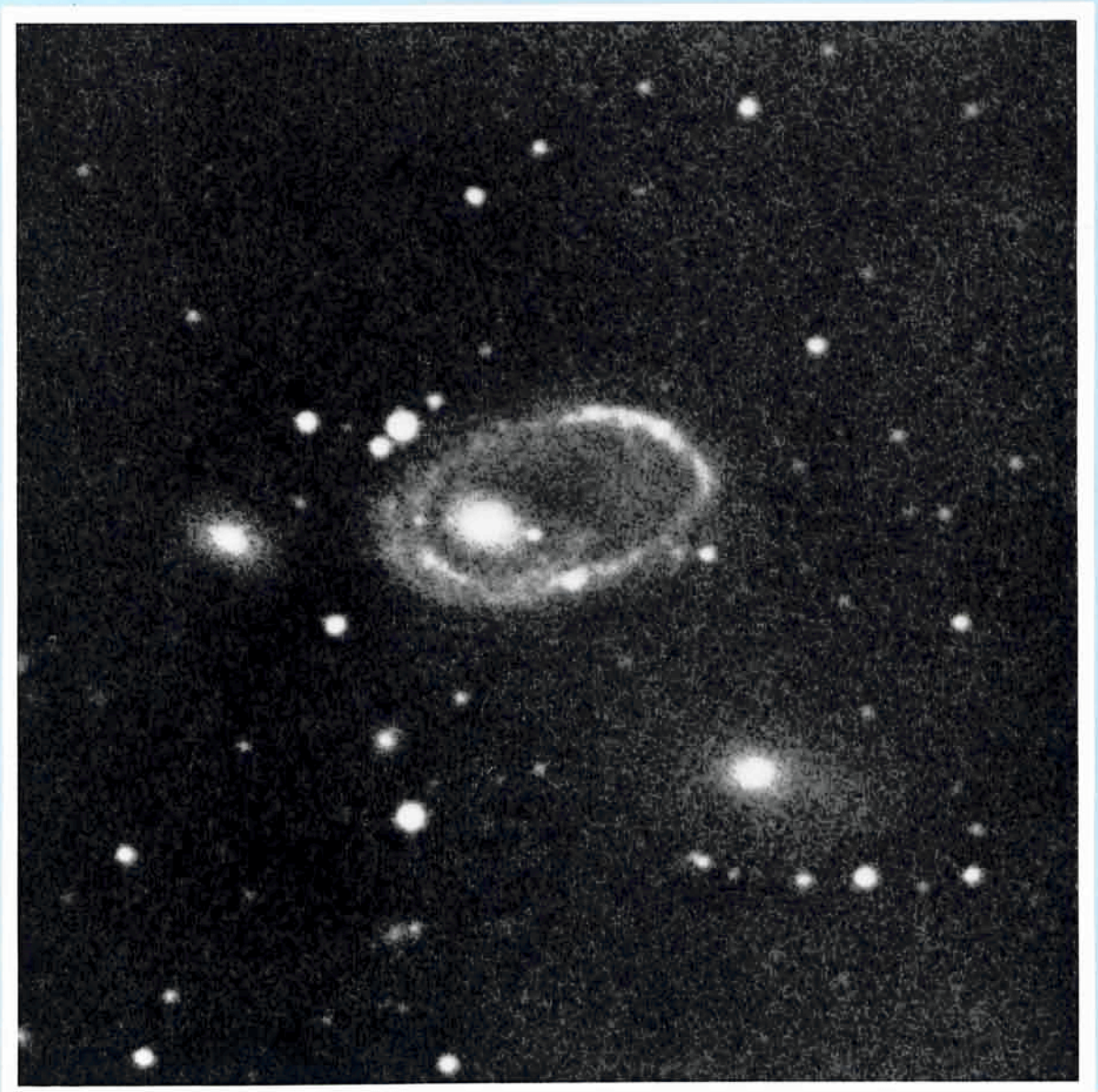
ANNUAL REPORT 1974



EUROPEAN SOUTHERN OBSERVATORY

Cover Photograph: *A Ring Galaxy in the Southern Sky*

The character of this object became apparent on a plate taken with the ESO 1 m Schmidt telescope on La Silla. Ring galaxies are extremely rare, only about half a dozen having been discovered so far. Their nature is still a mystery, but they represent a very brief evolutionary phase. Two other galaxies, which are physically related to the ring galaxy, are seen nearby. Further spectroscopic studies made on La Silla with the 1.5 m telescope and also elsewhere show that these galaxies are receding from us with a speed of about 6,000 kilometres per second, indicating a distance of the order of 300,000,000 light-years. The overall diameter of the ring is around 100,000 light-years, about the same as the diameter of our own Milky Way galaxy. The very detailed studies required to fully elucidate the nature of this curious object will become possible once the 3.6 m telescope becomes operational.

ANNUAL REPORT 1974

presented to the Council
by the Director-General, Prof. Dr. L. Woltjer,
in accordance with article VI, 1 (a) of the ESO Convention

Organisation Européenne pour des
Recherches Astronomiques dans l'Hémisphère Austral

EUROPEAN SOUTHERN OBSERVATORY

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INTRODUCTION

The year 1974 saw much activity within ESO. The construction of the main parts of the 3.6 m telescope neared completion. Smaller-scale versions of the electronic control system were installed on the 1 m and on the Schmidt telescopes and demonstrated the excellence of the basic system. Several new buildings on La Silla were started, including the building for the 3.6 m telescope. Important, previously virtually unexplored portions of the southern sky were photographed with the ESO Schmidt telescope. A wide variety of stars, galaxies, X-ray sources and gaseous nebulae were studied with a variety of photometric and spectroscopic techniques.

No fewer than fifty visiting astronomers from institutes in the ESO member countries obtained observations on La Silla. The work done there by staff and visiting astronomers led to more than seventy publications in professional journals. Several cooperative ventures with other organizations were initiated: With the University of Uppsala a programme of identification of galaxies and other objects was started. With the Science Research Council of the United Kingdom a conference was organized on the utilization of large telescopes. The Astrolabe programme conducted with the Universidad de Chile resulted in some important catalogues of star positions.

RESEARCH ACTIVITIES

Telescope Use

Requests for telescope time by visiting astronomers greatly exceeded the time available. During the period April 1, 1974 to April 1, 1975, 557 nights were requested for the 1.52 m telescope, of which only 223 could be granted. For the 1 m telescope the corresponding figures are: requested: 241, granted: 199. ESO staff astronomers received 142 nights with the 1.52 m and 166 nights with the 1 m telescopes for research and maintenance. A complete log of the telescope use is presented in Tables 1-6. For the Bochum and the Danish telescopes only the time used by ESO staff and visiting astronomers is listed.

The Schmidt telescope was extensively used during the year to obtain plates for the Quick Blue Survey. The Objective Prism Astrograph (GPO) was used without a prism during part of the year.

Table 1

Use of the 1.52 m telescope during 1974

Period	Observer	Observatory	Programme	Equipment
January 1—3	de Groot	ESO	P Cygni-type stars in the LMC	Coudé
January 3—4	Dürbeck-Gieren	Hoher List	Eclipsing binaries and cepheids	Coudé
January 4—15	Kohoutek	Hamburg	Comet Kohoutek 1973 f; Planetary nebulae	Coudé
January 4—15	Elst	Brussels	AI Velorum	Coudé
January 15—18	Wood	ESO	Objects with magnetic fields	Coudé/Zeeman
January 18—29	Mrs. Grenier	Paris	Radial velocities and classification of G stars	RV Cass
January 29—30	Rickard	ESO	Bright galactic nuclei	Boller & Chivens
January 31	Westerlund	ESO	SMC 2, NGC 1535	B & C
February 1—6	Dachs	Bochum	Bp, Ap, O and Of-type stars	Coudé
February 6—16	Swings	Liège	Peculiar emission-line objects	Coudé
February 16—21	Dachs	Bochum	(See Feb. 1—6)	
February 21—25	Danziger	ESO	Supernova remnants	B & C
February 25	de Groot	ESO	Tests	
February 26—March 1	Spite, F.	ESO	Metal-deficient stars	Coudé
March 1—9	Vreux	Liège	Spectrophotometry of Of stars	Coudé
March 9—13	Wolf	ESO	A and B supergiants	Coudé
March 13—25	Miss Burnichon	Paris	Spectrophotometry of young multiple systems	Special
March 13—25	Miss Divan	Paris	Spectrophotometry of 3C 273	Special
March 13—25	Hua	Allauch	Spectrophotometry of planetary nebulae	Special
March 25—April 1	Spite, M.	ESO	Metal-deficient stars	Coudé
April 1—10	Hultqvist	Stockholm	Li abundances in F and G stars; Sp. binaries	Coudé
April 10—19	Borgmann *et al.*	Roden	Infrared spectrophotometry	Special
April 19—26	Westerlund	ESO	Vela supernova remnant, Ara cluster	B & C, Image tube
April 19—26	Danziger	ESO	Supernova remnants	B & C, IT
April 26—May 1	Wolf	ESO	A and B supergiants	Coudé
May 1—10	v. d. Heuvel	Amsterdam	Optical candidates for X-ray sources	Coudé
May 10—12	Dossin	Liège	Planetary nebulae	Coudé
May 12—13	v. d. Heuvel	Amsterdam	(See May 1—10)	
May 13—21	Dossin	Liège	(See May 10—12)	
May 21—27	Rickard	ESO	Interstellar H + K lines in bright stars	Coudé
May 27—June 1	Spite, M.	ESO	Halo stars	Coudé
June 1—11	Vreux	Liège	(See March 1—9)	

Period	Observer	Observatory	Programme	Equipment
June 11—20	Schnur	Heidelberg	Faint OB stars in Norma	RV Cass
June 20—24	Danziger	ESO	Supernova remnants	B & C, IT
June 24—28	Grønbech	ESO	Search for He^3 in weak B stars	Coudé
June 28—July 1	Wolf	ESO	A and B supergiants	Coudé
July 1—10	van Paradijs	Amsterdam	Super metal-rich/strong CN stars	Coudé
July 10—14	Wolf	ESO	(See June 28—July 1)	
July 14—18	Rickard-Westerlund	ESO	Tests	Non-objective grating
July 18—26	Terzan	Lyons	Search for new variable stars	Zeiss
July 26—29	Wood	ESO	New southern magnetic stars	Zeeman
July 29—Aug. 7	Schneider-Marchal	Nice	Spectroscopy at high dispersion	Coudé
August 7—10	Breysacher	ESO	Tests	Echelec
August 10—14	Wolf	ESO	Supergiants	Coudé
August 14—22	Spite, F.	ESO	Galactic Pole	RV Cass
Aug. 22—Sept. 1	Miss Seitter, Miss Shirn	Hoher List	Be stars	Coudé
September 1—5	Spite, F.	ESO	Galactic Pole	Coudé
September 1—5	Spite-Breysacher	ESO	Tests	Echelec
September 6—14	West	ESO	McCormick SGP fields, F stars	RV Cass
September 14—18	Danziger	ESO	Supernova remnants	B & C, Zeiss, IT
September 18—19	de Groot	ESO	P Cygni in LMC; Sp. binaries; Special objects	Coudé
Sept. 19—Oct. 1	Andersen-Helt	Copenhagen	Radial velocities of bright early-type stars	Coudé
October 1—14	Koester	Kiel	Stars of solar type	Coudé
October 14—20	Rickard	ESO	Barred spiral galaxies; tests	B & C, IT
October 20—24	Wolf	ESO	Supergiants in LMC	Coudé
October 24—26	Danziger	ESO	Tests	B & C
Oct. 26—Nov. 6	Combes	Meudon	IR spectroscopy of Jupiter	Special
November 6—11	Wolf	ESO	Supergiants in LMC	Coudé
November 10—12	de Groot	ESO	P Cygni stars in SMC, LMC	Coudé
November 10—21	Breysacher	ESO	Tests; various objects	Echelec
November 14—19	Rickard-Westerlund	ESO	Structure in selected galaxies	IT
Nov. 19—Dec. 3	Andersen-Nordström	Copenhagen	Radial velocities of bright stars $\leq$ F 5	Coudé
December 3—13	Prévot	Marseilles	Radial velocities and classification in SMC	RV Cass/Coudé
December 14—22	de Groot	ESO	P Cygni-type stars in SMC	Coudé
Dec. 22—Jan. 7	Dravins	Lund	Stellar chromospheres	Coudé

