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EM. PROFESSORS, UNIVERSITY OF ATHENS

ASTRONOMY IN MODERN GREECE

ATHENS - GREECE
1978

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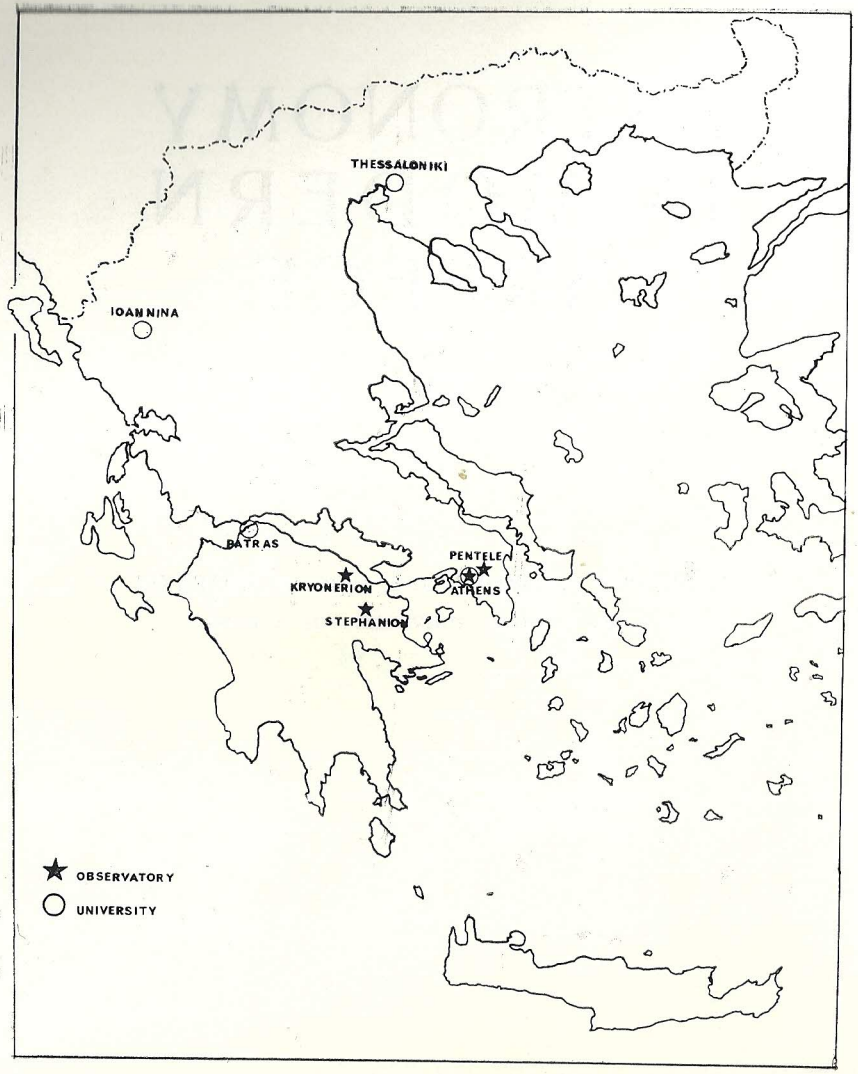


Astronomical Centers in Greece.

PREFACE TO THE FIRST EDITION

The cultivation of astronomy in Greece has a long and glorious tradition through the ages. The foundations of the study of the stars as a science were laid by the ancient Greek philosophers. Athens, Constantinople, Alexandria and Trebizonde were renowned for their flourishing schools where astronomy was taught by distinguished professors. Ptolemy's Almagest was translated by the Arabs and through them the Greek knowledge of cosmos from the Mediterranean coast of Africa reached Spain, while a flock of refugees after the fall of the Byzantine Empire was teaching the Greek theories of the cosmic system in the famous schools of Italy. The voice of the Byzantine professors was still heard in those Italian schools when Copernicus came in Padova to read the Greek authors in their original texts and bring again to light the heliocentric theory of Aristarchus of Samos as it is exposed by Archimedes.

After the capture of Constantinople by the Turcs in 1453 the Greek nation remained under the Turkish rule for about 400 years. During that long period of slavery astronomy was successfully studied and taught by several Greek professors at certain Greek schools in the Balkans and in Asia Minor.

The revival of systematic astronomical studies dates from the foundation of the University of Athens in 1837 and the erection of the National Observatory of Athens a few years later.

A short description of the institutions where astronomy is cultivated nowadays in Greece is given below.

Athens, June 1960 **S. P.**

PREFACE TO THE SECOND EDITION

The present edition circulating nearly two decades after the first one is enriched with material referring to the new Institutes and astronomical research Centers inaugurated in the mean time in this country. However many of those mentioned in the previous edition were supplied with modern instruments and new astronomical Stations with the respective staff. All these prove the increased interest in the cultivation of Astronomy in modern Greece.

Warm acknowledgements are addressed to the Institutes which have contributed several official data in connection with their activities."In this way this edition may give a comprehessive but accurate picture of the astronomical work carried out today in the Universities and the other research Centers of this country.

Athens, June 1978 **S.P. – D.K.**

I. THE NATIONAL OBSERVATORY OF ATHENS

History

The National Observatory of Athens was founded by a wealthy Greek merchant from Moschopolis of Northern Epeirus, Baron George Simon Sinas, General Consul of Greece in Vienna, Austria, at the suggestion of George C. Vouris, the first Professor of Astronomy, Mathematics and Physics in the University of Athens and first Director of the Observatory.

The corner stone was laid on June 26th 1842 by the King Otho I. The erection of the main building started in 1843 and it was completed in 1846. Observations begun in September 1847.

At that time the Observatory was out of town on the top of a hill, found in a site of great historical interest. As it comes out from an inscription carved on the rock, in the ancient times at that site there was a Temple dedicated to the Nymphs. The so called «Hill of Nymphs» is situated in the quarter of Theseion to the NW of the Acropolis and the Areios Pagos, where St. Paul for the first time had preached Christianity to the Athenians. At a short distance southwards is the hill of Pnyx, where in the 5th century B.C. Meto the Athenian astronomer was conducting his observations not very far from the place occupied now by the dome housing the 40 cm Doridis refractor.

These days the Observatory is in the center of a thickly inhabited region developed by the tremendous extension of the capital especially after the two World Wars

In order to avoid the unfavourable observing conditions created under these circumstances a new Astronomical Station was inaugurated in 1937 at Pentele, about 19 km out of Athens— (see below).

The National Obseratory of Athens is accessible by car and by bus No 9 from Omonia Square, or by bus No 16 from the Constitution Square. In both cases the end station is Theseion Square. From there a well paved road (Demetrius Eginitis road), a side

road of the Avenue of Dionysios Areopagitis, is leading to the entrance of the Observatory.

The first principal instruments were also supplied by Baron G. S. Sinas. Those are the following:

a) Starke - Fraunhofer Transit Circle of 10 cm.

b) Ploessl Equatorial Refractor of 15 cm.

c) One Berthoud mean time clock and one Kessel sidereal time clock.

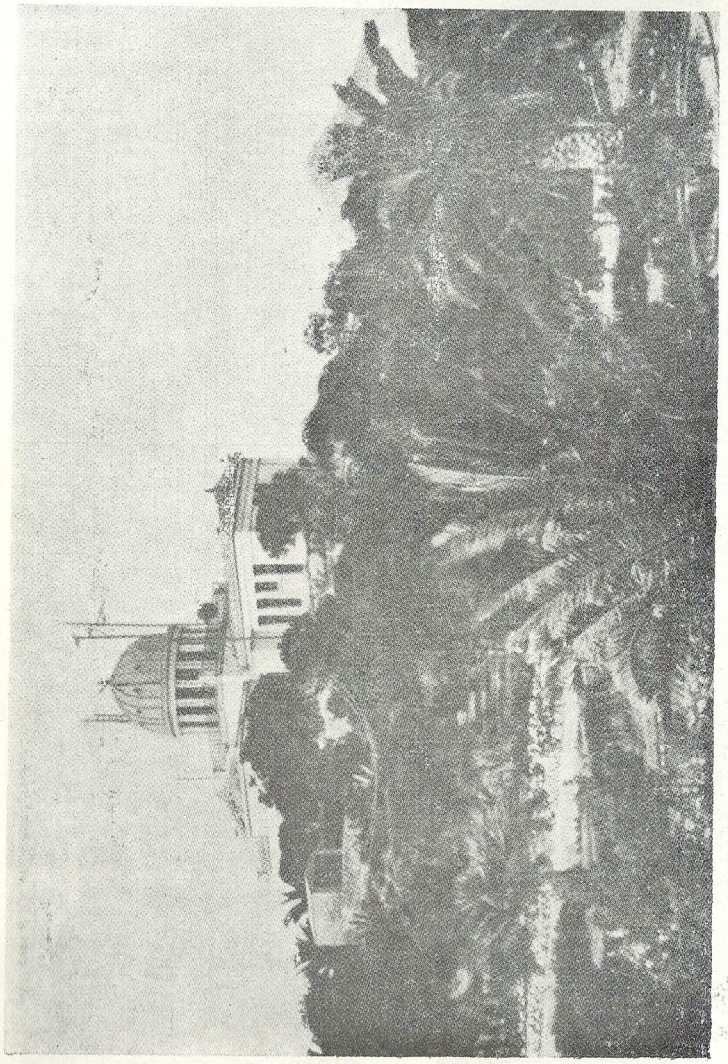
d) Five small telescopes and

e) A complete set of meteorological instruments.

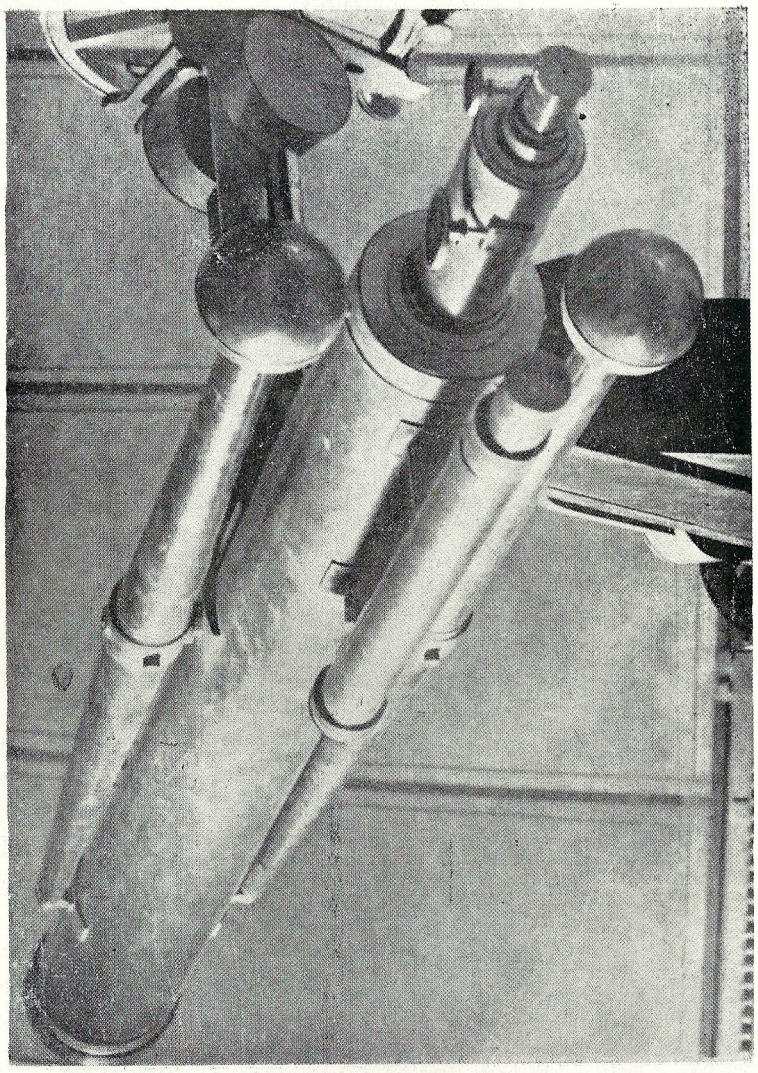
In spite of several difficulties Professor G. C. Vouris left a considerable amount of scientific work most of which is published in the Astronomische Nachrichten (1849 - 1853). He determined the geographical coordinates of his Observatory, he made a great number of meridian observations of stars, especially of southern declination and he confirmed the variability of the proper motion of Sirius detected by Bessel. Between 1848 and 1851 he was busy with observations of position of Neptune, of the asteroid Irene and of Mars. He also published a memoir on the climate of Athens.

