Technical Report No. 11: The Image Dissector Scanner—General Description and Astronomical Specification. By M. Cullum.

Technical Report No. 12: Triplet Adapter for the ESO 3.6 m Telescope—General Description and Specifications. By M. Ziebell.

Technical Report No. 13: The ESO Coudé Auxiliary Telescope. By T.E. Andersen.

Proc. ESO/SRC Conference on Applications of CAMAC to Astronomy (ed. M.J. Cullum and C.L. Stephens).

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41. R.M. West and R.A. Bartaya: A Preliminary Investigation of a Distant Globular Cluster in Eridanus (GCL 0422-213). Submitted to *Astronomy and Astrophysics*. January 1979.
42. R.C. Kraan-Korteweg and G.A. Tammann: A Catalogue of Galaxies Within 10 MPC. Submitted to *Astronomische Nachrichten*. January 1979.
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54. M. Azzopardi and J. Breysacher: More Wolf-Rayet Stars in the Large Magellanic Cloud. Submitted to *Astronomy and Astrophysics, Suppl. Series*. April 1979.
55. M.P. Véron and P. Véron: A Study of the 4C Catalogue of Radio Sources between 20° and 40°. II. The Sample. Submitted to *Astronomy and Astrophysics Suppl. Series*. May 1979.
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APPENDIX IV – Members of Council, Committees and Working Groups for 1980

Council

Belgium:	P. Ledoux M. Deloz/L. Poulaert
Denmark:	H. Jørgensen H. Grage
France:	J.-F. Denisse (President) S. Filliol
Federal Republic of Germany:	I. Appenzeller C. Zelle
The Netherlands:	A. Blaauw B. Okkerse
Sweden:	B.E. Westerlund M. Lemne

Committee of Council

A. Blaauw	H. Grage
M. Deloz/L. Poulaert	B.E. Westerlund
J.-F. Denisse (President)	C. Zelle

Scientific Technical Committee

G. Gahm (1979–81)	J. Lequeux (1978–80)
M. Grewing (1980–84)	C. de Loore (1978–81)
H. van der Laan (1978–82)	G. Münch (1979–83)
A. Labeyrie (1980–84)	P.E. Nissen (1978–80)
P. Léna (1978–82) (Chairman)	J.P. Swings (1979–83)

Finance Committee

Belgium:	M. Deloz (Chairman)/L. Poulaert
Denmark:	H. Grage
France:	M. Rey
Federal Republic of Germany:	W. Sandtner
The Netherlands:	R.A. van Welt
Sweden:	M.O. Ottosson

Observing Programmes Committee

<i>Members</i>	<i>Substitutes</i>
L. Houziaux (until 31. 12. 1980)	C. de Loore
K. Hunger (31. 12. 1981) (Chairman)	Th. Schmidt-Kaler
S. Laustsen (31. 12. 1983)	P.E. Nissen
P.S. Thé (31. 12. 1982)	P.C. van der Kruit
P. Véron (31. 12. 1984)	G. Monnet
B.E. Westerlund (31. 12. 1982)	A. Elvius

Users Committee

J. Andersen (1978–80)
W.M. Goss (1980–81)
G. Lyngå (1980–81)

W. Seitter (1980–81)
F. Spite (1980–81)
J.P. Swings (1978–89) (Chairman)

Working Group for the Planning of the ESO Headquarters

A. Blaauw
M. Deloz
J.-F. Denisse

H. Jørgensen
B.E. Westerlund
C. Zelle

Meetings in 1979

Council	13 June Munich	29 November Munich
Committee of Council	16 May Geneva	16 November Geneva
Finance Committee	12 June Munich	14–15 November Geneva
Scientific Technical Committee	15 May Geneva	13 November Geneva
Observing Programmes Committee	29–31 May Liège	4–6 December Geneva
Users Committee	17 May Geneva	

ESO ADDRESSES

Until September 1, 1980

Administrative Offices	Schleißheimer Straße 17, D-8046 Garching bei München Fed. Rep. of Germany. Telephone: (089) 3204041-5 Telex: 05215915 eso d. Telegrams: EURASTRO Garching b. München
Scientific- Technical Group	ESO/CERN CH-1211 Geneva 23, Switzerland Telephone: (022) 836111 Scientific Group: 835081. Engineering Group: 834692 Instrumentation Development Group: 834831 Sky Atlas Laboratory 834834 Geneva Administrative Group: 832235 Telex: 28491. Telegrams: CERNLAB – Genève

After September 1, 1980

European Headquarters (Administration and Scientific- Technical Group)	Karl-Schwarzschild-Str. 2 D-8046 Garching bei München Fed. Rep. of Germany Telephone: (089) 32006-0
Headquarters Chile	Alonso de Cordova 3107, Vitacura. Casilla 16317 – Santiago 9, Chile Telephone: 285006. Telex: 40853 Telegrams: ESOSER—Santiago de Chile
Guesthouse	Gustavo Adolfo 4634, Santiago de Chile Telephone: 484254
Office La Serena	Las Cisternas 2020, La Serena Casilla 567, La Serena Telephone: 1167. Telegrams: ESOSER—La Serena
La Silla Observatory	c/o Santiago Headquarters address Telephone: La Serena 3048/Santiago 380420 Telex: 40881