Table 2

Use of the 1 m telescope during 1974

Period	Observer	Observatory	Programme	Equipment
January 5—14	Gammelgaard	Aarhus	O, B and A supergiant stars in SMC	Special
January 14—17	Vogt	ESO	Dwarf novae and ex-novae	Standard
January 17—20	Garnier	ESO	UBV photometry in LMC and Coal Sack	Standard
January 20—23	Danziger	ESO	Clusters in LMC	Standard
Jan. 23—Feb. 3	Bernard	Lyons	UBV-uvby photometry of glob. clusters in LMC	Standard
February 3—6	Garnier	ESO	Tests	KLM photometer
February 6—9	Havlen	ESO	Hβ, Puppis OB stars	Standard
February 9—11	Wood	ESO	Photometry	Spectrum scanner
February 11—19	Hansen	Copenhagen	Spectral scanning of G and K giants	Spectrum scanner
February 19—23	Havlen	ESO	Hβ, Puppis and Ara OB stars and clusters	Standard
Feb. 23—March 7	Wramdemark	Lund	Carina Arm	Standard
March 7—12	Havlen	ESO	Hβ, OB stars Puppis and Ara	Standard
March 12—22	Mauder	Tübingen	Star spots in T Cha, SY Cha, VZ Cha	Standard
March 22—25	Garnier	ESO	UBV and Hβ photometry in the Coal Sack	Standard
March 25—April 1	Geyer	Hoher List	Eclipsing binaries in NGC 3201 and in ω Cen	Standard
April 1—10	Borgmann *et al.*	Roden	Infrared photometry in HII regions	Special
April 10—19	Oyen	Louvain	UBV photometry of OB stars	Standard
April 19—24	Garnier	ESO	Hβ photometry	Standard
April 24—26	Danziger	ESO	Supernova remnants	B & C
April 26—May 1	Vogt	ESO	Dwarf novae	Standard
May 1—6	Wood	ESO	Photometry	Spectrum scanner
May 6—20	Manfroid-Danks	Liège	Southern HII regions	Special
May 20—24	Havlen	ESO	Faint blue stars in Puppis and Norma	B & C, Standard
May 24—June 4	Plaut	Groningen	B, V photometry of faint RR Lyrae stars	Standard
June 5—8	Havlen	ESO	Faint O-B2 stars in Norma	Standard
June 8—14	Behr	ESO	Polarimetry in K Cru and testing	Special
June 14—20	Plaut	Groningen	(See May 24—June 4)	
June 21—23	Danziger	ESO	Supernova remnants	Standard
June 23—27	Vogt	ESO	Dwarf novae	Standard
June 27—July 15	Schultz	MPI Bonn	Measurements of infrared objects	Special
July 15—21	Havlen	ESO	UBV Hβ of faint OB stars in Norma	Standard
July 21—27	Garnier	ESO	UBV photometry	Standard

Period	Observer	Observatory	Programme	Equipment
July 27—August 1	Tamman	Hamburg	UBV photometry of pulsating variables	Standard
August 1—9	Schultz	MPI Bonn	(See June 27—July 15)	
August 9—16	Tamman	Hamburg	(See July 27—August 1)	
August 16—20	Garnier	ESO	UBV photometry in Norma and SA 140	Standard
August 20—26	Alcaíno	Santiago	Sequences for globular clusters	Standard
Aug. 26—Sept. 2	Wood	ESO	Photometry	Spectrum scanner
September 2—6	West	ESO	McCormick fields near SGP	Standard
September 6—18	Grenon	Geneva	Photometry in the Geneva System	Standard
September 18—23	Garnier	ESO	UBV photometry of radio sources, SMC, SA 140	Standard
Sept. 23—Oct. 1	Blaauw-West	ESO	Faint stars in McCormick fields near SGP	Standard
October 1—6	Wood	ESO	Photometry	Spectrum scanner
October 6—14	Garnier	ESO	UBV photometry X-ray sources, SA 140, SMC	Standard
Oct. 14—Nov. 4	Vigneau	Toulouse	Photometry in SMC	Standard
November 4—6	de Groot	ESO	AE Aqi, P Cygni-type stars in SMC and LMC	Standard
November 6—13	Danziger	ESO	Supernova remnants	B & C
November 23—27			Aluminization	
Nov. 27—Dec. 1	Behr	ESO	Tests	Special
December 1—3	de Groot	ESO	P Cygni stars in LMC	Standard
December 3—8	Garnier	ESO	UBV photometry, SMC, QSO	Standard
December 8—12	Vogt	ESO	Eruptive variables	B & C
December 12—25	Materne	Hamburg	Photometry of pre-main-sequence stars	Standard
Dec. 28—Jan. 3	Smith-de Groot	ESO	Aluminization and tests	

Table 3

Use of the ESO 50 cm telescope during 1974

Period	Observer	Observatory	Programme
January 1—4	Dürbeck-Gieren	Hoher List	UBV Hβ photometry of AH Vel
January 4—8	Senkbeil	Hamburg	Central stars of planetary nebulae
January 8—14	Lohsen	Hamburg	Photometry of visual binaries
January 14—31	Senkbeil	Hamburg	(See January 4—8)
February 1—7	Tinbergen	Leiden	Linear and circular polarimetry
February 7—9	Senkbeil	Hamburg	(See January 4—8)
February 9—15	Vogt	ESO	Variable Stars
February 15—18	Senkbeil	Hamburg	(See January 4—8)
February 18—25	Tinbergen	Leiden	(See February 1—7)
February 25—27	Senkbeil	Hamburg	(See January 4—8)
Feb. 27—March 15	Tinbergen	Leiden	(See February 1—7)
March 15—22	Garnier	ESO	UBV and Hβ photometry in the Coal Sack
March 22—April 1	Danziger-Kunth	ESO	Hβ photometry
April 1—13	Geyer	Hoher List	UBV photometry of EA binaries
April 13—15	Havlen	ESO	Hβ Puppis, Ara
April 15—19	Dennefeld	ESO	Tests
April 19—22	Borgman *et al.*	Roden	Infrared spectrophotometry of planets
April 22—24	Oyen	Louvain	UBV of OB stars
April 24—26	Garnier	ESO	Hβ photometry in Crux
April 26—27	Danziger	ESO	
April 27—May 11	Chevalier	Meudon	Variable X-ray sources
May 11—16	Garnier	ESO	
May 16—June 11	Schöffel	Bamberg	UBV of eclipsing binaries
June 11—19	Walter	Tübingen	UBV observations of eclipsing systems
June 19—28	Kunth	ESO	uvby photometry of stars in M 7
June 28—July 15	Walter	Tübingen	(See June 11—19)
July 15—18	Humbug	Bonn	Infrared photometry of variables
July 19—23	Olsen	Copenhagen	uvby photometry of standard stars
July 23—24	Walter	Tübingen	(See June 11—19)
July 24—August 1	Olsen	Copenhagen	(See July 19—23)
August 1—9	Marchal-Schneider	Nice	Cepheids
August 10—11	Olsen	Copenhagen	uvby photometry of selected standard stars
August 12—19	Kunth	ESO	uvby, Hβ photometry on M 7 and SGP
August 19—26	West	ESO	UBV and uvby beta photometry
September 1—20	Vigneau	Toulouse	Magellanic Clouds
September 20—30	Vogt	ESO	Supergiants in Ceph. Strip, Ap stars
October 1—15	Tolbert	ESO	SGP McCormick fields in uvby and Hβ
October 14—17	Koester	Kiel	Stars of solar type

Period	Observer	Observatory	Programme
October 18—21	Vogt	ESO	Ap programme
October 25—28	Vogt	ESO	Ap programme
October 29—31	Vogt	ESO	Ap programme
November 1—5	Vogt	ESO	Ap stars and dwarf novae
November 5—9	Lohsen	Hamburg	BD 16°516; Orion Trapezium
November 10—13	Wolf	ESO	LMC supergiants
November 14—16	Roman-Vogt	ESO	Ap programme
November 17—22	Lohsen	Hamburg	(See November 5—9)
November 23—27	Schoembs	Munich	Photometry of rapid variable stars
Nov. 28—Dec. 1	Roman-Vogt	ESO	Ap programme
December 2—13	Schoembs	Munich	(See November 23—27)
December 14—31	Elst	Uccle	AI Velorum; Standard stars

Table 4

Use of the Objective Prism Astrograph during 1974

Period	Observer	Observatory	Programme
January 1—3	Azzopardi, Miss Martin	Toulouse Marseilles	Search for hot stars in the LMC
Jan. 13—Feb. 1			
Feb. 11—March 1	Amieux	Nice	Radial velocities and classification in galactic clusters
March 13—April 1			Halo stars
April—June	Vega	ESO	Various galactic fields
April 19—22	Oyen	Louvain	OB stars in Circinus
April 24—30			
May 15—29	Gieseking	Hoher List	Radial-velocity curves of cepheids
August 13—20	West	ESO	McCormick field
September 14—23	Tolbert	ESO	McCormick field
October 5—24	Azzopardi	Toulouse	SMC and LMC
November 3—13	Miss Martin, Azzopardi	Marseilles Toulouse	Survey of LMC in 3 colours
November 14—23	Miss Martin	Marseilles	Spectral classification
December 2—19	Figuière	Haute-Prov.	Radial velocities; Spectral classification in LMC

Table 5

ESO use of the Bochum 61 cm telescope during 1974

Period	Observer	Observatory	Programme
January 1—3	Vigneau	Toulouse	UBV for members of the SMC
January 3—14	Vogt	ESO	Variable stars
January 16—23	Mermilliod	Geneva	7-colour photometry of NGC 2516
January 23—30	Havlen	ESO	UBV Puppis OB stars
Jan. 31—Feb. 6	Mermilliod	Geneva	(See January 16—23)
February 15—21			
March 18—23	Vogt	ESO	U-Gem stars; High-speed photometry
November 23—27	Häfner	Munich	Simultaneous photometric observations of fast variable stars
Nov. 28—Dec. 2	Lohsen	Hamburg	Tests of two UBV filter sets
December 3—13	Häfner	Munich	(See November 23—27)
December 24—31	Miss Särg	Lund	UBVRI photometry of M giants

Table 6

ESO use of the 50 cm Danish telescope during 1974

Period	Observer	Observatory	Programme
April 22—May 14	Sterken	Ghent	Light variations of supergiants
May 17—25	Chevalier-Ilovaisky	Meudon	Variable X-ray sources
September 18—30	Grenon	Geneva	Photometry in Geneva System
December 26—31	Materne	Hamburg	Pre-main-sequence stars in young clusters

Many of the programmes listed in the tables are still in the stage of reduction and analysis. In the following some of the results obtained during 1974 are summarized.