After the retirement of Professor G. C. Vouris in 1855, owing to incurable illness, the direction of the Observatory was temporarily entrusted to J. G. Papadakis, Professor of Mathematics in the Universiry of Athens, but in 1858 Simon George Sinas, the son of Baron G. S. Sinas, selected a German astronomer, Johann Friedrich Julius Schmidt and appointed him Director of the Observatory of Athens.

Julius Schmidt availing himself of the proverbial clarity of the Athenean sky contributed a considerable number of observations of Sun spots, Comets, Minor Planets, Meteors and Variable Stars, some of which were discovered by him. His topographic map of the Moon with the accompanying descriptive volume, both published by the Prussian Academy, embody the outcome of 34 years of observations. J. Schmidt made also a long series of meteorological, hypsometrical and geophysical observations. His whole work was published in German in two volumes under the title «Publikationen der Sternwarte zu Athen», as well as in the Astronomische Nachrichten.

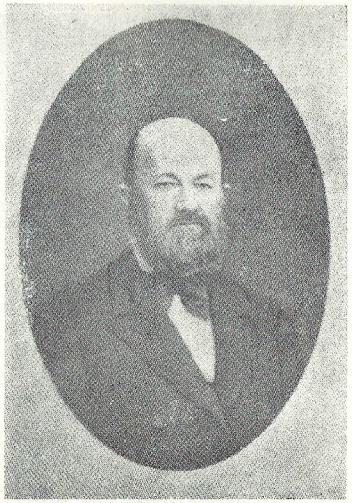


The National Observatory of Athens.



The 15 cm G. Sinas refractor by Ploessl.

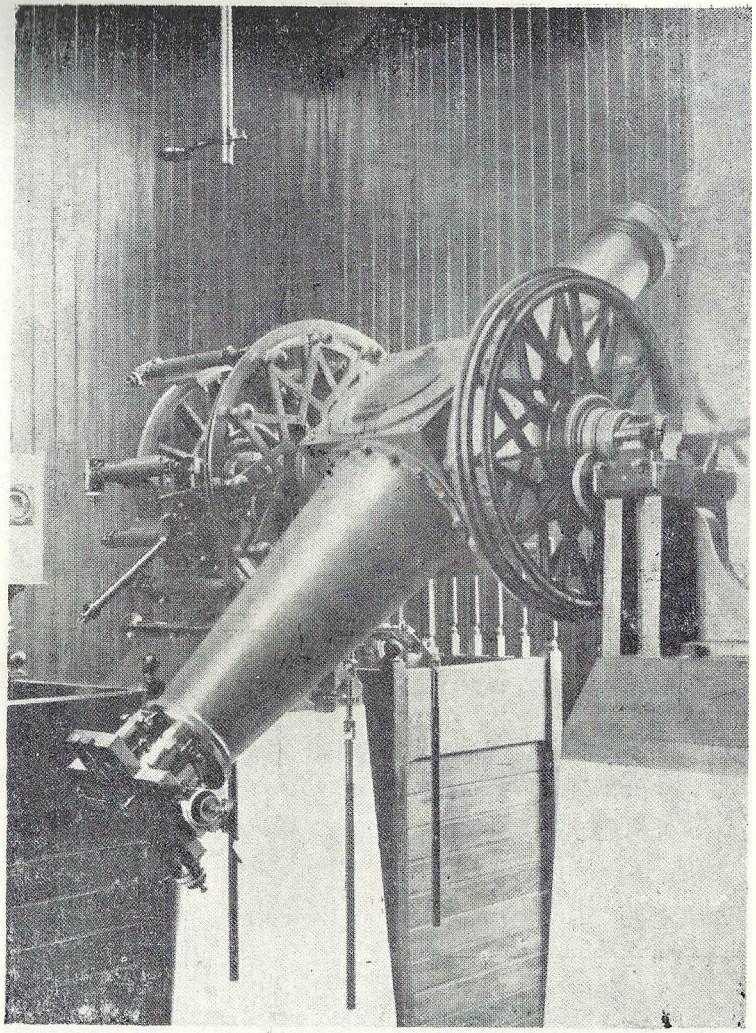
G. VOURIS
(1790 - 1860)



J. SCHMIDT
(1825 - 1884)

D. KOKKIDIS
(1840 - 1896)

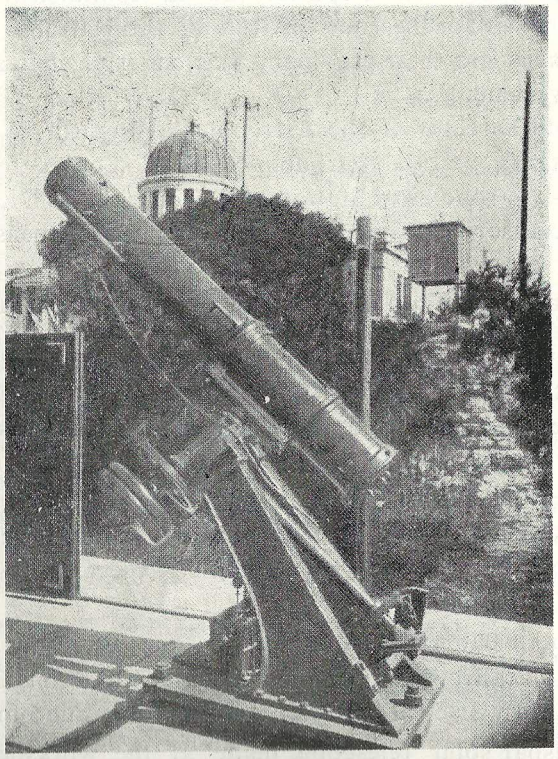
D. EGINITIS
(1862 - 1934)



The 15 cm A. Syngros meridian circle
by P. Gautier.

After the death of J. Schmidt in 1884 his collaborator Demetrius Kokkidis, Professor of Astronomy in the University of Athens, took charge of the Observatory up to June 1890, when Demetrius Eginitis was nominated Director by the Greek Government. Under his direction the Observatory was completely reorganized. By a special law the Observatory was divided into three Sections: Astronomical, Meteorological and Seismological. The existing net of Meteorological and Seismological Stations was extended to cover all the provinces of Greece. A scientific library, which now contains more than 50.000 volumes, was established, several new buildings were erected and new instruments were obtained through generous gifts.

Most of the scientific work carried out under the direction of Professor D. Eginitis is contained in the 12 volumes published by him in French under the title «Annales de l' Observatoire National d' Athènes». He also published several papers in the Comptes Rendus de l' Académie des Sciences, Paris, in the Astronomische Nachrichten, in the Monthly Notices of the R.A.S. etc.



The 20 cm C. Ionidis refletor by Browning.

A. THE ASTRONOMICAL INSTITUTE

After the death of Professor D. Eginitis in 1934 several persons took charge of the Obsvervatory until a new law was passed in 1942. By that law the National Obsvervatory was divided into three Intitutes: Astronomical, Meteorological and Seismological. Through an amendment of the same law in 1955 a fourth Intsitute, the Ionospherical, was added. Each one of the four Institutes comes under the direction of the Professor holding the respetive chair in the University of Athens.

In conformity with a special law an Administration Board of five members for the four Instituts of the National Obsvervatory of Athens and their provincial Stations is periodically named by the Government.

Actually Director of the Astronomical Institut as well as of its two Stations, viz. the Astronomical Station of Pentele and the Korialenios Astronomical Station of Kryonerion, is Dr. G. Contopoulos, Professor of Astronomy, University of Athens.

a) Instrumental Equipment and actual program of work

In addition to the aforesaid outfit presented by Baron G. S. Sinas, most of which is now of rather historical value, the following are the most important astronomical instruments obtained since 1896:

1.—Visual equatorial refractor of 40 cm aperture and 5 m focal length made by P. Gautier, Paris, being a gift from D. Doridis fund. It is fitted with a set of eye pieces, a filar micrometer and a spectroscope.

2.—Equatorial reflector of 20 cm aperture and 2 m focal length made by Browning, London, being a gift from C. Ionidis. It is fitted with a set of eye pieces and a filar micrometer.

3.—Trispar solar telescope, made at the workshop of the Astronomical Institute.

4.—Two Hα and one K filter made by Halle Optical Co,

Berlin. The passband of these filters is 0,5 A°. A line shifter permits a shifting of ±1 A° from the core of each line.

5.—Transit circle of 15 cm aperture and 2 m focal length made by P. Gautier, Paris, being a gift from Andrews Syngros (no more in operation).

6.—Transit instrument of 9 cm aperture made by Troughton and Simms, London. It is fitted with a self recording micrometer. This instrument is on indefinite loan from the Dominion Observatory Ottawa, Canada, to the Department of Astronomy of the University of Athens and is installed in the gardents of the National Observatory next the Transit Circle (for educational purposes).

7.—One sidereal clock, one chromometer and a chronograph, all made by Fénon, Paris, from the A. Syngros fund.

8.—One sidereal clock of constant pressure made by Clemence Riefler, being a gift of Mr. Bodosakis Athanasiadis, Chairman of the Powder and Cartridge Factory, Athens.

9.—One chronograph made by H. Wetzer, Germany.

10.—Two sets of radio receivers for time signals.

11.—One Hartmann visual microphotometer and two Dallmeyer short focus cameras of 5,5 cm aperture and 34 cm focal length on loan from the Dominion Observatory Ottawa, Canada.

12.—One polarimeter being a gift from Dr. Audouin Dollfus of the Paris - Meudon Observatories.

13.—One apparatus for measuring astrographic coordinates made by Charles Ridell, Williams Bay, Wis., U.S.A.

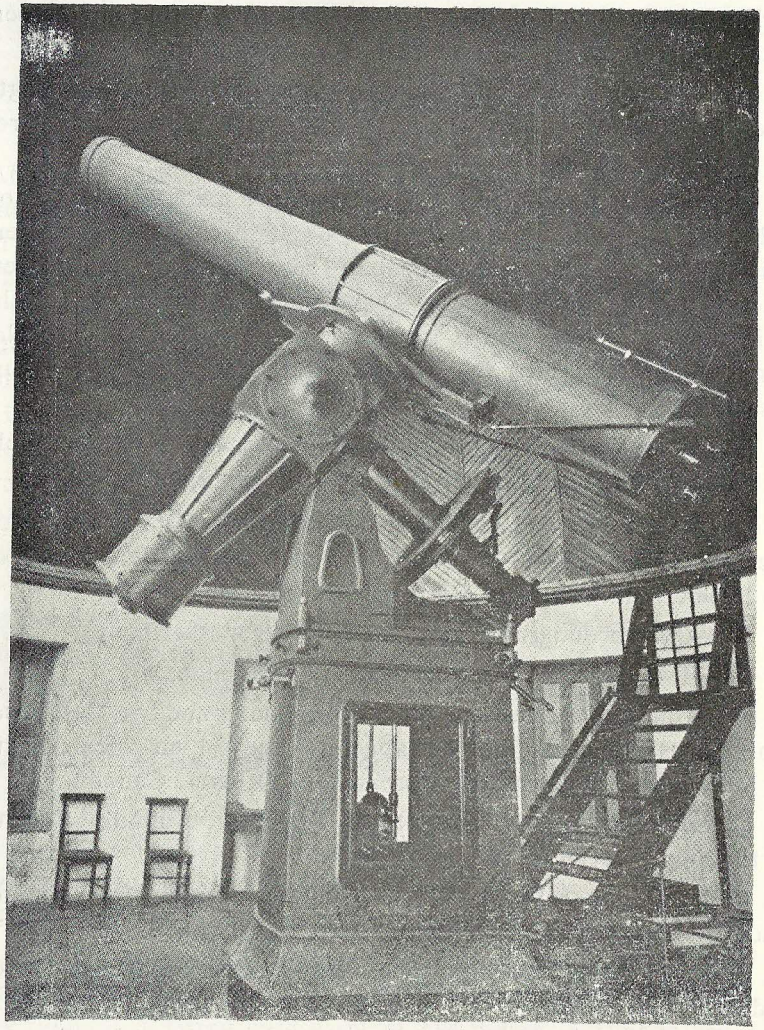
14.—One Yerkes - Schmidt flat field camera F/0,8 made by C. Ridell.

15.—One Fecker - Ross wide angle lens of 25 cm aperture made by J. W. Fecker, Pittsburg, Pa, U.S.A.

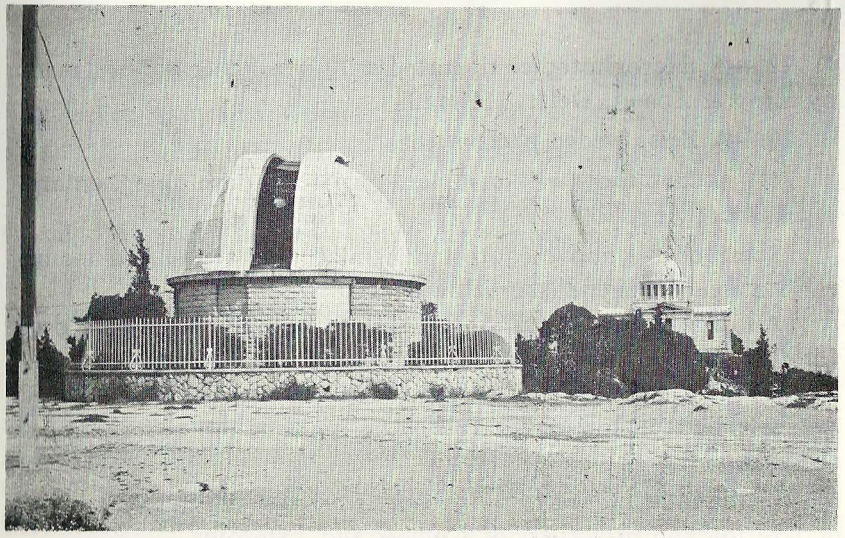
16.—One Bruce astrograph of 25 cm aperture, a gift from the Yerkes Observatory of the University of Chicago, Ill. U.S.A.

17.—Several scientific calculators.

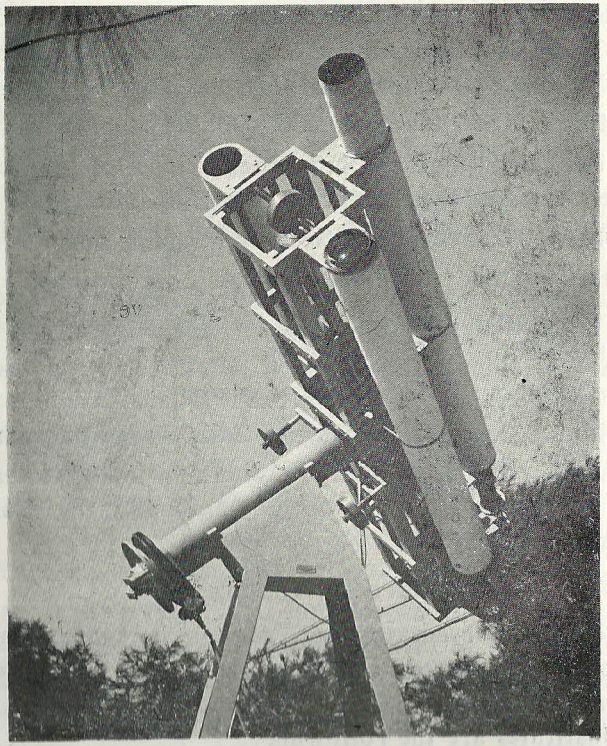
18.—Several small portable telescopes, chronometers and accessories,



The 40 cm D. Doridis refractor
by P. Gautier.



The Dome of the 40 cm Doridis refractor.



The trispar solar telescope.

19.—A microphotomer operated with Moll thermopiles made by Kipp & Zonen, Delft, Holland.

20.—A Zeiss wedge photometer.

21.—A dark room with complete outfit for developing, enlarging and copying.

Some of the above equipment is also used at the Astronomical Station of Pentele (see below).

An engineering workshop is enriched with the necessary tools for the repairs or constructions of several instruments.

Routine work, pertaining to Positional Astronomy and Astrophysics, comprises the following items of our observational activities.

1.—Equatorial observations (visually) for the determination of position and brightness of Comets and Asteroids.

2.—Observations of occultations of stars by the Moon (visually and photoelectrically) on the basis of predictions kindly supplied by H. M. Nautical Almanac Office, I.O.T.A. Chicago, Ill. and U.S. Naval Observatory, Washington, D.C.

3.—Micrometric observations of Double Stars.

4.—Visual and photographic observations of the chromospheric phenomena of the Sun through the Halle filters (see below).

5.—Observations of Long Period or Irregular and Flare Stars.

6.—Selenographic and Planetographic observations.

7.—Astrographic observations through a yellow filter by means of the 40 cm Doridis refractor.

8.—Polarimetric observations of planets.

9.—Visual photometry through a Zeiss wedge photometer.

10.—Photographic photometry of Short Period Variable Stars with the Dallmeyer short focus cameras and the Hartmann microphotometer.

b) Cooperation with foreign Institutes

The National Observatory of Athens is cooperating with several foreign Institutes interested in special items of our observational activities.

Such Institutes are the following:

Smithsonian Astrophysical Observatory, Cambridge, Mass. U.S.A. for Asteroids, Comets, Novae, Minor Planets etc.

H. M. Nautical Almanac Office, Herstmonsieux Sussex, Eng.

U. S. Naval Observatory, Washington, D.C. and I.O.T.A. Chicago for occultations of star by the Moon.

The American Association of Variable Star Observers (AAVSO) for Long Period, Irregular and Flare Stars.

The Solar Division of the AAVSO, Ramsey, N. Jersey U.S.A., *the Federal Observatory at Zürich*, Switzerland, *the Observatory of Meudon*, France, *the Fraunhofer Institute*, Freiburg, Germany, *the World Data Center «A»*. Boulder, Col. U.S.A. and *the World Data Center «B»*, Moscow, U.S.S.R., *Roma Observatory Osservatorio Astronomico Triest*, Italy, etc., for Solar work.

The Observatories of Meudon and Pic du Midi, France, and the *Lowell Observatory* Flagstaff, U.S.A., for the study of Major Planets.

The Royal Observatory of Edinburgh, the Department of Astronomy, University of Manchester and *the Observatory of St. Michel*, Haute Provence, France for astrophysical research.

c) Publications and Educational Program

Owing to the lack of funds the publication of the «Annales de l' Observatoire d' Athènes» was discontinued since 1931. In lieu a multigraphed «Bulletin of the Astronomical Institute» summarizing our running observational activities both at the Athens Observatory and the Pentele Astronomical Station was published in English at irregular intervals since 1950. That Bulletin was distributed free of charge to the Astronomical Observatories of the world interested in our observational subjects as above, on the basis of the international exchange scheme.

Last years the issue of that Bulletin was discontiuned. Instead all observations and research work carried out by the Institute are published in specialized foreign astronomical magazines or in monographs under the title «Memoirs of the National Observatory of Athens, Series I. Astronomy».

After an agreement between the University of Athens and the National Observatory the students of Physics and Mathematics who take courses of Astronomy in the third year of their studies have a free access to the astronomical instruments for their training in Practical Astronomy (in Athens and in Pentele).

Thoughout the year open house is held for anyone who wants to visit the Observatory. Reservations are needed only for looking through the 40 cm Doridis refractor. More than 3.000 persons per year are visiting the Observatory.

A flare taken by means of the trispar.

B. THE ASTRONOMICAL STATION AT PENTELE OF THE NATIONAL OBSERVATORY OF ATHENS

a) History of selection and study of the site

The Astronomical Station at Pentele was founded in 1937 by the Geodetic Commitee of the State on the top of the hill, named «Koufos», for the erection of a modern astrophysical observatory.

The idea for the establishment of such an observatory out of the capital was dictated several years ago by the fact that the observing conditions at the old National Observatory of Athens became gradually quite unfavourable for astrophysical research programs as a result of the tremendous expansion of the town of Athens all around the Observatory especially after the two World Wars.

Koufos (508 m) belongs to the mountain range of Pentelikon, the birth place of the renowned white marble, used in the ancient times for building the Parthenon, and is situated on the SW side of the highest summit (1109 m) of the mount.

The Station is at a distance of 19 km NE of the town of Athens. To reach it one has to take the «Old Pentele» bus, leaving from the Archaeological Museum every 20 minutes in summer or every half an hour in winter. After a 45 minutes ride visitors have to stop at «Haravghi» and from there they have to climb the hill on foot or by car. A well paved road constructed by the Army is leading up to the hill. Several worthseeing spots of historical interest, are to be found in the neighbourhood, such as the medieval Monastry of Pentele, founded in 1576 by St. Timotheus, bishop of Euripus, and the reconstructed palace with the tomb of a fervent philhellene French lady, Sophie de Marbois, Duchesse de Plaisance, born in Philadelphia, U.S. (3 Aug. 1785) and deceased in Athens, Greece (14 May 1854).

After the selection of the site some 100 acres of land were generously offered by the Ministry of Finance, Direction of Pu-

blic Estate, to the Geodetic Committee of the State for establishing a trial Astronomical Station.

The corner - stone of a small house for sheltering the observers and the first portable instruments was laid on the 4th July 1937.

The construction of a second building comprising four rooms, a dark - room and a room surmounted by an iron revolving dome for sheltering an equatorial refractor was completed in 1959.

The instrumental outfit of the Station was contributed by several Scientific Services represented in the Geodetic Committee of the State by their Directors, viz. the Laboratories of Astronomy and Physics of the University of Athens, the National Observatory of Athens, the Geographic Service of the Army, the Hydrographic Service of the Royal Navy etc.

The most important instruments supplied by the obove Services are as follows:

a) A 10 cm Zeiss heliograph with equatorial mounting, hour and declination circles, clock work, a set of 6 eye pieces, zenith, Herschel and Colzi prisms, eye end for binocular vision, eye end for the attachment of several magnifications, solar camera and moon camera with three double plate holders for each, projection screen, and a filar micrometer being a gift from the late Dr. J. J. Nassau.

b) A 7 cm Zeiss refractor with a strong iron azimuth stand and a set of 6 eye pieces, zenith prism and double vision eye end.

c) A 5 cm Watt's geodetic theodolite.

d) Two naval chronometers one of sidereal and the other of mean time.

e) A pair of Goerz prismatic binoculare 10×50.

f) A complete set of meteorological instruments.

The main object of the observations carried out by naked eye and through the instrumental outfit enumerated as above was the study of the prevailing local meteorological conditions as far as direction and force of the winds, humidity, changes of temperature during the day and the night, transparency of atmosphere, cloudiness and seeing are concerned.

As it resulted from the observational data, collected especially during the period 1946 - 1956, the site of Koufos fully justified our previsions regarding its suitability for the erection of a modern astrophysical observatory. The late Dr. Henry Norris Russell, Professor of Astronomy in the University of Princeton, U.S.A., who visited the Station in May 1938, summarized his impressions from the inspection of the site in his letter of May 21, 1938 which reads as follows:

Hôtel Grande - Bretagne
«Le Petit Palais»
Athens, May 21, 1938

It was with great interest that I visited yesterday the hill of Koufos near Pentele and examined the site which Professor Plakidis has chosen for the erection of the first building of a new Observatory.

In my judgment, the University of Athens is much to be congratulated upon Professor Plakidis' good judgment and success in securing so excellent a situation.

The present site of the National Observatory was excellent fifty years ago! But the great growth of the city has surrounded it with lights and with smoke and dust, so that it no longer fulfills the requirements of modern photometric and photographic observations.

The new site meets them admirably. Its distance from the city and its altitude of about 500 metres remove it from disturbance by smoke, dust and lights. The position of the hill on the southern side of Mt. Pentelikon is favourable. It rises above the currents of cold air which descend the mountain slopes in winter, but is far enough below the summit to escape interference by the clouds which may form on it.

The pin forest which clothes the hill is a great advantage. The larger observatories in the Western part of America have all been placed on wooden hills on mountains, since open ground is much more heated by the Sun in the daytime—with serious results from ascending air currents which persist into the night, and greatly impair the quality of the telescopic image.

The accessibility of the new site is of much importance. An excellent road leads to the foot of the hill, and a fairly good one to within a few hunderd meters distance from the top. This makes the instruments available for teaching as well as research. Students of the University can come out by motor omnibus quickly and at small expense, as can also members of the scientific staff who are teaching in the University.

From a wide acquaintance with Observatories in Europe and America I can say, without hesitation, that the hill of Koufos affords an excellent site for an observatory. Its distance from the city, its altitude, its wooded slopes and its accessibility are all highly favourable, and I have seen no disadvantages.

The area of 90.000 square meters, which I understand is now at the disposition of the Observatory is rather small, and it would be desirable if additional land could be obtained to protect the site from future encroachment. If this should be done an excellent location would be provided not for the present small observing station alone, but for a great Observatory, which would carry on the admirable traditions of Greek astronomy and powerful modern instruments extend and increase them. It is my earnesst hope that this possibility may soon be realized.

(Sd) Henry Norris Russell

The program of trial observations during the 20 years since the foundation of the Station contained the following items.

a) Meteorological observations at 8h, 14 h and 20h every day.

b) Visual observations of sun spots and other photospheric phenomena.

c) Visual observations of long period and irregular variable stars.

d) Occasional observations of solar or lunar eclipses and occultations of stars by the moon.

e) Observations of comets and shooting stars.

f) Observation of zodiacal light and visibility of Venus in daytime or stars in the twighlight.

g) Naked eye observations of stars in different regions of the sky for checking the seeing under various conditions.