Galactic Structure

Havlen continued his investigation of the OB star distribution along the galactic plane from $l = 235°$ to $l = 255°$. A survey of the brighter stars near the core of the association Pup OB2 was made. The faint stars will be observed photoelectrically in the near future. UBV photometry was completed with the Bochum telescope and Hβ photometry was carried out with the 1 m telescope. The survey limit is between $V = 12.0$ and 12.5. The previously determined distance modulus of Puppis OB2 is confirmed and it appears probable that the faint OB stars in the region are also members of it. UBV and Hβ photometry was also obtained for a concentration of OB stars around $l = 248°.5$.

Wramdemark has observed photoelectrically in UBV ($V < 15$) and Hβ ($V < 13$) a number of faint early-type stars in the Carina direction ($l = 290°$). Individual distances have been determined. The interstellar extinction appears to be low, amounting to about 3 magnitudes at $r = 10$ kpc. In the direction of the HII region R 54a about ten early-type stars were found with distances exceeding 10 kpc. It is proposed that this group of stars causes the excitation of the nebula instead of MR 32.

Westerlund and Garnier have continued the photometric study of stars in the Crux region ($11^h50^m < \alpha < 13^h30^m$, $-55° > \delta > -67°$). The programme involves 321 stars which may be separated into (a) OB stars; (b) Be stars; and (c) M stars, C stars and peculiar emission objects. Spectroscopic information on these objects is also being obtained.

Oyen has completed his UBV observations of 249 OB stars in Circinus. The region has also been observed with the GPO astrograph for radial-velocity determinations.

Havlen has completed UBV photometry for 33 stars down to $V = 15^m$ in a field in Norma centred at $l = 328°$, $b = -0°.6$. It is expected that some of the stars lie in the Norma-Scutum arm at more than 5 kpc from the sun. Hβ photometry for a few of the brighter stars has also been obtained, as well as image-tube spectra for classification purposes.

Schnur has obtained 45 spectra for determining radial velocities in a Norma region around $l = 331°$; $b = -1°$. The preliminary results are that six stars, situated in the next inner spiral arm, show radial velocities of about −20 km/sec, while twelve stars at larger distances show radial velocities between −60 km/sec and −100 km/sec, in accordance with models of galactic rotation.

Garnier measured in UBV stars near to the Anon Cluster found by Westerlund in the Norma region $l \sim 332°$.

A new analysis of the spiral structure of the Galaxy has been made by Moffat and Vogt on the basis of observations with the Bochum telescope of more than

70 open clusters. A special effort was made to select distant young clusters. Some conspicuous groups of luminous stars were observed to determine whether their members are physically related.

The main new results concerning the galactic structure are:

(1) An extension of the outer arm was found from $l \simeq 105\text{-}180^\circ$ to $l = 245^\circ$, at distances of 5-7 kpc from the sun.

(2) A probable extension of the local arm out to beyond 5 kpc was found in the direction $l \sim 240^\circ$ to 280°.

(3) It was found that the Carina arm may be defined to a distance of 8 kpc by young star clusters. Previously this stretch had only been delineated by HII regions.

Using the 1 m telescope, Vogt and Moffat carried out UBV measurements of 32 faint stars ($\sim 15^m$) in a star cloud in Sagittarius. These stars are candidates for distant highly-reddened OB stars.

Mrs. Amieux has observed a number of galactic fields with the GPO astrograph for radial-velocity determinations. Preliminary results are available for stars in the galactic cluster NGC 3114. Emission-line stars on these plates are being studied by Miss Lacoanet.

Grønbech and Olsen have made 9,000 Hβ observations of 3,000 stars with the Danish 50 cm reflector. Included are the 2,700 bright stars fainter than 4^m5 and earlier than G0 ($\delta < +10^\circ$) and 300 other stars of special interest (visual binaries, FK4 stars, uvby standards). Previously they had obtained uvby photometry of the same stars.

In a programme of Strömgren and Olsen with the ESO 50 cm telescope, uvby observations of 64 standard stars were made in six nights. The purpose was to investigate the relationship between the standard uvby system of Crawford and Barnes (1970, AJ 75, 978), the instrumental system of the Danish simultaneous 4-channel spectrographic photometer and the instrumental system of the single-channel ESO photometer. Mean errors of one observation were 0^m0023, 0^m0040 and 0^m0042 in b-y, m_1 and c_1 respectively.

Related to the uvbyβ programme are the radial-velocity programmes by Andersen, Grosbøl, Helt and Nordström. In one of these, information on the galactic spiral field is obtained by computing the birthplaces of stars with accurately-known ages and space velocities. Radial-velocity observations at 20 Å/mm of about 250 selected B-A0 stars have been obtained. Each final velocity will be based on three plates distributed over a period of a few months in order to detect variability. One or more observations are now available for about 180 stars.

Nordström and Andersen continued their programme to complete the Bright Star Catalogue in radial velocities to spectral type F4. The observing programme comprises about 450 B, A and F stars for which no published radial velocities exist. Observations at 20 Å/mm are now available for about 200

stars. In addition, about 70 stars with known velocities have been observed, which will be used to establish the wavelength system. A number of new double-lined spectroscopic binaries, Be and shell stars have been found.

Mrs. Grenier obtained 117 spectra with the RV Cass spectrograph for completion of a programme initiated in 1970 and aimed at a statistical study of cool stars.

Interstellar Matter

Rickard has continued his study of the distances to cold interstellar clouds towards the galactic centre. Coudé spectra at 3.3 Å/mm have been obtained for about 30 bright stars earlier than B5 to study interstellar H and K lines in the direction of three self-absorption features in the neutral hydrogen distribution (at + 7, + 4 and 0 km/sec) in a large area towards the galactic centre.

It was found that the + 4 km/sec self-absorption feature has optical counterparts in several stars beyond about 200 pc. This gas may well be associated with the Gould Belt, as has been suggested by Lindblad. However, the strongest self-absorption feature at + 7 km/sec has no optical corollaries out to a distance of at least 400 pc, and then in only two stars. It shows up in nearly all stars at distances greater than 800 pc and is cold gas in either the interarm region or in the Sagittarius arm.

Danziger and Aaronson (Harvard) have identified forbidden lines of [C1 II] at 8579.5 Å and [Fe II] at 8617 Å in the Orion nebula. They have also discussed the unusual behaviour of the OI allowed transition at 8446.4 Å.

Danziger's photoelectric spectrophotometry of NGC 3576, RCW 38 and NGC 6357 shows that in all cases the helium/hydrogen ratio N (He^+)/N (H^+) lies near 0.11. Since radio observations of NGC 6357 gave much lower values, it is considered that there is a significant proportion of neutral helium in this nebula.

Danziger, Dennefeld, Kunth and Schuster have identified a large new reflection nebula of low surface brightness on ESO Schmidt plates centred at $l = 314°$, $b = -22°6$. The study of an associated star illuminating a small part of the nebula suggests a distance of 77 pc and a size of 13.5 pc. It is suggested that the nebula is illuminated by the integrated light of the Galaxy.

Danziger, Dennefeld, Havlen and Schuster have detected a dark globule on ESO Schmidt plates at $l = 3°5$, $b = -4°9$. An associated star whose light is reflected from one edge of the globule gives a distance of 630 pc. A mass of 0.8 $M_\odot$ has been determined from the absorption. The object is a good candidate for studies of molecular lines.

Danziger and Dennefeld have presented a list of approximately 55 emission lines identified in the supernova remnants RCW 86, RCW 103 and N 63A in the LMC, with rough estimates of their relative strengths. The strengths of these lines are in qualitative agreement with expectations of the theory of isothermal shock heating and cooling of the interstellar medium. The presence

of lines of [Ca II] is of particular interest. A discussion of spectra of N 120, the northern extension of N 49, RCW 89, Kesteven 45 and N 57, reveals that they are supernova remnants, except for N 57 which is more probably a photo-ionized HII region.

Danziger finds that the continuous radiation from NGC 6210 between 0.37 and 10 μ shows contributions from the central star, the nebula, and dust in the nebula, each characterized by a different temperature. An excess peaking at 1.4 μ requires a different explanation, and the possible roles of H^- and of a faint red star are discussed. The helium abundance N (He^+)/N (H^+) is 0.11.

Globular Clusters

Alcaíno obtained photoelectric sequences for the globular clusters NGC 288, NGC 6809 and NGC 5927, making use of the 1 m telescope. Thirteen stars in the magnitude range $10 < V < 16.2$ were observed an average of three times in each cluster. The sequences are being used to calibrate photographic plates obtained with the 40-inch CARSO telescope.

Infrared Observations

Using the 1 m telescope, Andriesse has performed surface photometry of the southern infrared source in M 17 in four wavelength bands. A "silicate" absorption feature was detected. The observations were discussed during the ESLAB symposium on "HII regions and the Galactic Center" at Frascati. Fragmentary data on other HII regions were obtained. The extent of the infrared envelope of η Car was studied and conclusions were drawn on the dust distribution and on the mass loss of the star.

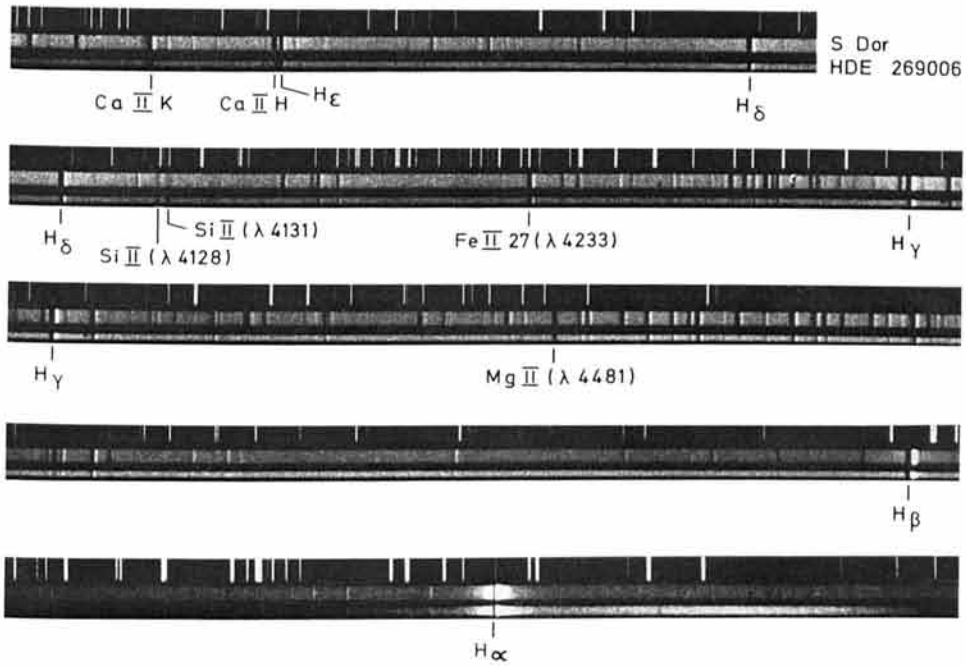
Andriesse, Borgman, Koornneef and de Vries used the 50 cm, the 1 m and the 1.52 m telescopes for observations in the infrared. Spectra were obtained in the 8-14 μ window of several sources, including the galactic centre where at 12.8 μ an emission line of Ne II was detected. Photometry between 3.5 μ and 20 μ was obtained of a large number of cool sources, hot emission-line objects and HII regions. Preliminary results have already been published.

During infrared observations by a team from the Max-Planck Institute for Radioastronomy, under the direction of Schultz, 16 new IR objects were identified which are coincident with OH sources.