The following are some of the data concluded from the above observations made by the late Dr. C. Chassapis (1957), assistant astronomer:

1) *Horizontal visibility.*—Objects up to a distance of 87 km may be seen at 8h a m. in 42% of the days of the year and at 14h in 38%. Visibility is very seldom reduced up to 10 km.

2) *Blueness of the sky in day time and blackness in the night.* A percentage of 68,8% of the cloudless days corresponds to a dark blue or blue day sky, while only 5,8% of the days the sky is whitish.

3) *Visibility of Venus in day time.*—It proves a high degree of transparency of the atmosphere permitting to distinguish the planet even when its angular distance from the Sun is between $25^0 - 30^0$.

4) As it comes out from the study of the *astronomical twilight observations*, its duration is 2m - 4m shorter than the theoretical. This proves the absence or the rareness of dust or other impurities in the atmosphere.

5) *Apparition of stars in the twilight.*—Sirius (α C Ma) is always visible 3m - 14m before sunset, while the apparation of 6th magnitude stars during the period of the maximum of the duration of the twilight fluctuates between 1h 31m in December and 1h 36m in June after sunset. During the minima of the twilight in March and September the respective time of apparition is 1 h 16m after sunset.

6) *The limit of magnitude of stars visible by naked eye* is as follows:

For	18,3%	of	nights	it is limited	to	6,1 mag.
»	75,1%	»	»	» rising	»	6,3 »
»	6,5%	»	»	» reaches	»	6,5 »

7) *The visibility of the zodiacal light* begins in the evening from middle of January and may last up to early April, covering a period of 82 - 91 days. Under exceptional conditions an absorption of the light of the 6th magnitude stars near the margin of the triangular zone is appreciable.

Its colour is constantly whitish or ashen towards the basis of the triangle without any other colour variations.

8) *Limit of star magnitudes through a telescope.*—Through a Zeiss refractor of 80 mm × 30 stars of 12,9 mag. are visible under exceptionally good conditions of visibility in the region of the zenith. At a height of 70° the magnitude usually accessible through the same refractor is 12,5.

9) *Weak points on the solar photosphere.*—Sun spot observations are carried out through a photovisual Zeiss refractor of 110 mm × 48. The constant coefficient k in the Wolf's relative number $R = k\,(10g + f)$ constantly remained smaller than unity, vis. as low as 0,65 due to the high transparency of the atmosphere which permits the observation of a great number of weak points in the regions of sun spots.

10) On the basis of 476 observations the following percentages were obtained for scintillation:

Scintillation with colour variations as low as		7,0 %
Plain scintillation	equal to	34,1 %
No »	reaching to	58,9 %

11) The quality of observations on the basis of a total number of 13.287 variable star observations is as follows:

12.317	observations	of I	class,	or	92,7 %
717	»	» II	»	»	5,4 %
253	»	» III	»	»	1,9 %

12) The percentage of the quality of 1980 sunspot observations is as follows:

Poor	237	observations, or	12 %
Fair	376	» »	19 %
Good	931	» »	47 %
Excellent	436	» »	22 %

13) *Wind.*—The prevailing wind is NNE. Only during the 7,8 % days in the year the force of the wind reaches 6 or more in the Beaufort scale. In such case the telescopic images become turbulent. Convection currents are very seldom.

14) *Cloudiness* —Its mean annual value is 5,0. During a two years period only on 153 nights it has not been possible to observe before midnight owing to clouded sky. For the same reason solar observations were not possible for 58 days in one year.

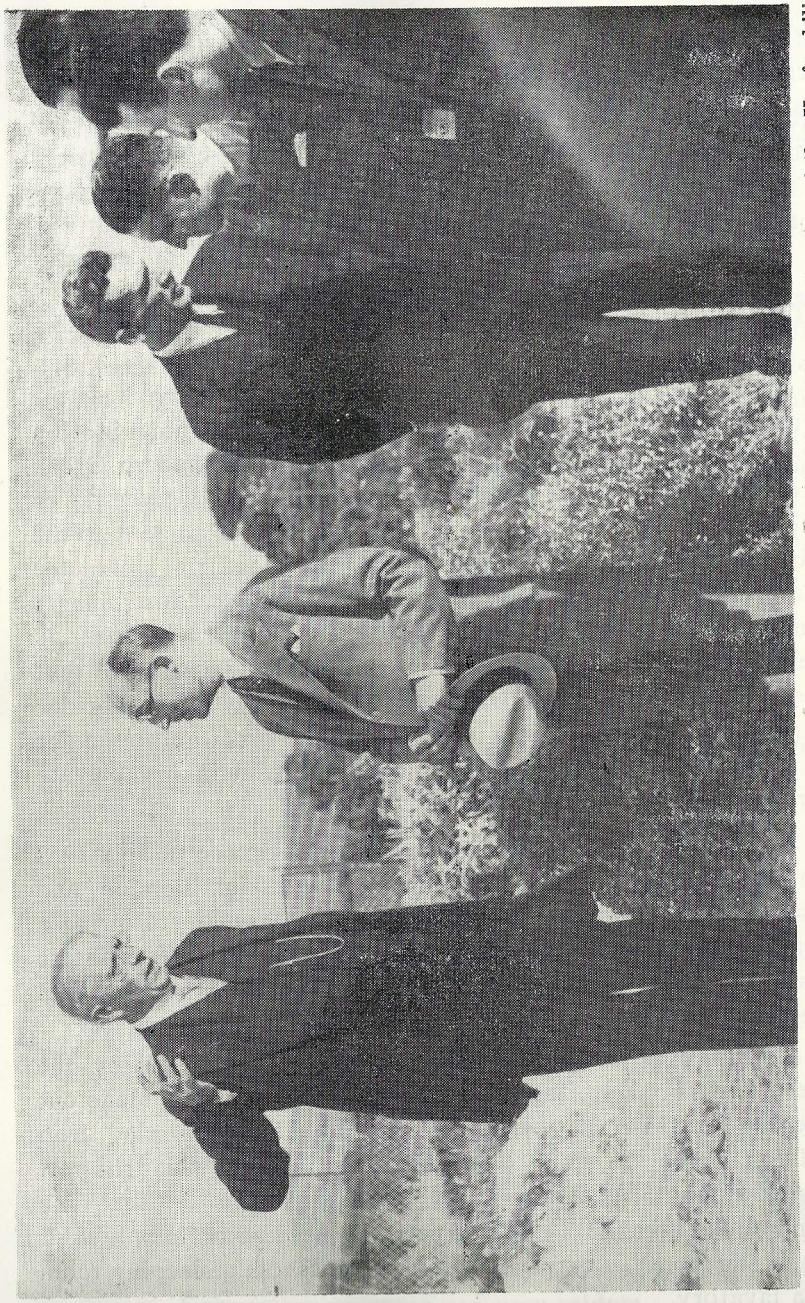
The above data argue in favour of the selected site as suitable for the erection of an Astrophysical Observatory.

b) The 63 cm R.S. Newall Refractor

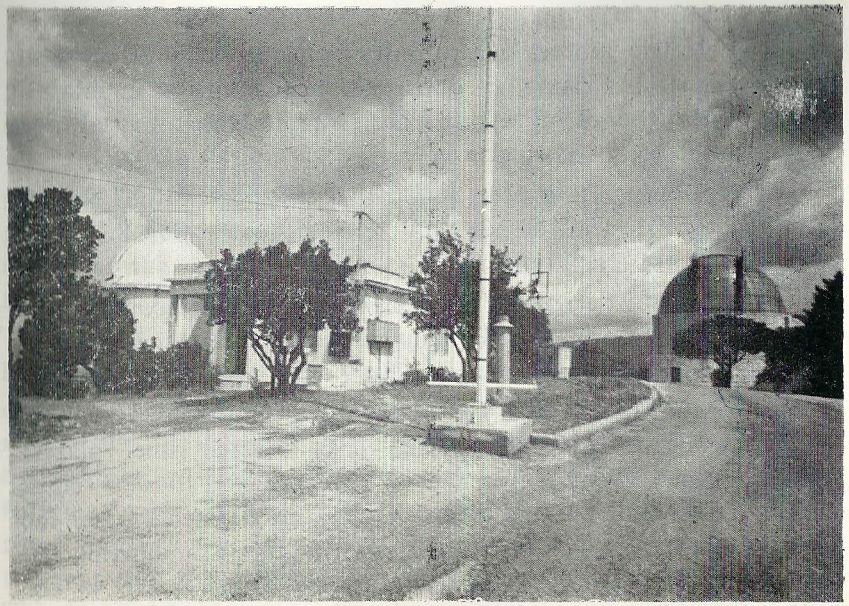
An important event which happened in 1956 marked the beginning of a new era in the history of the Astronomical Station at Pentele and more generally in the history of the modern Greek Astronomy. That was a generous gesture of the University of Cambridge, England, consisting in their decision to present to the National Observatory of Athens the 63 cm equatorial refractor made in 1869 by the famous factory of astronomical instruments Thomas Cooke & Sons of York for R. S. Newall, Esquire, of Gateshead, a fervent friend of Astronomy, who in 1890 offered that powerful instrument to the University Observatory of Cambridge Eng , trusting that in this way it might be more profitably used for the progress of the science than by keeping it in his private Observatory at Ferndene.

The Newall refractor was transported to Greece in July 1957 at the expenses of several Greek shipowners of London and reassembled at Pentele by the Royal Naval Arsenal following a decision of the Geodetic and Geophysical Committee of the State to assign the Astronomical Station and its land to the National Observatory of Athens.

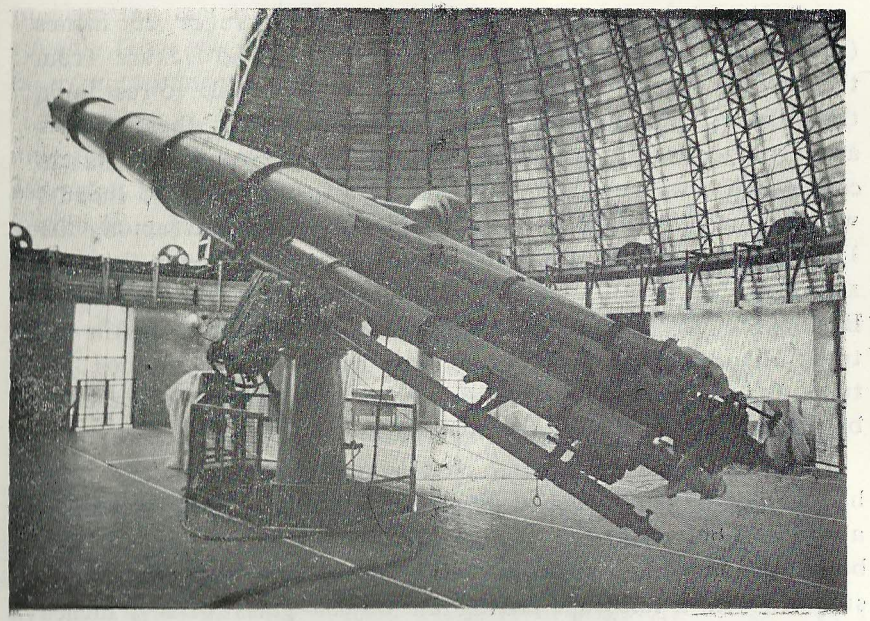
A fund of about 3.000.000 Drs. was offered (1956) by the Government for sheltering the instrument. The building, made out of Pentelic marble, is surmounted by an aluminum clad iron revolving dome of 16 m diameter, with a 4 m wide shutter. A rising floor is provided with a vertical stroke of 5 m. The ground-floor comprises two rooms to be used as offices, a dark room, a storeroom, a carpenter shop, a workshop, a sleeping room and a lavatory.



Prof. H. N. Russell with Prof. S. Plakidis and some members of the Geodetic Committee on the top of the Koufos hill.



The dome (right) of the 63 cm Newall refractor and (left) the dome of the 31 cm Star line reflector.



The 63 cm Newall refractor.

The electric motors or opening of closing the shutter, rotating the dome, and rising or lowering the floor are manipulated from a control board on a four wheeled table which may always be within the reach of the observer.

The following is an abstract of a description of the Newall refractor published in the Monthly Notices of the R.A.S., (Vol. XXX, No 4, p. 112).

«The general design and appearance of the telescope is the same as that of Cookes well-known equatorials on the German principle improved; but the extraodinary size of all the parts has necessitated the special arrangement of most of them.

The length of the tube, which is of riveted steel plates, including dew-cap and eye-end, is 32 feet, and it is of cigar shape; the diameter of the object-end being 27 inches, and the center of the tube 34 inches. The cast-iron pillar supporting the whole is 19 feet in height from the ground to the centre of the declination axis, when horizontal; and the base of it is 5 feet 9 inches in diameter. The trough for the polar axis weighs alone 24 cwt., the weight of the whole instrument being nearly 9 tons.

The object-glass has an effective aperture of 25 inches (nearly). In order as much as possible to avoid flexure from the unequal pressure of the object-glass, it is made to rest upon three fixed points in its cell, and between each of these points are arranged three levers and counterpoises round a counter-cell, which act through the cell direct on to the glass, so that its weight in all positions is almost equally distributed among the 12 points of support, a slight excess being thrown upon the 3 fixed ones. The focal length of the object-glass is 29 feet. A Barlow lens is arranged to slide on a brass framework within the tube. The hand is passed through an opening in the side of the tube, and by means of a handle attached to the cell the lens may be pushed into or out of the cone of rays.

Attached to the eye-end of the tube are two finders, each having an object-glass of 4 inches aperture; they are fixed above and below the eye-end of the main tube, so that one may be readily accessible in all positions of the instrument. It is also supplied with a telescope having an object-glass of $6\frac{1}{2}$ inches

aperture. This is fixed between the two finders, and is for the purpose of assisting in the observations of comets and other objects for which the large instrument is not so suitable...

The driving clock (weight driven) is in the lower part of the pillar... The instrumment being nicely counterpoised a very slight power is required to be exerted by the clock through the tangent screw, on the driving wheel (7 feet diameter) in order to give the necessary equatorial motion.

The declination axis is of peculiar construction, necessitated by the weight of the tubes and their fittings, and corresponding counterpoises on the other end, tending to cause flexure of the axis. This difficulty is entirely overcome by making the axis hollow, and passing a strong iron lever through it, having its fulcrum immediately over the bearing of the axis near the main tube, and acting upon a strong iron plate rigidly fixed as near the centre of the tube as possible, clear of the cone of rays. This lever, taking nearly the whole weight of the tubes etc., of the axis, frees it from all liability to bend.

The hour-circle on the bottom of the polar axis is 26 inches in diameter, and is divided on the edge and on the face and read roughly from the floor by means of a small diagonal telescope or by microscopes».

For the convenience of the observer several alterations and modifications were effected. Formerly a rough motion in right ascension by hand was arranged for by a system of cog-weels moved by a grooved wheel and endless cord at the lower end of the polar axis, so as to enable the observer to set the instrument approximately in right ascension by the aid of the diagonal telescope. An electric motor was substituted for the old system as above to give quick motion to the telescope. Two automatic switches are provided at both ends of the driving sector.

Another electric motor was also installed, in the place of the old system with endless cord to secure slow motion of the telescope while guiding for astrographic work or micrometrical measurements.

The old weigh driven clock work was replaced by a Zeiss new one operated with a synchronous electric motor.

Electric illumination was also provided for the hour and the declination cicles, the field of the main and the guiding telescopes as well as for any accessory that may be attached at the eye end, such as the filar or the double image micrometer etc.

The Newall Refractor is fitted with the following accessories : a) A series of 10 Zeiss eye pieces, b) A zenith prism, c) A Herschel prism, d) A double image micrometer, e) A polarimeter, f) A Zeiss wedge photometer, g) A Photoelectric photometer, h) An astrographic camera with three double plate holders for plates of 9×12 cm, i) A photographic camera for Major Planets, j) 3 micrometers etc.

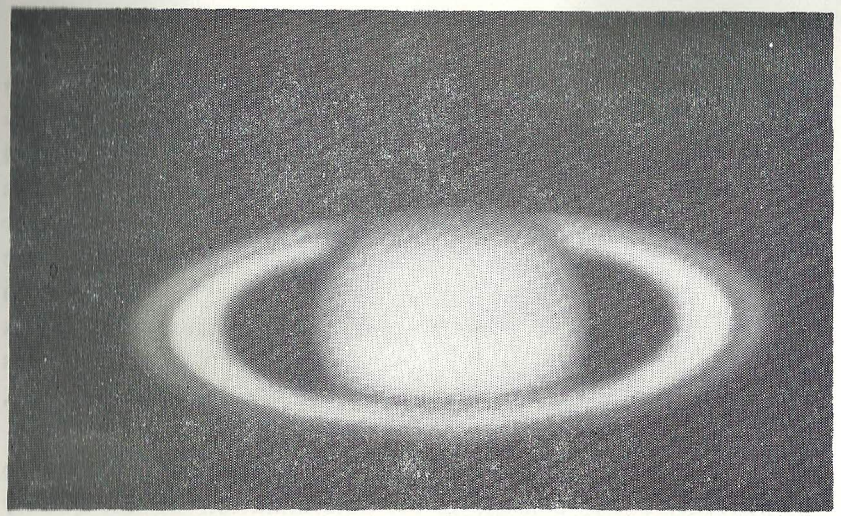
Moreover all the accessories of the Zeis 80 and 110 m/m refractors may be fitted on the eye end of the main or the guiding telescope by means of proper adapters.

c) Research work

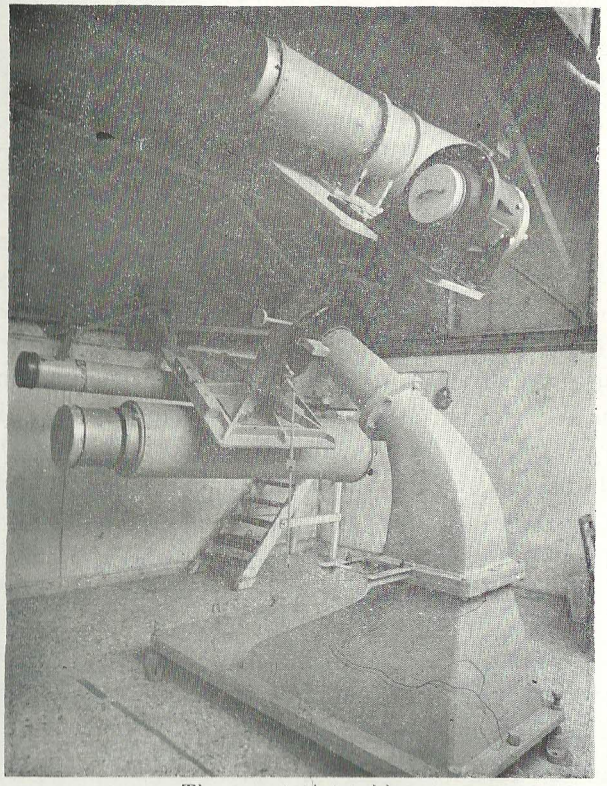
The research work done at the Astronomical Station of Pentele belongs to the following fundamental types, covering topics which cannot be anymore conducted in the Athens Observatory owing to unfavourable observing conditions created by the expansion of the capital.

1) *Positional astronomy.*—The object of this branch is to determine the exact position of celestial bodies by visual observations and by photographic means. Under this heading comes the observation of comets, asteroids, double stars and occultations of Stars by the Moon, as well as micrometric measurements of the diameters of the Major Planets and the diameters of their Satellites, study of the details of the planetary surfaces, visual tracking of artificial satellites etc.

2) *Photometry.*—This is the technique concerned with the precise measurement of the quantity of light which reaches us from a given star or stellar system. To this effect visual, photographic and photoelectric methods are used. In the first case the star is compared with another star of known brightness or with an artificial star produced by a precisely calibrated standard lamp.



Photograph of Saturn through the 63 cm Newall refractor.



The equatorial table.

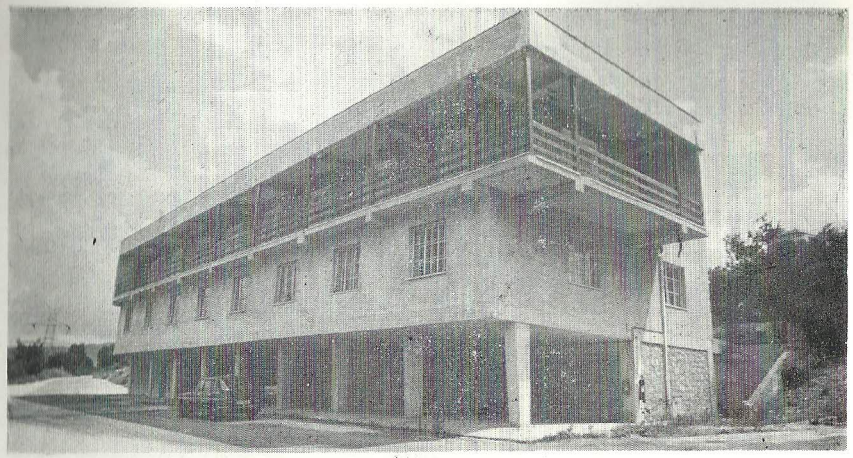
In the second, the amount of blackening of the photographic plate by the radiation of the star is measured by means of auxiliary equipment, the so called photographic protometer. In the third the light of the star is converted into electrical current which is measured directly at the telescope through special devices or recorded by self recording apparatus. The data obtained by these different methods, or by a combination of them, gives information about the brightness of stars, the variations of these brightnesses and the colour of the stars. Integration of these data yields information which leads to the determination of the temperatures, distances and masses of individual stars.

3) *Polarimetry*.—The aim of this new methods of study to the heavenly bodies consists in the determination of the quality and the quantity of polarized light emited by the stars and more particularly by the Moon and the Major Planets. The data of such a research will help in gathering useful information on the nature and the constitution of the lunar surface as well as of the details of the planetary configurations.

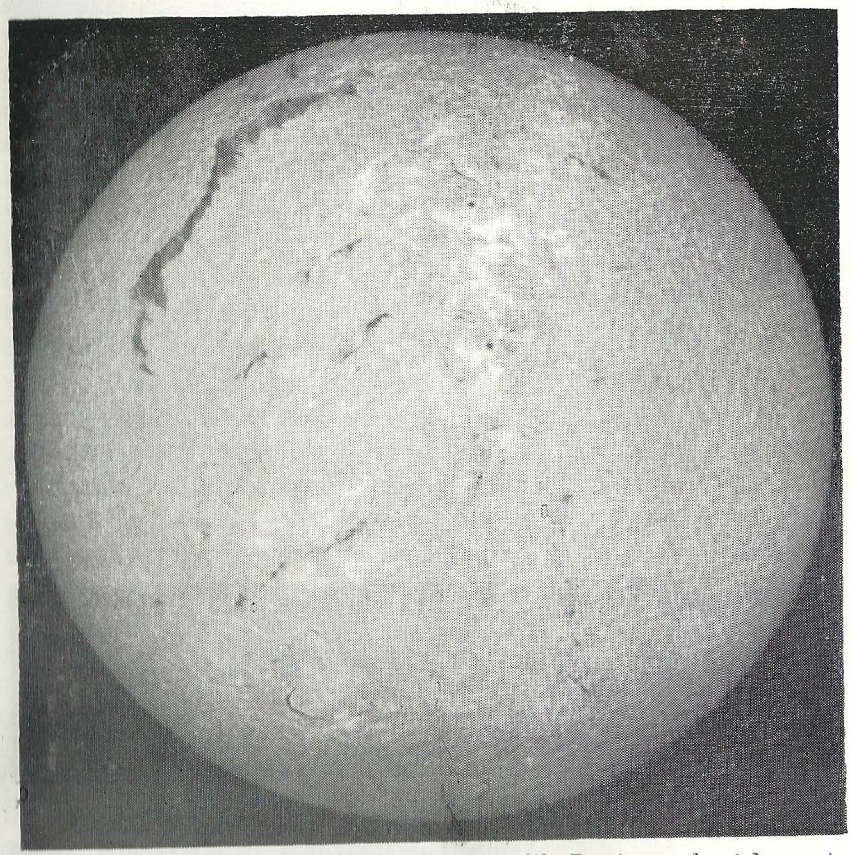
d) Further Activities

During the period 1965 - 1971 two building were erected. The first of them is housing the officies of the staff, library, a room for keeping several intruments, a dark room and the living quarters of night observers and visiting astronomers either Greek or foreigners. A hall is also provided for scientific meetings, seminaria and lectures for students of the University of Athens trained in Practical Astronomy. In the second building the Razdow solar telescope is intalled as well as the solar radiotelescope.