Wood carried out observations with the Chilimap telescope to look for 5 μ sources. No new sources were found. Mira, R Dor and η Car were being monitored.

The Magellanic Clouds

The UBV photometry of some of the blue objects in the Wing of the Small Magellanic Cloud, started by Garnier and Westerlund three years ago, is now finished. The colour-magnitude diagram shows that the stars form a homogeneous group. A good photometric sequence resulted. It is being used for the calibration of photographic plates so that a larger number of stars may be added to the investigation.



High-dispersion spectra (12.3 Ä/mm in the blue and 31 Ä/mm in the red around Hα) of S Dor and of HDE 269006 of the Large Magellanic Cloud. HDE 269006 is a S Dor-type variable star of a higher temperature. Strong P Cygni-type profiles of the hydrogen lines as well as most of the metallic lines are characteristic in both cases. The spectrograms were taken on November 12 and 13, 1973 (S Dor) and November 8 and 9, 1974 (HDE 269006) with the coudé spectrograph of the ESO 1.52 m spectroscopic telescope.

The UBV photometry of about 50 stars near to the emission nebula N 55 in the Large Magellanic Cloud has been completed by Garnier. The first results show that most stars brighter than V = 15.5 are members of an association of blue stars in the LMC.

Geyer has found many variables in the Large Magellanic Cloud on plates taken with the Schmidt telescope.

External Galaxies

Danziger and Schuster obtained photographs and image-tube spectra of the spiral galaxy NGC 646. The results can be interpreted as two galaxies interacting gravitationally.

M^me^ Alloin and Kunth observed peculiar nuclei of several galaxies in the spectral range 3300-6300 Ä with 87 Ä/mm dispersion. Included were the nuclei of NGC 613, 1068, 1365, 1404, 1433, 1672, 1808 and 7552.

Rickard has continued his work on the bright galaxies NGC 1097, 1291, 1365, 1433, 1487, 2997, 3256 and IC 4662. The object of the programme is to examine the rotational velocities of the large emission regions near the centres of these galaxies—so-called "hot spots". Image-tube photographs have resolved many of these hot spots into chains of large HII regions. Spectra have been taken to study the velocity field in the nuclei of these galaxies.

The recently-published Revised New General Catalogue by Sulentic and Tifft contains 102 objects still classified as "unverified southern objects". Schuster and Westerlund have identified 40 of these objects on ESO Schmidt plates and prepared new descriptions.

Schuster has started a search for clusters of extremely faint galaxies using the Schmidt telescope with long-exposure red plates.

Special Objects

Some ultraviolet spectra of 3C 273 were taken by M^{lle} Divan to study a possible anomaly.

Vreux and his associates have studied spectra of Of stars near η Car. Differences with the description of Walborn are outlined for HD 93129 A, for HD 93161 A and B (separate spectra show the latter to be hotter and possibly variable) and for HD 93222. The structure of the Ca II interstellar lines is also studied. Radial velocities of the components of the Ca II lines as well as of some other lines (Hβ, Hγ) have been obtained. A complete spectral coverage, extending from 3700 Å to 7000 Å, has been obtained for 20 Of and peculiar O stars.

Dachs has studied possible variations of radial velocities and line strengths in peculiar B- and A-type stars in the open clusters NGC 2516 and NGC 2287, and in O- and Of-type stars near η Car and Sco OB I.

Wolf continued the spectroscopic monitoring of A- and B-type supergiants. Dispersions of 12 Å/mm in the blue and 30 Å/mm in the red were frequently used. Included are S Dor and HDE 269006. The spectra are presently being studied in a joint programme with Nelson Zárate from the Universidad de Chile.

M^{lle} Burnichon studied the intrinsic properties of very luminous stars, by obtaining reddening corrections from fainter companions. Jointly with M^{lle} Divan a spectrum of Sirius B was obtained during a night of exceptional seeing.

Sterken obtained with the Danish telescope photometric observations of twelve extreme galactic A and B supergiants. Eleven of these are variable, with amplitudes ranging from some hundredths to 0.2 of a magnitude in V. The variations are most pronounced in HD 160529. In this star there is evidence of short-term variability on a time-scale of a few hours, with an amplitude of about 0.02 magnitudes in V.

Koester has made spectroscopic coudé (1.52 m telescope) and photoelectric (50 cm telescope) observations of twelve stars of approximately solar type. The aim is to determine the stellar parameters and element abundances and to provide reference points in the Hertzsprung-Russel diagram, which may serve as a guide for the vast majority of stars for which the observational possibilities do not permit such detailed analyses. It is intended to investigate the effects of differences in chemical composition on the location of the main sequence, to determine the microturbulence in late F and early G stars and to study the dependence of UBV and Strömgren colours on various parameters.

Van Paradijs obtained 167 coudé spectrograms of super-metal-rich G- and K-type giants and of some standard stars in several spectral regions.

Line-blocking coefficients measured between λ 6900 und λ 8600 appear to be larger than values which have been carefully extrapolated from solar values. The data will be used as an observational check of colour-index (R-I) calculations, based on model atmospheres.

M. and F. Spite have obtained, with the coudé spectrograph, spectra of the halo stars HD 128279 and HD 184711 in the red region, at a dispersion of 12 Å/mm, with the new 098-02 Kodak emulsion. Some spectra of other metal-deficient stars were also obtained.

The analysis of the extreme subdwarf HD 128279 has been completed. Its parameters ($\Theta_{eff} = 0.92$, $\log g = 3.5$) show that the star is not very far above the main sequence. All metals Na, Ca, Ti, Fe and the heavy elements are deficient by the same factor of 50 relative to the sun. It appears well established that the heavy elements, especially the s process elements, have no under-deficiency (in contrast to the situation in HD 122563). There only exists a significant under-deficiency of Mn, but it is not completely excluded that this could be explained by the effects of hyperfine structure on the saturation of the lines. A beginning was made with the analysis of the metal-deficient star HD 184711, which seems to be a giant.

J. P. Swings studied the spectra of HD 45677, HD 87643 and GC Car, all peculiar stars with infrared excesses. Evidence was found that the Fe II emission lines originate in rotating equatorial rings around these stars. Variations of the V/R ratio of the emission components of the hydrogen lines Hγ and Hδ are clearly seen on 20 Å/mm plates of HD 45677.

Mrs. Elvius is investigating a peculiar strongly variable blue object in Centaurus which seems to have a spectrum resembling that of a white dwarf. Danziger obtained for her some spectra with a red-sensitive image tube on the 1.52 m telescope. So far no emission lines of hydrogen were detected. Hydrogen absorption lines are also absent or very weak. The best plate shows a series of at least twelve absorption features which have been interpreted as He I lines. One He II line may also be present. No other lines have been identified so far. Although the spectrum is rather similar to that of a DB white dwarf, the very strong variations in magnitude (3-4 mag), combined with small changes in colour, make the object difficult to understand in terms of a white dwarf, unless it is part of an eclipsing binary where the other star is practically invisible.

Lohsen continued his observations of variable stars in visual binaries. He observed BM Ori. The white dwarf eclipsing binary BD 16° 516 has also been observed. In addition, standard stars were observed with two different sets of UBV filters at the Bochum telescope.

Haefner and Schoembs carried out simultaneous high-speed photometric observations at the 50 cm ESO and the 60 cm Bochum telescopes to look for

periodic and non-periodic intensity variations in narrow wavelength regions. They observed α Gru, ε Eri, γ Eri, α Scl, γ^2 Vel and π Aqr. In collaboration with Vogt they surveyed the brightness of VW Hya every night. In the nights of November 25 and 28 a nearly complete set of measurements of a normal-type outburst was obtained.

Gieseking has used the GPO astrograph to investigate how much smaller the error of the measurements of changes of radial velocities is compared with the error of measurement of single radial velocities previously attained with the GPO. Radial-velocity curves of several cepheids and eclipsing binaries will be measured.

Wood used the spectrum scanner to obtain a number of Hβ profiles in suspected spectrum variables. In addition SX Phe was observed in Hα and Hβ.

Vogt has checked a total of 28 stars located in the Cepheid Instability Strip for variability. Several stars show small variations, especially in U-B. Vogt continued his investigation of eruptive variables. The orbital period of VW Hya was found to be $0^d.07427111$. Two types of eruptions occur: short maxima and flat, long maxima. During flat maxima, repeating peaks have been detected with a period $\sim 3\,\%$ larger than the orbital period. Extensive observations were obtained on RR Pic, AU Car, BV Cen and EX Hya, the last one in a joint investigation with W. Krzeminski and C. Sterken. More limited data have been collected for SY For, BV Pup, BX Pup, V 373 Cen, MU Cen and AT Ara.

Andersen and Hultqvist obtained coudé spectra at 12 Å/mm of double-lined eclipsing binaries. Accurate mass determinations (mean error 1-2 %) have been completed for SZ Cen, RS Cha, RZ Cha, χ2/Hya, TY Pyx and CV Vel. A less accurate mass has been determined for the O-type system TU Mus, and observations are still incomplete for V 539 Ara, V 760 Sco and V 1647 Sgr. Photometric solutions of new light curves are under way for several of these systems. The observations also provide information on the effects of line blending in B-type systems.

Dachs has obtained a number of spectra of the X-ray source candidate stars HD 37041, HD 77581 and HD 153919. Preliminary results on the variations of line strengths in HD 153919 have been obtained.

Geyer has observed eclipsing binaries which may be members of globular clusters, V 65 in NGC 3201 and V 78 in NGC 5139. From the UBV photometry it follows that V 65 in NGC 3201 is not a cluster member but a distant EA-type binary. Also its radial velocity, which was obtained by means of one image-tube red spectrum taken by Danziger, does not conform to that of the cluster. V 78 in NGC 5139 is most likely a cluster member lying within the RR Lyrae gap. The photometry confirms that this EA star shows also intrinsic variability.

The eclipsing binaries RZ Cha, YZ Cha, DZ Mus and the X-ray binary HD 153919 were observed by Geyer in a joint programme with Strohmeier and Mauder. It appears that the previous period for YZ Cha is to be doubled.

Grønbech reports that the eclipsing-binary programme for the determination of absolute dimensions of stars is nearly finished. Light curves are now complete or nearly complete for SZ Cen (with K. Gyldenkerne), AI Hya, CV Vel and AU Vel. In collaboration with J. V. Clausen (Copenhagen) he determined orbital elements for ζ Phe. All four colours of the Strömgren system gave a consistent and quite accurate solution. A study of the apsidal motion in the FT Orionis system (period about 500 years) was completed.

Schöffel reports observations of the eclipsing binary CX Vir. The first results show that the two components must be close to their corresponding Roche limits. Around secondary minimum there is strong emission superposed on the B-light curve. Also DL Vir and V 250 q Sgr have been observed. BV 1556 turned out not to be an eclipsing binary. Its light variation is only 0.06 mag in B but periodic (P = 5.6 days). A spectrum taken by Vreux shows an A0 spectrum.

Vogt has obtained a complete light curve of the double-line eclipsing binary HD 52942 with the Bochum telescope.

Walter continued photometric measurements of the eclipsing binaries RW Ara, XZ Sgr, V 505 Sgr and X Gru with the 50 cm ESO telescope for an investigation of problems of gas streams in semi-detached binary systems. A total of 3,400 observations have been obtained to date.

Comets

Comet Kohoutek (1973 f) was observed spectroscopically and photometrically by Kohoutek.

Miscellaneous

Wolf with Altenhoff and Wendker has carried out radio observations at 3 cm wavelength of α Cyg with the 100 m radio telescope in Effelsberg, Germany, to look for a possible chromosphere. A satellite programme proposed by Wolf, "Chromospheres in A Supergiants", has been accepted by the ESRO Observation Programme Selection Committee for the "International Ultraviolet Explorer".

Joint Research with Chilean Universities

C. Anguita, F. Noël and their associates at the Departamento de Astronomía, Universidad de Chile, Cerro Calán, continued the work on "The Impersonal Astrolabe Project".

The "First Astrolabe Catalogue of Santiago", an observational star catalogue giving the positions for the mean epoch of observation of 325 FK4 and 215 FK4 Sup. stars, was published. It is based on the observations of fundamental stars made during more than six years with the Danjon astrolabe installed at the National Astronomical Observatory at Cerro Calán. The results for systematic errors of the right ascension system of the FK4, as a function of declination, based on the Astrolabe Catalogue, confirm largely the first results obtained during the first two years of observations (1966, 1967), which were

published earlier. A discussion of systematic errors of the FK4 as a function of right ascension, based on the Astrolabe Catalogue, has been completed.

L. Campusano of the Universidad de Chile spent all of 1974 on an ESO fellowship at Paris Observatory, Meudon.

Several students from Chilean universities participated in scientific and technical work at ESO for various periods. Included were Ms. D. Comte, E. Costa, M. Faúndez, H. Neupert, Ms. A. Sulic and N. Zárate from the Universidad de Chile in Santiago, R. Garcías and A. Maha from the Universidad Técnica, Federico Santa María and A. Saavedra and Ms. E. Villegas from the Universidad Católica de La Serena.

Scientific Meetings and Study Visits

A conference on "Research Programmes for the New Large Telescopes", sponsored jointly by ESO and the SRC, was held in Geneva on May 27-31. The proceedings of the conference were published six weeks later under the editorship of A. Reiz. Numerous ESO staff members attended this conference and also the IAU European Regional Meeting in Trieste in September. Papers were presented at the latter meeting by Blaauw and Wolf.

Havlen and Rickard presented papers at the August meeting of the American Astronomical Society; Havlen also presented a paper at the Albany IAU symposium on "Multicolor Photometry and the Theoretical HR Diagram". Vogt presented a paper at IAU symposium 67 in Moscow.

Danziger lectured at summer institutes in Cambridge (England) and Erice (Sicily).

Westerlund represented ESO at the inauguration of the Anglo-Australian 3.9 m telescope at Siding Spring Observatory on October 16.

Miscellaneous other visits by ESO staff included, in addition to many brief visits to various places, a visit by Breysacher to the Observatoire de Paris and the Observatoire de Haute-Provence, by Danziger to KPNO in Tucson, by de Groot to Lund Observatory, by Rickard to the Observatoire de Marseille, by Schuster to Uppsala, by F. and M. Spite to the Observatory of Rio de Janeiro, by Vogt to the astronomical institutes in Bochum and in Warsaw, by West to the Abastumani Observatory and the 6 m telescope facility of the Academy of Sciences of the USSR, and by Wolf to the Universitäts-Sternwarte in Munich. Several persons from ESO-Chile paid visits to the TP Division in Geneva and to the Hamburg headquarters.

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ESO Publications

Annual Report 1973.

ESO Bulletin No. 10.

Proceedings of the ESO/SRC/CERN Conference on Research Programmes for the New Large Telescopes, Geneva, May 27-31, 1974. Editor: A. Reiz.

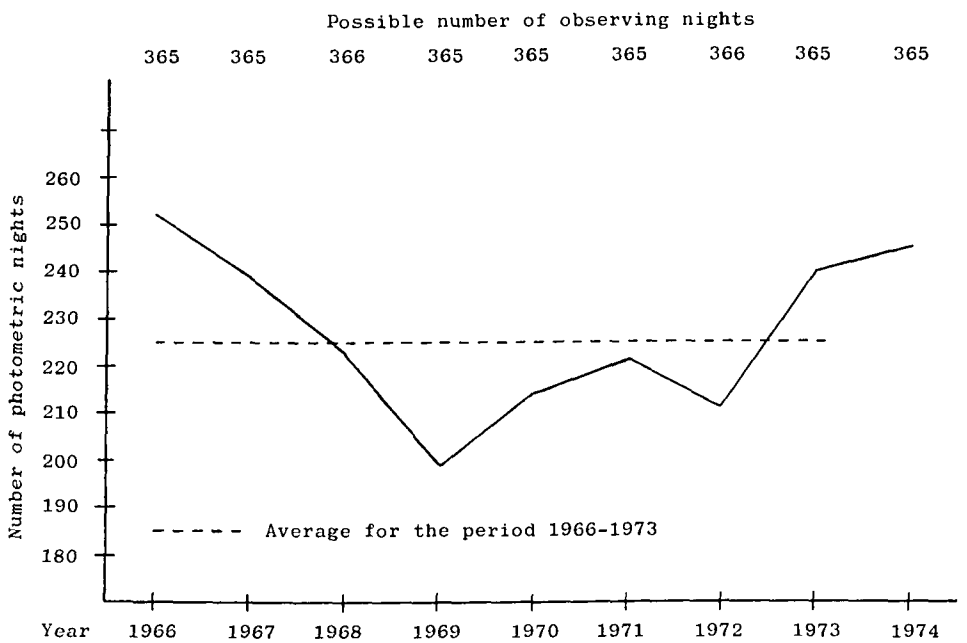
Libraries

During the year, 353 new books were added to the library in Geneva; the library in Santiago received 260 and that on La Silla 112. A total of 130 subscriptions for periodicals were processed and a continuous flow of observatory publications was received. In addition, the library in Geneva benefited by the purchase of a collection of optics books and periodicals. A total of 471

volumes of periodicals were bound in the three libraries. Back numbers of several periodicals were purchased. The excellent cooperation with several other libraries was much appreciated.

Meteorological Report

During the year there were 245 photometric nights (with six or more hours of uninterrupted clear sky). As can be seen from the figure this is well above the average for the period 1966-1973. February, April and October were particularly good in comparison with previous years. January was rather poor. The total number of clear hours was 2,452, the highest since 1966. Snow fell on La Silla on June 8, 15, 24, August 3 and September 24. Rain fell on June 19 and September 23 and 24.



Photometric nights

The ESO Sky Atlas Laboratory

Plates continued to be taken for the ESO B Survey with the 1 m Schmidt telescope on La Silla. By the end of the year more than 130 accepted survey plates were available. Progress was somewhat hampered by various electronic and mechanical imperfections of the telescope, which occasionally resulted in wrongly-centred plates. With the installation of a new improved telescope control system in November, these difficulties were partly overcome.

A study of the limiting magnitude on the survey plates by Schuster and West indicated that good plates of 60 minutes exposure reached $21^{m}5$.

The production of the B Atlas at the Sky Atlas Laboratory in Geneva continued. By the end of the year about 100 fields had been copied and distributed

to institutes in the ESO member states and elsewhere. An agreement was concluded between ESO and the Uppsala Observatory concerning the organization of a systematic search for interesting objects in the ESO B Atlas. Under this agreement ESO provides support for an astronomer at Uppsala in charge of the search programme (Dr. A. Lauberts). Four lists containing a total of 149 objects in 65 survey fields were prepared. In the meantime two of these lists have been published. About 60 per cent of the listed objects are catalogued for the first time, many of them being extremely interesting, e. g. strongly interacting galaxies and galaxies of peculiar shapes. Studies of individual objects from the lists are being undertaken at La Silla as well as at other observatories.

Two special measuring machines were built at Uppsala for the search, one of which is now installed at the Sky Atlas Laboratory in Geneva.

The agreement between ESO and the SRC for the production of a joint atlas of the southern sky was formally concluded. Red plates will be taken with the ESO Schmidt telescope, blue plates with the SRC 48″ Schmidt at Siding Spring, Australia. All copies of the ESO/SRC atlas will be produced at the ESO Sky Atlas Laboratory. The first on-film edition has been fixed at about 100 copies.

A comprehensive technical report on the production of the atlases was written by Dumoulin and West: "Photographic Reproduction of Large Astronomical Plates."

A small collection of enlargements of particular objects from the ESO B Survey was established and copies were dispatched during the year. Colour-photography tests were undertaken with the Schmidt telescope during some nights. The first results look promising.

Study visits to the Sky Atlas Laboratory were made by several astronomers from other institutes.

THE ESO 3.6 METRE TELESCOPE PROJECT

In the course of the year, work continued on all the major contracts for the 3.6 m telescope. In Europe all the constituent elements of the telescope proper were being assembled in the Creusot-Loire (St. Chamond) plant to which the assembly contract had been awarded. By the end of the year the main structure (Creusot-Loire) and the hydraulic plant (Rexroth) had already been partially assembled, while the main gears (MAAG), mirror supports (Creusot-Loire), Cassegrain cage and handling equipment (Allerups), mirror cells and dummy mirror (REOSC) were all awaiting assembly in the large hall of the French contractor. The top units (Atelier Bouvier) were nearing completion at Grenoble. Meanwhile the dome parts had been completed by Krupp and the first shipment of these parts to Chile had taken place. The building on La Silla (Interbeton) had virtually reached its maximum height and the end of the concrete work was at hand, while the installation of the air-conditioning (Sulzer) was being prepared. According to the current overall project planning, the telescope should be brought into service in August 1976, a delay of about three and a half months compared to the original planning schedule dating from January 1973. Earlier in the year, the new power-generating plant (three diesel motor-generator sets of 450 kVA each, supplied by MWM) had been installed in a building specially constructed for the purpose some five kilometres from the summit of La Silla.

Towards the end of the year a reorganization took place in the Organization of ESO in Chile, as a result of which the so-called Auxiliary Construction Programme became the responsibility of the TP Division. This programme, originally managed by the Technical Department of ESO-Chile, consists of the construction of various support facilities for the observatory as a whole and comprises, among other things, the construction of new stores and workshops, new living quarters for the local staff, the improvement of the water, heating and electrical distribution networks and the road improvement programme. These projects will now be supervised by the TP Building Group, supplemented by staff transferred from the Technical Department.

In Europe, the extension of the TP premises was completed in September, giving an increase of 500 m^2 of workshop, laboratory and office space.

At the beginning of 1974 the Division consisted of a total of 32 staff members, three visitors and seven persons on contract from agencies. By the end of the year four staff members had left ESO, while a further eight had been recruited, bringing the total number to 36 (with two more to take up appointments in

January 1975). In addition, at the close of 1974 there were still three visitors and further eleven persons from agencies. The latter figure varies from month to month according to the workload.

3.6 m Telescope Building

Interbeton completed a variety of site installations (workers' camp, office and warehouse building, workshop hall and a storeroom. In June a new tower crane was installed in the telescope building in order to accelerate the concrete work.

During the whole year the main building activity was to make all the framework and the steel reinforcements and the pouring of the concrete for the telescope building, the coudé auxiliary telescope (CAT) tower and the service building. The main dates were:

— the foundation for the external B construction was ready in January,

— the central octagonal telescope pier reached its final height of 15 m in April,

— the coudé platform was poured in September,

— the observing-floor slab was finished in November,

— the foundations for the CAT tower were ready in August,

— the central CAT pier reached its final height in November,

— the main concrete structure for all buildings was finished just by the end of the year.

In Europe the design work for the interior and exterior outfit continued. Particular attention was given to the outside aluminium cladding, the flexible joints between the A and B structure, the coudé laboratory walls with high thermal insulation, the false floors on the observing-floor and in the computer room, the structural steel parts in the buildings, the electrical and sanitary installations and many other details.