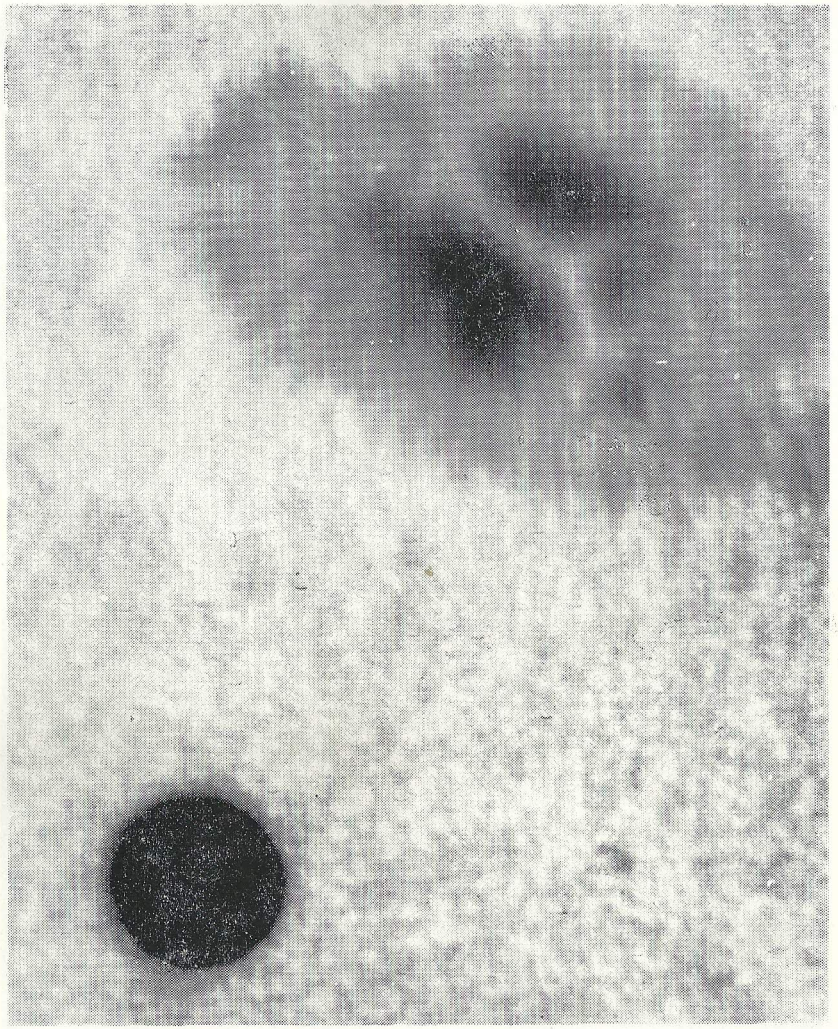
In addition during 1972 a special shelter with sliding roof was made for housing an equatorial table. The heavy part of its mounting was made free of charge by the Naval Arsenal in Salamis while the rest of the instrument was completed in 1964 by Mr. E. Sigalas and Ch. Burdas, technicians of the Observatory under the guidance and supervision of Prof. S. Plakidis and assistant J. Focas. As a guiding telescope is used a 16 cm refractor parallel to which the Yerkes - Schmidt Camera f/0,8 and the two wide angle astrographs Fecker - Ross and Bruce - Petswall are



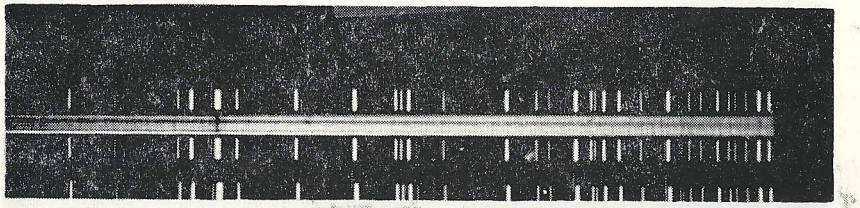
The building for the officies of the staff, library, a dark room, the living quarters of night observers etc.



A great chromospheric filament (9 - 6 - 1971 with Razdow solar telescope).



Transit of Mercury on 5-5-1970 (63 cm Newall refractor).



Spectrum of a CMi (Procyon) taken on April 12, 1978, with the Richardson spectrograph (63 cm Newall refractor).

attched. A Zeiss electrical drive was fitted in 1973. The first testing observations were carried out by the staff of the Department of Astronomy of the University of Athens.

In the mean time the road making in the campus, the fencing of the whole ground and the house of the guardian were completed. Provision was also made for security zones and other measures, for protection of the buldings and instruments against fire.

In addition to the aforesaid outfit, the folloving are the most important astronomical instruments obtained last ten years (1968 - 1978).

1) A small, off-axis, light weight spectrograph (Richardson spectrograph) designed especially for the Newall refractor by Dr. H. Richardson and costructed (1973) at the optical shop of the D.A.O., Victoria, B.C., Canada. The dispersion of the instrument is aroung 26 A/min in the blue-red region. The electronics necessary for the operation of this instrument include a light integrator and indicator, of D.A.O.'s own special design, which was supplied with the spectrograph, as well as two voltage supply units (one for 0-1600 V - Hewlett-Packard Model No 6515 A and one for 0-320 V - Hewlett-Packard Model No 2909 B) which were bought by the Observatory. The special working case for the spectrograph was made at the Dept. of Astronomy of the University of Athens by Dr. P. G. Laskarides, under the financial assistance of the National Research Council of Greece, which also supplied 500 Kodak IIaO spectroscopic plates. A low voltage supply unit was constructed at the same Department where also a small calibration spectrograph with rotating-sector is under construction for the full use of the Richardson spectrograph, which has been tested in 1977 and used since then.

2) A 31 cm Star-liner reflector with equatorial mounting.

3) A 30 cm Zeiss Coelostat with a telescope for projection of the disc of the Sun (diam. 12,7 cm) and a 10 cm Zeiss Heliometer (after E. Schoenberg methode).

4) A astrometric camera, a gift of the Department of Astronomy, University of Manchester, Englang.

5) A microphotemeter Joyce - Loebl. It is a photoelectric one giving results as follows:

a) photometric profil of one scanning of the film
b) isodensity maps of a film on a paper or
c) store up the data on a magnetic tape in order to use them through a computer to have fast results.

6) A ΔT instruments measures the temperature fluctuations of the air, at different heights from the ground level. These results give good correlation with the seeing conditions.

7) Two dark rooms with complete outfit for developing, enlarging, and copying.

8) Basic Units of Time:

a) Horloge Quartz B - 800, Ebanches S. A. Neuchâtel, Switzerland.
b) Digital Counter Clock, Series B - 7000/7010, Oscillo-quartz, S. A. Neuchâtel.
c) Master Clock system, model SPbc, 24 E Patek-Philipp, automatic time control by radio receiver signal TV2 of HBG 75KHz.

e) Solar observations

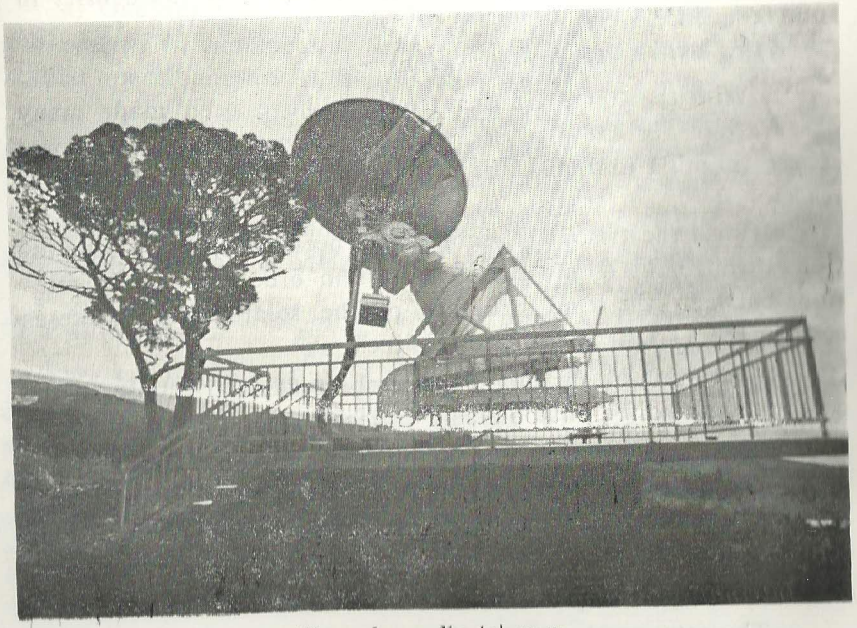
Instruments:

1) A trispar solar telescope made especially for photographing the solar image in Hα (6563A°), CaII - K(3934A°) spectral lines as well as in white light. The characteristics of the mounted telescopes are:

a) D = 16 cm, f = 240 cm
b) D = 11 cm, f = 165 cm
c) D = 15 cm, F = 226 cm

2) The Razdow solar telescope (D = 25 cm, f = 225 cm) is used for the everyday observation of the Sun on Hα spectral line. With the incorporated two magnified systems it gives a solar image of 15 and 45 mm ∅. The cinematographic film of the solar image in a programmized sequence permits to the Observatory to have a very good solar observations archive. The used Hα filter is a construction of Halle with passband 0,5A° and line shifter for ± 1A°.

The 25 cm Razdow solar telescope.



The solar radio telescope.

3) The everyday photospheric image is taken from a Unitron 10 cm telescope mounted on the Razdow telescope.

To secure better seeing conditions the Razdow mounting is installed on a 12 m tower.

4) A 25 cm Star - liner reflector will be used as a solar telescope for photographing the photosphere (sunspots-granulation etc).

5) In cooperation with the A.W.S. a solar radio telescope is working in Pentele Station. This instrument gives the total solar flux density in four frequences as follows: 1415, 2695, 4995 and 8800 MHz. The diameter of this antenna is 250 cm

The routine program of the solar observations concludes the following:

a) Optical observation of the solar photosphere, map of the sunspots, their position, area, type and Wolf number.

b) Continuous photography of the chromosphere through an Hα filter. These data are used for the study of flares and other transiet phenomena.

c) Continuous registration of the total solar flux density in four frequences.

The investigational observations:

a) With the 40 cm Gautier telescope have been made many observations for the study on the fine structure of the photosphere (granulation) and the chomosphere (fine mottles, spicules etc).

b) With the trispar telescope have been made many observations through the K and the Hα filters in order to find correlations between the fine structure of the solar chromosphere as seen in the two different spectral lines.

c) The staff of the solar service observed solar eclipses in the central line at different points in Greece or in other countries.

Many articles have been published on solar granulation, sunspots, spicules, on the disc and on the limb, dark and bright mottles, transient phenomena as flares and active filaments, solar eclipses etc.

International cooperation:

—The astronomical Institute gave a hand to the European

effort to find a site with good seeing conditions of the installation of the European telescope in order to obtain observations as good as possible (J.O.S.O.).

—In the international observing programs (IQSY, SMY, CINOF etc) the Astronomical Institute took part and offered his observations for research programs or for publications.

—A new solar telescope - spectograph is in the way to be drawn at Meudon Observatory for Athens. This instrument will be installed in Greece with the help of French Coleagues. A group of five Greek Astronomers from Athens Observatory and University of Athens will work on this project.

—The American Air Weather Service teem that is working on solar observations in Pentele, in collaboration with the National Observatory of Athens plans to move his activities at Kryonerion Station. So, a very good solar observing Station will be acting during the next solar maximum.

The instruments to be installed at Kryonerion are the following:

a) One optical telescope with 25 cm ∅ and f = 530 cm, that can observe in two spectral lines, simoultaneously, and will have a solar spectrograph with dispersion 1,9 mm/A°.

b) Three parabolic antennas for the radio - observation of the Sun in the frequences 245, 410, 606, 1415, 2695, 4995, 8800 and 15400 MHz.

c) Two bicone antennas for sweep frequency system monitoring between 24—48 MHz.

f) Public visits

The Station is open to the public free of charge especially during the summer months for viewing through several small telescopes and for attending popular lectures on some aspects of Astronomy. Visitors of the 63 cm Newall refractor are accepted after special permit of the Direction.

C. THE KORIALENIOS ASTRONOMICAL STATION AT KRYONERION - CORINTHE OF THE NATIONAL OBSERVATORY OF ATHENS

a) The 120 cm Cassegrain–Coudé Telescope and its history

In 1916 D. Eginitis, at that time Director of the National Observatory of Athens and Professor of Astronomy in the University of Athens, writes :

«The Greek national benefactor and personal friend of mine, Marinos Korialenios, who lately died in London, has disposed nearly the whole of his great estate for national purposes and bequeathed at my request to the National Observatory of Athens the amount of Drs 200.000 for the purchase of a big equatorial telescope. By means of this bequest, the major part of which has arleady been collected and deposited with the National Bank of Greece, our Observatory will soon obtain the desired powerful instrument which under the clarity of the sky of Attica will undoubtedly offer great services to the Science».