Domes

The design work for the 30 m dome was finished in November. A new CAT-dome agreement with Krupp was prepared.

The manufacturing and assembly of dome parts continued, the top-units platform, the ring girders, the two arch girders, the running wheels and the rotation drives were pre-assembled and inspected in the works.

The electrical switch cabinets were tested in the BBC plant in Mannheim.

Air-Conditioning

The manufacturing of various parts was started at Sulzer in Buenos Aires.

Transport Equipment

Specifications were established and a call for tenders was sent out for:

— the mirror carriage, which provides the lifting and transport equipment for installing and dismantling the main mirror,

— two hatches to close the holes of the vertical shaft in the observing-floor and the second floor.

Orders were placed with Creusot-Loire for the mirror carriage and with Krupp for the guiding system and the hatches. The manufacturing is under way.

Two fork-lifts of 3-ton capacity have been ordered for use in the main building. A tractor with semitrailer of 30 ton live-load has been ordered at Volvo, Göteborg. The vehicles should arrive early in 1975.

3.6 m Telescope

A number of subassemblies have been completed and tested in the course of the year. These are: the main structure (Creusot-Loire, France); the main gears for polar and declination axis (MAAG, Switzerland); the hydraulic plant for the oil pad bearings (Rexroth, Germany); the Cassegrain cage, cable twists and handling equipment (Allerups, Denmark).

For other subassemblies, which had been ordered towards the end of 1973, the detail drawings were made in early 1974. The manufacturing stage followed and at the end of the year the units were in the assembly phase: top units carrying the secondary mirrors, carriages to exchange the secondary mirrors, prime-focus unit (Bouvier, France); mirror-3 unit and exchange arm, mirror-4 subassembly, sky baffle and main mirror cover, units for the position control of the axis (Creusot-Loire, France).

Further units are still being manufactured and will be delivered in the course of 1975: mirror-5 assembly (Creusot-Loire, France); alignment equipment (Elyt, Switzerland).

The assembly of the telescope was also started and, at the end of the year, the polar axis turned on its oil pads.

The prime-focus and Cassegrain cages have been assembled for tests in Geneva. Design work has been carried out for the instrument adapters in the prime and Cassegrain foci.

Aluminizing Plant

Three offers had been received for the construction of the aluminizing plant. The contract was awarded to High Vacuum Equipment, USA. The elaboration of the workshop drawings started at the end of the year.

CAT

The design of the coudé auxiliary telescope was also started in 1974. The turret for the secondary mirrors, the drive for mirror 3 and the main parts of the pedestal have been finalized. The structural design has been checked with a structural analysis. This resulted in improved cross-sections of the cradle and a counterbalanced support of mirror 3.

Controls

A new control system for the ESO 1 m telescope was successfully made operational at the end of 1973. This system served as a first operational prototype

for the large telescope. Many novel features and capabilities could thus be tried out and their principles tested. A major effort could therefore be made in 1974 on finalizing the design and preparing the production version of a large number of electronic subassemblies and computer programmes for the 3.6 m telescope system.

After testing on a laboratory model, actual tests on the servo-drive system could be performed on the polar axis gear at MAAG in Zürich. For this purpose a van (camion-laboratoire) has been equipped with the drive circuitry, computer and measuring instruments. This same van will later be moved to St. Chamond for the final assembly and testing of the telescope in Europe.

Different drive configurations could be tested. These tests have led to a satisfactory configuration, which will be installed and later optimized on the telescope.

A large number of motors, driven in an on/off mode of operation, is used for the control of mirrors, counterweights as well as for the automatic exchange of top units. A standardized modular drive system has been developed and manufactured for this purpose. Particular attention has been paid to the interlocks designed to prevent damage to the equipment in case of malfunction or operator error.

A computer programme has been used for the layout of the cables within the telescope, to identify them and to minimize their length.

The very precise movement of the telescope and the positioning on the desired objects is measured by a system of encoders. A sophisticated hardware/software system has been developed that takes the input from these encoders and, after treatment in the (integral) computer, drives the motor units with the required precision.

The transmission of data to and from the different telescope components is effected by means of a specially-developed system which, because of its simplicity, is highly reliable. After the tests of the prototypes, these devices are manufactured partly in the CERN workshops, partly in industry.

The development of the computer programmes has proceeded very satisfactorily. All engineering programmes have been written, while those that could be tested on the 1 m telescope have been optimized.

A proposal that was made in 1973 to have other ESO telescopes and instruments on La Silla benefit from the 3.6 m computer system has been further developed. It will be gradually implemented. An astronomy-oriented interpretative language is being developed.

The prototype of the central computer system in Geneva is maintained with great success by Controls Group technicians. Regular preventive maintenance is performed. This makes the system available for development almost 100 per cent of the time.

Optics Group

The optical design work gathered momentum as the Optics Group increased in size. The newly-acquired ACCOS programme proved to be a valuable working tool. In addition to its regular activities the group did some work for other institutes, including work on Cerenkov Optics for CERN.

3.6 m Telescope Adapters

An initial attempt to commission out the optical design work to industry was not successful: the optics produced was too complex and the interplay with the mechanical design inadequate. It was therefore decided to concentrate the efforts of the Optics Group on the design of the adapters. Three quarters of the total activity was absorbed by this. By the end of the year much of the detailed optical design of a simplified prime-focus adapter, including the Gascoigne plate, had been completed, while good progress was being made with the Cassegrain adapter. Since it was intended to use fibre optics, extensive experiments were made to demonstrate the feasibility of this.

Prime-Mirror Cell

Preliminary measurements of the astatic loads had revealed a somewhat unexpected load distribution. Steps were taken to make detailed calculations to study the effects of this.

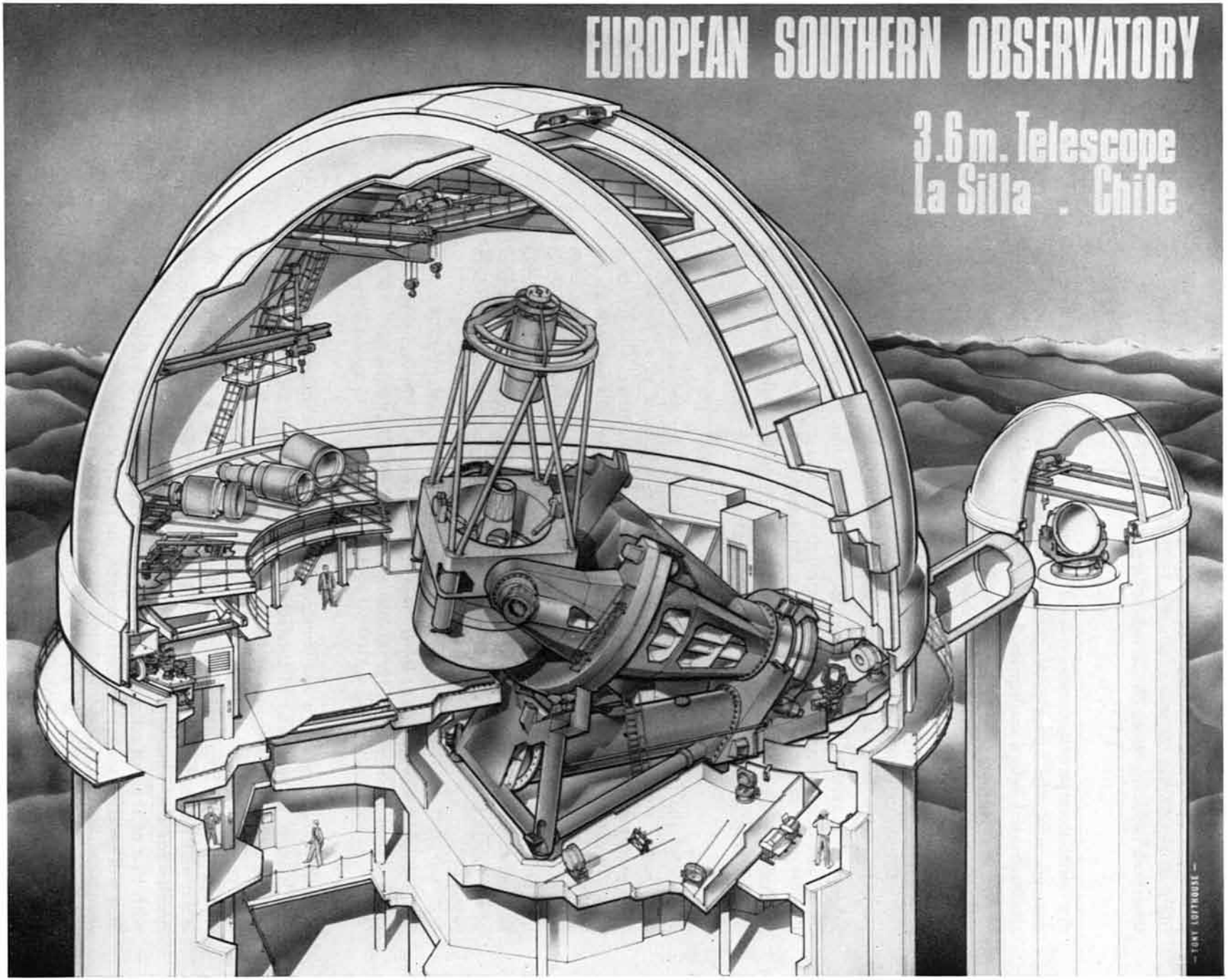
Auxiliary Instrumentation

Because of the large amount of design work needed for the adapters, progress in the area of auxiliary instrumentation was still quite slow. However, good progress was made with the four(six)-channel photometer. The design is virtually complete and the present construction schedule calls for tests at the 1 m telescope on La Silla before the end of 1975. The photometer has been designed for simultaneous measurements in UBV, in uvby or in three spectral lines and three surrounding continua. Provision for polarimetric measurements in these various colour systems has also been made. The main innovative aspect of the design is the use of dichroid mirrors to separate the various wavelength regions.

Some progress was also made with the further definition of the coudé system, in part through the award of a small contract to CERCO in Paris.

Other Projects

Miscellaneous other design and construction activities were undertaken by the TP Division, in particular in connection with activities on La Silla. Included in these are the construction of a new control system and the design of a new television guider, both for the Schmidt telescope; construction of a control system for the Danish telescope and the construction of a building for the same; and some design studies for a 1.5 m infrared telescope. The control systems for the Schmidt and for the Danish telescopes are virtually identical with that of the 1 m telescope. The standardization of control systems on La Silla will greatly facilitate the maintenance, the training of personnel as well as the keeping of spare parts.


EUROPEAN SOUTHERN OBSERVATORY
3.6 m. Telescope
La Silla . Chile

The illustration shows a drawing of the 3.6 m aperture telescope — the largest and most modern instrument planned for ESO, which will come into operation in the second half of 1976.

The 3.6 m telescope functions on a quasi-Ritchey-Chretien principle and can be used in three distinct modes of operation, viz. prime focus, Cassegrain focus and coudé focus, with aperture ratios of f/3, f/8 and f/30 respectively.

The main mirror is of fused quartz and weighs about 11 tons with a free diameter of 3.57 metres. The telescope is also equipped with two convex secondary mirrors of 1.5 m diameter, housed in exchangeable top units, one for Cassegrain, the other for coudé operation. This last mode requires a further three plane mirrors for multiple reflection of the light beam into the coudé laboratory, located immediately below the observing floor.