The aforesaid national benefactor Marinos Korialenios in his will (1915) wrote the following: «Wishing to be of service to the Observatory of Athens so that it may benefit the rare clearness of the sky of Attica and so serve the Science of Astronomy more efficiently than it is doing up to now I give to the said Observatory the amount of 8.000 pounds to be used for the purchase and installation of a big equatorial telescope which is to be named after me. This bequest will be valid only if Mr. D. Eginitis will accept to keep on the direction of the said Observatory at the time when this bequest will be put in practice and under the condition that he will be entrusted with the complete application of this provision in conformity with the opinion of the majority of the Greek executors of my will».

In 1969 Dr. S. Plakidis, Emeritus Professor of Astronomy in the University of Athens and Honorary Director of the Astronomical Institut of the National Observatory of Athens writes the following in connection with the fate of the M. Korialenios bequest: «Unfortunately it has not been possible to acquire the Korialenios telescope owing to the intervention of several events, such as the First World War, the Asia Minor disaster and other internal anomalies. The Korialenios bequest, which later was amalgamated by Prof. D. Eginitis with the estate of the Observatory, has suffered considerable mutilation after the Second World War and the subsequent distress of this country to such a degree that it was not sufficient for bringing into effect its purpose. In order that the gesture of the enlightened donator might not be forgotten and the dream of the person who had suggested that donation might be effected the only way was to dispose the balance left or made up, if necessary, by an amount from the Governmental Budget or from a private donation, for the purchase of a mirror of 60—100 cm to be used for making a Cassegrain reflector for special research».

The rapid progress of Astronomy especially after the Second World War imposed the initiative for the purchase of a Cassegrain reflector with a Coudé system so that the National Observatory of Athens might avail a modern instrument with a great aperture to be used for photometric and spectroscopic research comparable with that carried out by the great European or American Observatories in such a way that the contribution of our Observatory to the international astronomical coorporation might be offered in an integrated and entirely modern form.

In 1970 Dr. D. Kotsakis, Professor of Astronomy in the University of Athens and Director of the Astronomical Institut of the National Observatory (since 1965) in continuation of the programs of the former Professors of Astronomy in the University of Athens and Directors of the Astronomical Institute was principally the responsible person for undertaking the purchase and installation of the modern big telescope. To this effect he obtained the approval of the Administration Board of the National Observatory of Athens, the unanimous assistance and collaboration of the astronomers of the Astronomical Institute, the concert and moral support of the National Committee for Astronomy

and all the colleague professors of Astronomy in the other Universities of this country.

Next year an application was submitted for a credit of Drs 12.000.000 which was approved by the Government. So an essential increase of the bequest was effected permitting to start enquiries and discussions with a view to buy a telescope of 100-120 cm. Tenders from the following firms were obtained: 1) Veb Zeiss Jena, 2) C. Zeiss, Oberkochen, 3) Grubb - Parsons and 4) Boller & Chivens. After detailed discussions the offer of Grubb - Parsons, Newcastle, was considered as the most advantageous.

The August 1972 a contract was signed in Athens between the National Observatory of Athens and the factory Grubb - Parsons and Co of Newcastle, England for the construction of a Cassegrain type equatorial reflector of 120 cm aperture and other auxiliary equipment included (revolving dome etc) for the total price of £ 156.000 under the condition that the installation of the instrument will be completed after 30 months, with the provision of a possible 6 months extension of term, so that building for housing the instrument might be ready. Provisions were made by contract in respect of the way of payment of the successive instalments, the control of the construction and the erection in the site to be selected. The aluminizing plant for the mirrors has also been ordered at Edwards High Vacuum Company of Crawlay Sussex, England at a price of £ 35.000.

In parallel with the placing of the order for the telescope several sites away from the plain of Attica were examined by the members of the Astronomical Institute So several sites Peloponnesus and Continental Greece were considered macroscopically and on the basis of climatic and meteorological data of many years. Among them a region of Corinthia, 22 km SW of Kiaton near the village of Kryonerion at a hight of 900 - 1.000 m was selected as the most appropriate, considering that many reasons such as the morphology of the ground, the first meteorological informations, the easiness of acces as well as of supply of electricity, water and telephone plead in its favour.

Of course the selection of a site for an Astronomical Station filling all the requirements of modern astronomy is a difficult and manifold problem. As the new observatory was proposed to

serve several purposes it would be necessary to conduct a longseries of trial observations at more than two sites a priori fulfilling certain general conditions, so that the most appropriate among them might be selected after at least a period of 5 years of systematic local study. Such a thing however was not possible under the pressing terms for the telescope and the integration of the work.

The factory did not accept - in all reason - a delivery after 4 or 5 years during which we might collect more data from the site under special test. Therefore it would be necessary either to baflle definitely the order or resume the required efforts for new credits, offers and discussions after a certain time or buy the instrument and keep it in boxes for 2 - 3 years-which is not acceptable-until the proper site is selected and the building for housing the telescope is completed. All the Greek astronomers were unanimously of the opinion - and rightly - that the order of the telescope should not be differed considering that in such case the amount granted by the Government might be withdrawn and the whole program frustrated as a result.

The solution of Corinthia seems to be the more satisfactory if we take in consideration the fact that in this way the Greek astronomers will avail themselves with a new big telescope suitable for carrying out observations able to satisfy the requirements of modern Astronomy.

The National Observatory of Athens proceeded to the purchase of a land of 60 thousand sq m. on the selectcd hill with a view to conduct the required drilling for the preparation of the static design of the building, to obtain its approval by the competent public services and get the building ready in 1974 for the erection of the telescope.

A preliminary survey showed the site at Kryonerion to be suitable During the summer 65 percent of the nights are clear, with less than one - tenth cloudiness. Systematic seeing tests of double stars with a 15 cm telescope showed that atmospheric turbulence was slight; 60 perent of the time the turbulence was estimated as better than 3 on a scale from 1 (the worst) to 5 (best).

At this Station in the summer, the temperature varies about six degrees centigrade during the day and only two degrees at night, with very little change during the coolest four hours after

midnight. The darkness of the nighttime sky is very satisfactory, as judged from star observations with a 15 cm telescope. All these preliminary results encouraged the Astronomical Institute to establish the Station (Kotsakis, Banos, Elias 1974).

The following are the results of measurements obtained later. According to them the seeing is satisfactory.

Preliminary results on the atmospheric extinction at the Astromonical Station of Kryonerion and Pentele have been obtained by P. Rovithis (1978). A two-beam multimode stellar photometer attached to the 120 cm telescope has been used to study the extinction coefficients K_B and K_V in the V and B band respectively. The seeing at Kryonerion is better than at Pentele.

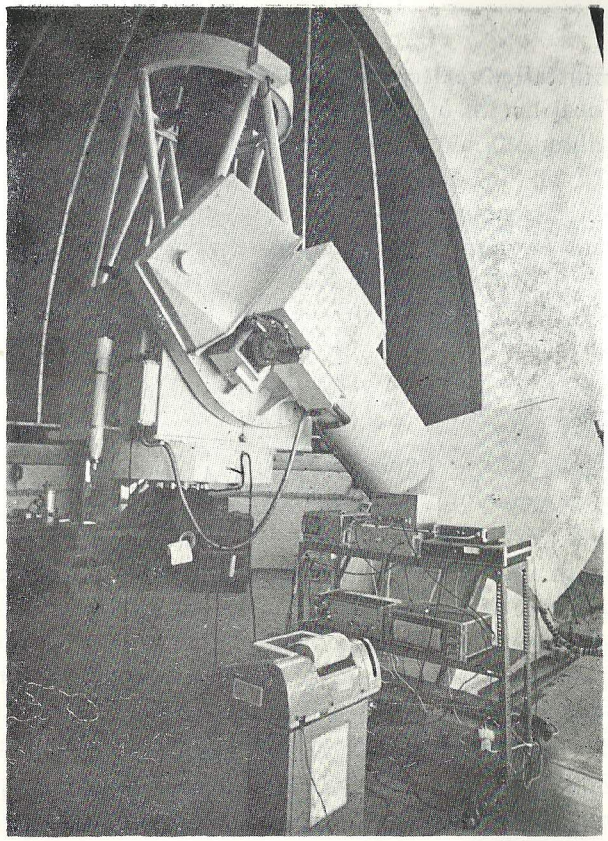
Preliminary values of the monochromatic extinction coefficient α (λ) for the wavelenght range 3800 A° to 5600 A° have been obtained at Kryonerion by E & M. Kontizas (1978). A photoelectric spectrum scaner (Smyth-Kontizas 1978) attached to the 120 cm telescope has been used for this purpose. These values have been determined for very good atmospheric conditions. From a similar study of the atmospheric extinction coefficients for the Mount Wilson and McDonald Observatories (Abbot 1929, Hilthner 1956) is has been prooved that the extinction coefficents for the Kryonerion site are competitive.

Although the data are not very extended it is believed that the seeing at the Kryonerion site is comparable to that of well known Observatories.

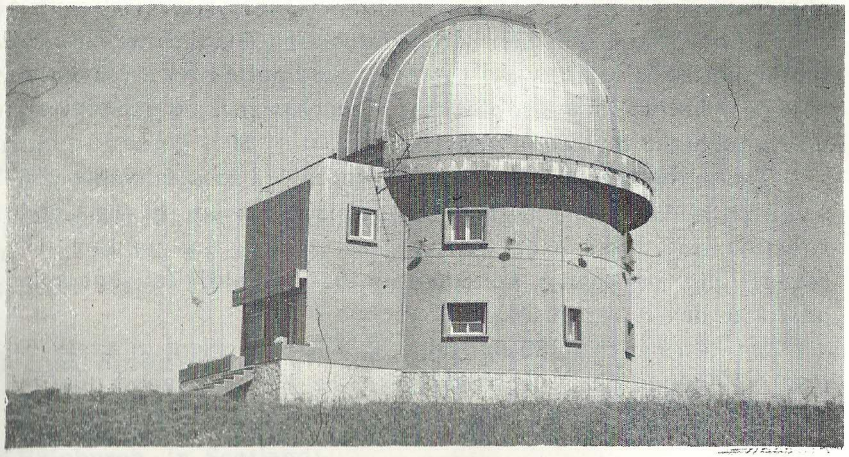
Prof. Ch. Fehrenbach, Director of Marseille Observatory, France, spent 3 days during January 1975 in the workshop of Grubb Parsons for the final testing of the 120 cm telescope. Prof. D. Kotsakis and Dr. C. Banos participated in this test.

The construction of the building for the 120 cm telescope and the installation of the dome and the telescope were completed in September 1975.

In the mean time a road of 1200 m leading from the highway up to the top of the hill was paved and electric current was supplied. In parallel water supply from a fountainhead at a distance of 200 m and the fencing of the ground were completed In 1976 the aluminizing plant was installed in the same building.



The 120 cm Cassegrain Coudé telescope by Grubb Parsons.



The dome of the 120 cm reflector.

The installed reflector's primary mirror is an f/3 paraboloid, with a focal length of 3,6 meters and a prime focus unvignetted field of about 40 minutes of arc. The f/13 hyperboloidal secondary, 30,6 cm in diameter, gives a Cassegrain effective focal length of 15,6 meters. Both primary and secondary mirrors are made from Zerodur blanks and have very low expansion coefficients. There are two 7,5 cm finders

The following three mirrors were ordered :

A. Convex secondary, F/36, pseudo hyperboloid, nominal conjugates 650 mm and 7800 mm. Diameter 245 mm, maximum thickness 40 mm.

B. Two flats: Diameter 285 and 255 mm—thickness 40 mm.

The diameter of the unvignetted field at Coudé focus will be 100 mm.

All mirrors will be manufactured from glass-ceramic material having a coefficient of linear expansion of less than $1,5 \times 10^{-7}/^{0}C$.

When the mirrors are used in conjunction with the paraboloidal primary mirror supplied with the telescope, the image quality on axis at Coudé focus will be such that 80 % of the reflected light falls within a circle of 0,6 arc second diameter.

A Coudé spectrograph will be ordered later.

As the instrument picture shows, the mounting is a modern torque - tube design, requiring no reversal of the telescope when observations continue past the meridian (as is necessary with a conventional singlepier German equatorial) The heavy base of the mounting is carried by three support points on a plate that is rigidly bolted to the top of the concrete pier, which extends up through the building from bedrock.

The main telescope controls are contained in a movable console, but an observer at the Cassegrain focus or in the Coudé room has the usual hand controls for setting and guiding. The setting and indicating systems are basically digital, but some analogue devices are used.

On testing the 120 cm telescope for us (September 1975), Prof. C Fehrenbach, declared it to be of very good quality. With some small adjustments it will be an instrument «de grande classe».

A three - lens correcting system gives a flat Cassegrain field about 20 cm square for celestial photography.

The photometric and spectrophotometric observations carried out during the last years were satisfactory.