The telescope design incorporates a combined fork and horseshoe support system for the telescope tube, in an equatorial mounting giving independent motion about the polar and declination axes. The mechanical design comprises certain novel features, in particular the design of the bearings and the gear drives.

The instrument is located in a building of circular cross-section which is made up of two independent structures. A central concrete pier of octagonal cross-section supports the telescope itself and the coudé floor, and is independent of the rest of the building. The design of the building is such as to provide the necessary resistance to earthquakes, an endemic hazard in this region. The building is crowned by a hemispherical dome which can be rotated about its vertical axis. The observing slit can be closed by motor-driven shutters and is equipped with a wind-screen. The dome is 30 m in diameter and weighs about 400 tons.

A most interesting innovation in the telescope is its control system. All telescope operations, rotation about polar or declination axis, rotation of the dome, operation of shutters, interchange of top units, pointing and tracking of stars are computer-controlled. Servo-motors and encoders are located at vital points on the telescope (about 140 in all) and a computer constantly checks the incoming data and applies the necessary corrections, so that the telescope is always in the right place, oriented in precisely the right direction and moving exactly as it should be. This automatic control system offsets, for example, the earth's rotation and keeps the telescope locked on the star of the observer's choosing. By typing the coordinates of a star into the computer, the telescope will receive the necessary adjustments, so that it points at the object in question.

DANISH NATIONAL 1.5 METRE TELESCOPE PROJECT

Optics

The work on the optics, carried out at the Institut d'Astrophysique in Liège under the responsibility of Dr. D. Malaise, was completed.

The Telescope Mounting

The manufacture of the telescope mounting by Grubb Parsons & Co in Newcastle proceeded according to schedule. It is planned to begin the assembly of the telescope in early 1975, and the instrument is expected to be ready for testing in the shop during the summer. The secondary mirror unit, which is being manufactured at the Institut d'Astrophysique according to the design of Dr. Malaise, has been brought close to completion.

The Electronic Drive and Control System

The drive and control system constructed at the ESO TP Division was largely completed.

The Telescope Building

The work on the telescope building progressed according to schedule. The central telescope pier was ready in August, while the main concrete work was finished in December. Installation of the dome will take place in early 1975.

The Dome

The construction of the reinforced glass fiber dome, contracted to Bronswerk-Structural Co. in Utrecht, was finished in mid-1974, and acceptance tests were carried out shortly thereafter. The dome was shipped to Chile in late December.

OTHER TELESCOPES AND AUXILIARY INSTRUMENTS

The 1.52 m Telescope

The 26 cm Cassegrain finder has been converted into a modified Cassegrain with a flat mirror at 45° located in front of the primary mirror and a rack and pinion focus device on the side of the tube. With a new eyepiece with built-in illuminated cross hairs, the quality is much improved.

The coudé spectrograph. A new very luminous iron comparison lamp has been installed.

The Zeeman analyser. Construction of a classical Babcock/Preston-type analyser is under way. Four crystals are designed to provide Zeeman plates with coudé cameras II and III and at wavelengths in the region of λ 4300 and λ 5900.

The Echelec spectrograph. At the end of June experiments began in the laboratory with the electronographic camera. The whole equipment appeared to be working well. After a new optical adjustment of the Bowen camera of the spectrograph, the first échelle spectra were obtained in August. Stellar spectra were obtained a month later. The Carnegie-RCA image-tube camera is now being assembled and tested for use at the Echelec spectrograph.

RV Cass spectrograph. Special lamps for the photometric calibration have been put into use. Electronic parts for an exposure meter have been ordered from Mianes, Lyons Observatory, and optical parts from Baranne, Marseilles Observatory.

The Boller and Chivens image-tube spectrograph. An off-set guider is nearing completion. It has movements of ± 5 cm in two dimensions and will allow blind off-setting with an accuracy of 10 μ.

Various mechanical instabilities in the spectrograph have been eliminated but some other instabilities require further attention. A new efficient grating has been installed with a first-order dispersion of 225 Å/mm, and blazed for 5000 Å.

Image-tube camera/Zeiss camera. A support mechanism was installed in the mounting cone of the instrument to allow the use of blazed transmission gratings, for obtaining low-dispersion spectra (1000-2000 Å/mm) of stars in limited fields. Three gratings exist for blue, visual and red, which can be used with either the image-tube camera or with regular plates.

The Silicon diode array detector. The system design is centrally dependent on the successful operation of the Optical Data Digitizer (ODD), manufactured by EMR-Schlumberger of Princeton, N. J. The ODD consists of a detector and computer-controlled scan circuitry which is directly inserted into the existing HP 2114B computer. These components arrived early in December. System integration will occupy the first half of 1975.

Photographic material. A project to bring darkrooms, sensitizing procedures, plate inventory and developing techniques to an acceptable level was started.

Water-filter systems and temperature-controlling devices have been ordered for all darkrooms. Tests have been conducted to evaluate nitrogen-baking procedures for IIIa-J and IIa-O emulsions. Tests on other emulsions are now in progress. A pre-flash box is also now available. The characteristic curves of sample plates from each plate batch are now obtained regularly. An experimental Jet-Spray Developer for the coudé plates is being built.

The 1 m Telescope

The performance of the new drive-control system has been extremely satisfactory. Especially valuable is the increased setting precision and the programmable off-set capability.

The control computer TCS 100 and the data-acquisition computer DAS 100 have been linked together, so that there is now an automatic transfer of stellar coordinates from the TCS 100 to the DAS 100, once the data acquisition has begun. With the present memory size this means, however, a restriction to 35 stars in the stellar coordinate library.

The cabling to the instrument end of the telescope has been unified and a junction box is located near the Cassegrain focus. Many loose cables can now be avoided by directly attaching new instruments to the data-acquisition system through the junction box.

The area scanner. Improvements were made as follows: The filter-holders were modified and the access to the filters was made much easier. The minimum scanning range was adjusted down to less than 2 mm. The electrical system as well as the mechanical stability of the rotation system were improved. New cross hairs were introduced. The slit area was modified to avoid parasite light on the photomultiplier during the operations of the shutter. The data-acquisition programme was improved.

Photoelectric system. Fluxá has recently installed and observationally tested a new pulse-counting system of his own design for use primarily with the high-gain EMI 6256 photo tubes. The SSR pulse-counting apparatus will be primarily employed for the ITT FW118 and FW130 photo tubes and the RCA 31034A tube. The general radio amplifiers have been replaced by solid-state Keithley 410A amplifiers. The former and the amplifiers previously built by Becker are now in use on the 50 cm and 1 m telescopes. Amplifier calibration is effected with Keithley Picoammeter sources.

Photometric test bench. Construction was completed. A regular control of many properties of our photomultipliers can now be made for ensuring optimum operating conditions.

The Schmidt Telescope

New mechanical right-ascension and declination drive systems were constructed at the TP Division in Geneva, together with an electronic control system which is similar to the system installed at the 1 m telescope in 1973. The drive systems were installed and tested at the telescope late in the year.

The direct focal guider was improved and adapted to an EBS camera tube. It is expected that the new camera will be installed in the first half of 1975. Special studies were made on torsion effects in the cradle of the telescope, causing fluctuations in polar orientation of the instrument.

The 50 cm Telescope

Some improvements have been made on the dome rotation as well as on the dome itself to prevent leakage. A fan removes the hot air coming from the computer units which have been separated from the telescope area by a glass partition. Some problems have been encountered due to failures of the Nova computer. They have been attributed to overheating.

GPO Astrograph

For the first time the telescope has been used without the prism and excellent direct photographs have been obtained.

Measuring Equipment

Radial-velocity measuring machine. The Abbé comparator on La Silla has been equipped with an electro-optical setting device, built according to plans by H. Barwig from the Universitäts-Sternwarte in Munich. The system works in a similar way as the Grant machine. The tracings of the direct and the electronically-inverted signal are displayed on a CRT. The measurement is performed by superimposing the image and mirror image of the scanned spectral line. An automatic data output is provided. The position is read from a digital coded incremental Heidenhain scale (resolution 0.5 μ), connected with the carriage of the photographic plate. The output of the attached counter is processed in an HP 2114B computer. The whole system is installed in a laboratory of the 1.52 m spectroscopic telescope on La Silla.

BUILDINGS AND GROUNDS

Establishments in Chile

Pelícano and La Silla
New Construction

The new warehouse building on La Silla has been completed. Construction of the new garage-workshop was started. Also the excavation for dormitory 7 was begun. Work on the new service trenches is well under way.

Power Supply

In March a new power plant was put into service three kilometres below the hotel on La Silla. This plant has been provided with three diesel-generator sets, a switchboard with electronic control for frequency and an automatic starting device. A high-tension transformer station equipped with 3 x 450 kVA oil transformers converts the generated 400 volts to 6,000 volts. From the new power house a 6,000-volt ground cable distributes the power to the sub-stations on La Silla.

Water Supply

The deep wells of Pelícano were regularly cleaned and maintained. The former rotating system of the pumps was discontinued and replaced by another, in which the pumps run steadily together. The water ditch was expanded to compensate for the higher water consumption. A collector system for the water ditch was prepared with an electric pumping device and tank.

Certain problems with the water supply occurred on La Silla, due to the high consumption by contractors. To obtain a better control over the situation, water meters were installed at all locations with high water consumption. In Pelícano the daily average pumping has been about 100 m^3.

Telescope Buildings

All electrical ground systems for the telescope buildings were overhauled and renewed. Additional exterior ground connections were made to copper bars submerged in a special material to ensure a lower electrical earth resistance.

In the Bochum dome a new motor for the wind-screen and a safety device for the dome rotating motor were installed. Stabilized power for the electronic equipment on a new switchboard was connected.

The roof of the Danish 50 cm telescope building was repaired and remote control for the dome rotation was supplied.

The photometric telescope building was connected to the stabilizing power plant.

In the Schmidt telescope building, in connection with the renovation of the photographic laboratory, a red-light system, wall plugs, air compressors and water filters were installed. A new cable for stabilized power and a distribution board, in combination with a new ground system, were set up for the new electronic equipment. A new air-conditioning system built by Sulzer Hnos. (Argentina) was finished. This equipment serves to maintain a constant temperature of 20° C in darkrooms and photographic laboratories.

The exterior of the spectrographic telescope dome was painted. Two darkrooms were built on the second floor of the building and equipped with utilities for the "caméra électronique". Miscellaneous improvements were made in the cold storage room for photographic plates and in the liquid-nitrogen plant. The installation of the voltage-stabilization plant was completed.

Electronic Laboratory

The old camp casino has been taken over temporarily as an electronic laboratory. A new casino has been built in the old camp.

Airstrip

The Pelícano airport was finished and approved for operations by the Board of Aeronautics in the month of July. The 1,200 m long and 30 m wide runway was made of a compound of clay which has been compacted by a treatment with water and tightened with a vibrator roller, which resulted in a very hard and clean surface.

Roads

Much maintenance was required on the road between Pelícano and La Silla, because of the heavy construction traffic. About 700 m of road at the observatory site were paved with cold asphalt-cement.

Vitacura Headquarters

Various areas were paved and some related gardening work was undertaken. A gasoline installation with a capacity of 24,000 litres was completed.

ADMINISTRATIVE MATTERS

The departure of two more staff members holding key positions in Santiago and on La Silla continued to create serious problems in the Administration. Continuity in the most important matters could only be ensured through prolonged visits to Chile by the administrative staff from Hamburg. Since, at the same time, the tasks of the central administration in Hamburg had also to be maintained, these efforts could only be concentrated on the most serious problems and could not lead to a permanent improvement of the local administration. This showed up the difficulties encountered by a small administration in taking over additional tasks at different locations, since e.g. the assignment of staff members from Europe to Chile or, in Chile, from Santiago to La Silla, immediately creates work problems in the European or Santiago establishments.

At the end of 1974 the situation was basically still unchanged, though new organizational schemes and recruitment measures are expected to bring some improvement around the middle of 1975, this also in connection with the plans for re-structuring the ESO establishment in Chile.

The Multilateral Protocol on Privileges and Immunities for ESO in Europe, which has been developed by a working group of the ESO Council in 1973, was signed by four countries during 1974. The remaining signatures and the ratification are expected for 1975. It will enter into force after ratification by at least three member states, providing then also the formal basis for the introduction of a system of internal taxation of ESO international staff salaries.

The activities of the Personnel Services in 1974 were again concentrated on the Staff Rules and Regulations for international staff, which, following a general revision in CERN, were also modified. This phase came to an end in June 1974 when the ESO Council approved the resulting changes in the previous Rules and Regulations.

In addition, the Personnel Services undertook in early 1974 a general review of the salary situation of ESO local staff in Chile, which, mainly through the development in the Chilean economy during the last years, appeared to be unsatisfactory.

Some immediate measures, including a new salary table introduced early in 1974, were followed by a comprehensive job review which was undertaken at the end of the year and will be terminated in early 1975. It is expected that this

job review will not only provide a more complete basis for the grading of local staff but will also permit conclusions on the number of local staff required.

The Working Group of the Finance Committee, established in 1972 to review the ESO Financial Rules and Regulations, resumed its work in September 1974, basically agreeing to a revised version of the ESO Financial Rules which will be submitted for approval to the Finance Committee and the Council during 1975. It will be followed by the review of the more detailed Financial Regulations, also for later approval by the Finance Committee and Council.

The newly-appointed external auditor from the French Audit Court established his first contact with the Administration in Hamburg and Geneva, and a first visit to the ESO establishments in Chile was scheduled for early 1975.

The 1974 budget forecast presented in the Annual Report 1973 had in 1974 been increased by DM 1,336,000 to cover additional costs for the auxiliary construction programme in Chile and a second crane for the 3.6 m telescope construction site on La Silla. This additional amount brought the overall budget total 1974 to DM 38,667,000 and could incomewise be covered by unused funds still available from 1973. Thus it was not necessary to increase the contributions of the member states for 1974.

Budget Statement 1974

(in DM 1,000)

Expenditure

Budget Heading	Approved Budget	Transfers	Revised Budget	Expenditure (incl. commitments and unused credits carried over to 1975) for			
				Directorate Hamburg	Establishment in Chile	3.6 m TP Division Geneva	Total
1 Personnel	11,129	—	11,129	2,143	5,727	2,443	10,313
2 Operations	6,152	209	6,361	1,268	4,060	1,033	6,361
3 Capital outlays	18,439	1,600	20,039	30	4,377	15,432	19,839
4 Sky Survey Project	893	—	893	804	—	—	804
TOTAL EXPENDITURE	36,613	1,809	38,422	4,245	14,164	18,908	37,317
Reserve for cost variation	2,167	⁄ 1,809	358	—	—	—	—
GRAND TOTAL EXPENDITURE	38,780	—	38,780	4,245	14,164	18,908	37,317

Income

Budget Sub-heading	Estimate	Actual (incl. receivables)
90 Contributions from member states	30,000	30,000
91 Unused appropriations from previous years	7,242	7,242
94 Sale of Sky Atlas	591	116
95 Miscellaneous	947	2,794
TOTAL	38,780	40,152

Accumulated Expenditure up to December 31, 1974

(in DM 1,000)

Description		
1 Personnel		40,731
2 Operations		26,167
3 Capital outlays		
(a) Sites, buildings, equipment	34,030	
(b) Astronomical instruments, auxiliary and test equipment	11,310	
(c) Architects and consultants	5,458*	50,798
4 Astronomical and meteorological activity, South Africa		2,024
5 3.6 m Telescope Project		48,045
6 Sky Survey Project		2,018
7 Unforeseen		342
TOTAL EXPENDITURE UP TO DECEMBER 31, 1974		170,125

* Commitments made up to December 31, 1970. From 1971 on, these expenses are included under the respective budget headings (capital outlays or operations).

Budget for 1975

(in DM 1,000)

Expenditure

Budget Heading	Directorate Hamburg	Establishment in Chile	3.6 m TP Division Geneva	Total
1 Personnel	3,280	8,576	4,302	16,158
2 Operations	1,671	4,711	1,443	7,825
3 Capital outlays	411	4,416	10,216	15,043
4 Sky Survey Project	736	—	—	736
	6,098	17,703	15,961	39,762
Reserves				
Reserve for cost variation (8 %)				3,181
TOTAL EXPENDITURE				42,943

Income

Budget Sub-heading	Estimate
90 Contributions from member states	32,000
91 Unused appropriations from previous years	5,599
94 Sale of Sky Atlas	591
95 Miscellaneous	4,753
TOTAL INCOME	42,943

Miscellaneous Statistics

(a) **Representation of nationalities**

In the accompanying table we present some information on the representation of nationalities among the international staff and on the share of telescope time among visiting astronomers based in the various member countries. The figure for the telescope time has been arrived at by assigning a weight 2 to the 1.52 m telescope, a weight 1 to the 1 m telescope and a weight 1/3 to the other telescopes. Because of the large annual fluctuations we also present the total over the last four years.

Representation of nationalities among the international staff and award of telescope time by countries

Member state	Number of employees	Number in %	Financial share in % (1974)	Observing time in %	
				1974	1971—74
Belgium	8	8.3	8.1	17	10
Denmark	7	7.2	4.7	10	6
France	26	26.8	33.3	28	36
Fed. Rep. of Germany	39	40.2	33.3	29	28
Netherlands	11	11.3	10.2	12	11
Sweden	6	6.2	10.4	4	9
Total	97				
Other	14				

(b) **Purchases**

The totals of purchase orders or contracts placed by the various establishments in the period October 1, 1973 to September 30, 1974, broken down by value, were:

	TOTAL	Chile	Hamburg	Geneva
Value below DM 10,000	2,028	1,228	422	378
Value DM 10,000 to 100,000	93	26	17	50
Value exceeding DM 100,000	10	3	—	7

COUNCIL, COMMITTEES, WORKING GROUPS

The Council of ESO met twice, on June 19/20 and on December 5/6. Both sessions took place in Hamburg (23rd and 24th meetings). The June session was concerned with the examination of candidatures for the position of Director-General as of January 1, 1975. The cooperation agreement with CERN for the 3.6 m telescope project was extended for a period of three years as of September 1, 1975. After the resignation of Mr. Alline, Dr. J. H. Bannier was appointed President of Council *ad interim.*

At the December Council session Professor Lodewijk Woltjer was appointed Director-General of ESO as of January 1, 1975 for a term of five years. A study group was constituted to examine the problems of a unified European headquarters for the Organization. The creation of a scientific group in close association with the TP Division was authorized. Its aims are to make studies on which programmes for the 3.6 m telescope may be based, to contribute to instrumental design and to foster cooperation in European astronomy.

The budget for 1975, which foresees a total expenditure of DM 42,943,000, was approved.

The Committee of Council met on March 26 in Geneva, on May 9 in Hamburg and on November 1 in Amsterdam.

The Finance Committee met on June 6 in Hamburg and on October 31 in Amsterdam. These meetings dealt with budgets, salaries, Staff Rules and Regulations and the up-dated financial plan for the 3.6 m telescope project.

The Working Group of the Finance Committee for the Revision of the Financial Rules and Regulations met on October 15 in Hamburg (2nd meeting). It examined a new draft of the Financial Rules.

The Scientific Policy Committee held two ordinary meetings, on June 18 and on December 4, and an extraordinary one on September 3. At these meetings ESO's interest in promoting infrared research was further discussed. In addition, at a joint meeting with the OPC on June 18, issues were discussed relating to fields of astronomy that have been comparatively neglected until now. At the

extraordinary meeting, held in conjunction with the regional meeting of the International Astronomical Union at Trieste, the SPC had an exchange of views with a few experts in the field, on the long-range perspectives in radio-astronomy in the southern hemisphere.

The Observing Programmes Committee met on June 17/18 in Hamburg and on December 2/3 at St-Michel-l'Observatoire. The main item for both meetings was the review of applications for observing time for periods 14 (October 1, 1974 to April 1, 1975) and 15 (April 1, 1975 to October 1, 1975). The overdemand again caused serious problems in reaching satisfactory allocations.

The second Users Meeting was held on August 30 in Geneva. Here members of the OPC and ESO staff met with visiting astronomers having experience with the work on La Silla. Possible improvements at La Silla were discussed in detail.

The Instrumentation Committee met on March 27/28 in Geneva and on October 15/16 at Lyons Observatory. The second meeting was combined with a visit to Creusot-Loire at St. Chamond (France) where the 3.6 m telescope could be seen in the first phases of assembly at the factory.

Apart from the items regularly figuring on the committee's agenda, such as reports on the status of operation of equipment in Chile and on the status of work for the 3.6 m telescope and its auxiliary equipment, the committee devoted considerable attention to the Schmidt telescope, the coudé auxiliary telescope, the prime-focus and Cassegrain adapters, the Cassegrain and coudé spectrographs, the 4(6)-channel photometer and the planning of an interconnected computer system on La Silla.

APPENDIX

List of Members of Council, Committees and Working Groups per January 1, 1975

Council

Belgium:	P. Ledoux M. Deloz / L. Poulaert
Denmark:	M. Rudkjøbing, B. Strömgren (President) P. A. Koch
France:	J.-F. Denisse A. Alline
Federal Republic of Germany:	R. Kippenhahn C. Zelle
The Netherlands:	H. G. van Bueren J. H. Bannier
Sweden:	P. O. Lindblad M. Fehrm

Committee of Council

B. Strömgren, President

J. H. Bannier	L. Biermann
J.-F. Denisse	G. Courtès
P. A. Koch	M. Deloz
P. O. Lindblad	G. Wlérick
C. Zelle	

Scientific Policy Committee

L. Biermann, Chairman

J. Lequeux	J.-C. Pecker
P. Mezger	P. Swings

The President of Council and the chairmen of the Finance Committee, the Instrumentation Committee and the Observing Programmes Committee have a standing invitation to attend the SPC's meetings.

Finance Committee

M. Deloz (Belgium), Chairman

Belgium:	L. Poulaert
Denmark:	H. Grage
France:	L. Amigues
Federal Republic of Germany:	C. Zelle
The Netherlands:	P. J. Fierst van Wijnandsbergen
Sweden:	M. O. Ottosson / B. Samuelsson

Instrumentation Committee

G. Courtès, Chairman

K. Bahner	D. J. Malaise
J. Borgman	P. E. Nissen
R. Cayrel	E. H. Schroeter
L. Delbouille	A. Wyller
Ch. Fehrenbach	

Observing Programmes Committee

Member	*Substitute*
G. Wlérick, Chairman	J. Lequeux
E. P. J. van den Heuvel	P. S. Thé
E. B. Holmberg	A. Elvius
L. Houziaux	C. de Loore
K. Hunger	Th. Schmidt-Kaler
M. Rudkjøbing	P. E. Nissen

Working Group for Financial Rules and Regulations

M. Deloz, Chairman

L. Amigues	H. Grage
P. J. Fierst van Wijnandsbergen	W. Sandtner
G. Friborg	

ADDRESSES

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The ESO Observatory on La Silla can best be reached by mail, telegrams etc. via Santiago Headquarters (address see above).

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