The programs of the 120 cm telescope include photometry and spectrophotometry of special classes of stars, infrared studies of particular Milky Way regions and observations of planets and comets to supplement current programs of the Observatory at Athens.

In view of the rapid development of new ways and methods of astronomical observations as well as of the theoretical research it has been considered necessary to send abroad several young Greek astronomers for training in special subjects. Such a scheme was started after the second World War and during the last decade was extended to all the Institutes of this country specializing in astronomical research.

Such a need was more particularly felt by the Astronomical Institute of the National Observatory of Athens and for this reason since long ago a program for special training at astronomical Centers of abroad is continued. More particularly in view of the erection of the 120 cm reflector a special program was drawn in consulation with the Deparment of Astronomy of the University of Athens for sending young Greek astronomers abroad for specialization so that all the requirements for the profitable use of the instrument may be secured. As it is evident such a program helps also in promoting the collaboration with home and foreign Institutes considering that several Greek and foreigner visiting astronomers are already welcomed for conducting programs of astronomical observations at Kryonerion and Pentele.

Accommodations for observers are now in the main building, but we expect to erect a separate dormitory that will allow extended stays by visiting astronomers.

b) Instrumentation

1. *Infrared Photometer* (Constructed by Royal Observatory of Edinburgh, in Scotland).

The infrared Photometer operates in the λλ(1 - 6μ) using an Indium Antimonide (InSb) detector cooled to Liquid Nitrogen temperature.

Filters of the type J(1, 2μ), H(1, 6μ), K(2, 2μ), L(3, 8μ), and M(4, 7μ) are available. The data handling and change of the filters are controlled by a system developed at the Royal Observatory of Edinburgh which is based on the Motorola Microcessor M6800.

2. *A two - beam Multi - mode Nebular - Stellar Photometer* (Constructed by the Department of Astronomy, University of Manchester, England).

It is designed to work on both extented and discrete objects emitting either line or continuum radiation in the wavelength range 9.000 A° to 3.700 A°. It has RCAC31034 protomultipliers with 4×18 mm photocathodes cooled witht dry ice. U, B, V, R filters are available.

3. *Planetary Gamera* (Constructed by the National Observatory of Athens).

It has a magnifying sustem giving a scale on the plate 5″/mm. It is loaded with plates 3 1/4×4 1/4 inches and Wratten filters No. 25, 47B and 60. The plates can be moved along two axes.

4. *Photoelectric Spectrum Scanner* (Constructed by the Department of Astronomy, University of Edinburgh, in Scotlant).

It will not be ready for observation before Juli 1979. It will contain a grating and will cover the spectral range 3.600 A° 8 500 A°.

It is planned to detect stars as faint as 10 - 12 mag. It will use a small fraction of the undispersed starlight to provide a reference beam for compensating changes in the atmospheric transparency, seeing and guiding errors.

5. *Camera for Stellar fields* (Constructed by Grabb - Parsons and Co).

It is a guiding system plateholder assembly. It takes 16×16 cm plates and has a field of 40′×40′. UGl, GG385, GG495, RG630 filters are available.

6. *1 P21 Photometer*

It has a 1 P21 tube and UBV filters. The tube temperature can be reduced down to - 45°C and can detect stars down to ~ 14mag.

II. DEPARTMENT OF ASTRONOMY, UNIVERSITY OF ATHENS

1. *Educational Program*

Courses in General, Mathematical and Practical Astronomy are given to the third year students of Mathematics at the University of Athens. The same students participate in Laboratory work in Astronomy and Astrophysics, including reduction of astronomical data, the use of astronomical instruments and stellar and solar observations in connection with visits to the National Observatory of Athens and the Astronomical Station of Pentele.

Elective courses are also given in Dynamical Astronomy and Cosmology, and in Astronautics to the interested fourth year students of the same University.

The Department is at present under the direction of Professor Dr. G. Contopoulos.

2. *Research*

a) Theoretical work

The research program includes Galactic Dynamic, General Dynamical Systems, General Relativity, Celestial Mechanics and Stellar Structure and Evolution.

b) Observational work

Members of the staff of the Department use the observing facilities of the National Observatory of Athens and the Astronomical Stations in Pentele and Kryonerion. The observational programs include stellar photometry and reduction of photometric data (both photoelectric and photographic), spectroscopy of variable and early type stars and infrared photometry.

Eleven doctoral theses have been completed during the last 10 years, as a part of the research work performed in this Department.

3. *Library*

An astronomical Library was established in 1935 for the use of the staff and the students. This Library includes now about 3000 volumes and subscribes to about 20 Scientific Journals.

4. *Instrumentation*

The Department owns some computing facilities and scientific instruments used in various research projects. Among them is an INTERDATA 7/16 computer equiped with a teleprinter, a keypunch and a memory expansion unit. This computer is intended for direct link with the reduction instruments of the Department.

Other instrumentation includes a transit instrument, a Fecker photoelectric photometer with an RCA-1P21 photomultiplier and a Honeywell recorder, a Laser unit, three theodolites and the secondary instrumentation of the Richardson spectrograph of the Station in Pentele. The reduction of data is carried out with the help of measuring machines and an Abbe comparator of spectroscopic plates.

The Department owns a completely equiped dark-room, many cameras, an astrocamera and a solar camera, some small telescopes and a 4-meter completely equipped optical table.

At the University campus the Department maintains a solar telescope (Zeiss 110 mm) and auxiliary instruments for the use of the students.

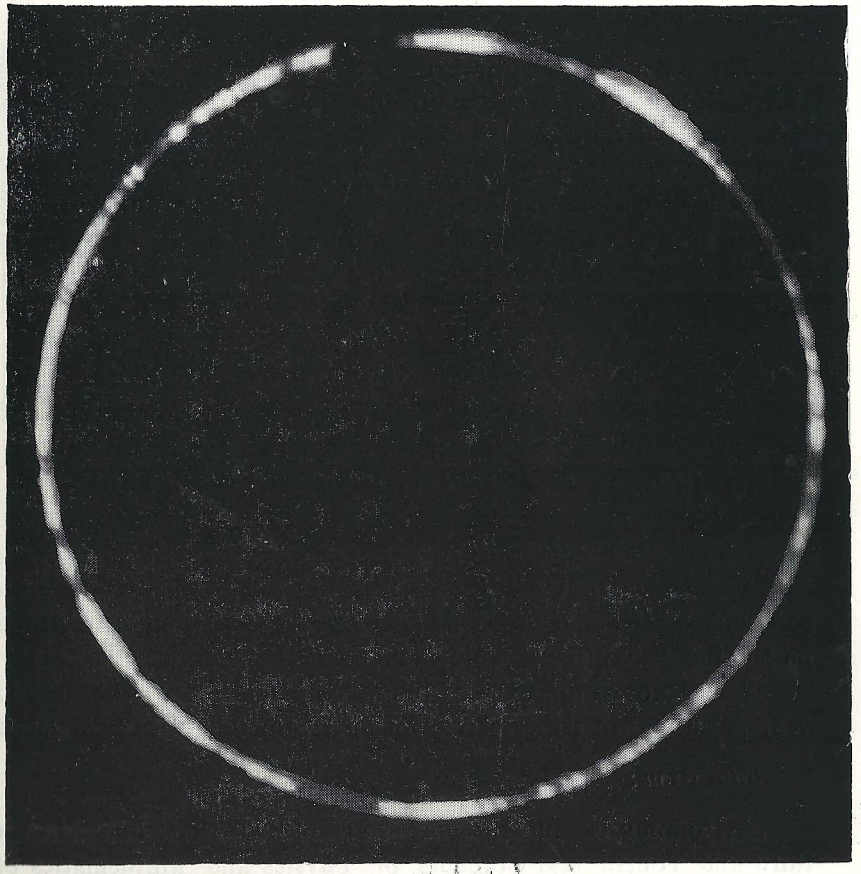
5. *Publications*

The contributions of the staff of the Department are published mainly in international journals. Some publications are published in Greek. There are also books in Greek for the students of Spherical Astronomy, Celestial Mechanics, Practical Astronomy and Astrophysics (4 Volumes on the Solar System, Stars, Stellar Systems and Cosmology).

6. *Other Activities*

The Department housed and partially supported the IAU Secretariat when Dr. G. Contopoulos, General Secretary of the Union, moved from Thessaloniki to Athens.

Members of the staff organized International Meetings on various astronomical subject abroad as well as in Greece (like the 1st European Astronomical Meeting, 1972). Also members of the staff gave invited lectures abroad and in Greece and many visitors from abroad visited the Department and spoke to the staff on modern astronomical subjects. A weekly seminar was held in the Department on subjects of current interest.



Annular solar eclipse on 29-4-1976 from Kos island (Expedition of this Department).

III. ASTRONOMY DEPARTMENT OF THE UNIVERSITY OF THESSALONIKI

The Department is at present under the direction of Assistant Professor Dr. S. Persides.

1. *Instruments :*

The Astronomical Department has an Observatory within the University campus. The main instrument is an 20 cm visual refractor made by Secretan, Paris. The telescope is housed under a dome of 6m diameter, made by Astro - Dome. The telescope is mainly used for educational purposes and Solar Observations, performed by the Staff of the Department. Two Hα - filters and a K - filter are also available for observations of the solar chromosphere.

2. *Research :*

There are three main programs of research work on which the staff of the Department is working : (i) General Relativity, Relativistic Astrophysics, (ii) Galactic Dynamics and (iii) Solar Observations.

About 100 publications have appeared in the last 20 years. These are papers published in international journals and they are distributed free of charge among Observatories and Institutions on the basis of international exchange.

Six doctoral theses have been completed during the last 15 years, as a part of the research work performed in this Department.

3. *Education :*

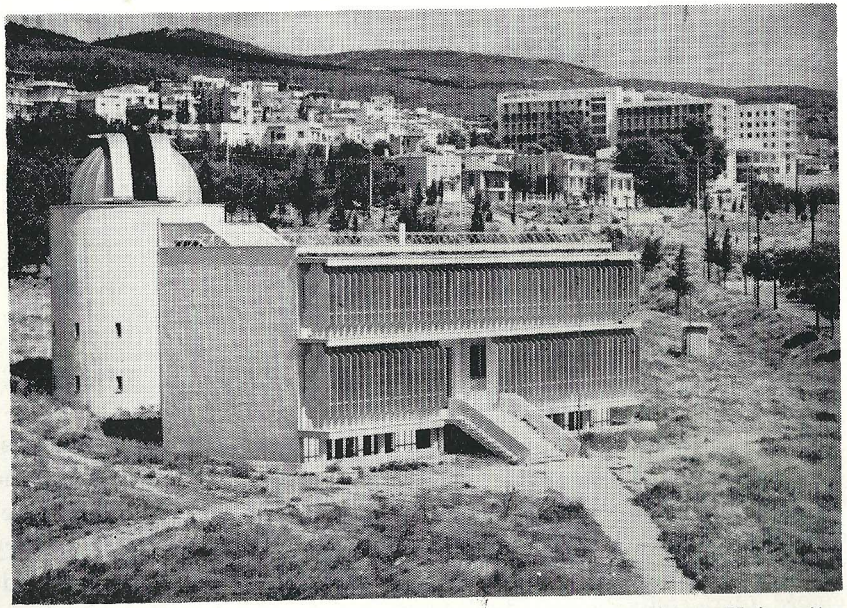
Astronomy is taught by the staff of the Department to the third and fourth year students of Physics and Mathematics of the University of Thessaloniki. The courses include among others Theoretical Astronomy, Celestial Mechanics, Classical and Relativistic Astrophysics, Galactic Dynamics, Cosmology, etc.

About 200 students follow these courses every year.

4. *Other Activities :*

The IAU Symposium N° 25 was organized by the Department (Dr. G. Contopoulos) at the University of Thessaloniki.

The Department provided housing and partial support of the IAU Secretariat while Dr. G. Contopoulos was Assistant General Secretary and General Secretary of the IAU.



The Dome of the 20 cm refractor (Department of Astronomy, University of Thessaloniki).

IV. LABORATORY OF ASTRONOMY OF THE NATIONAL TECHNICAL UNIVERSITY OF ATHENS

1. *Instruments*

1) Universal Instrument Wild T_4 fitted with impersonal micrometer.
2) Wild T_2 Theodolite with Astrolabe.
3) Wild T_2 Theodolite with Astrolabe.
4) Kern DKM_3A Theodolite.
5) Time signal receiver FAVAG and OMEGA.
6) Chronograph.
7) Sextants.
8) Complete set of meteorological instruments.
9) Several appliances for educational purposes.

2. *Education*

The students of the Faculty of Rural and Topographical Engineering of National Technical University of Athens in the third and fifth year are taking courses of Mathematical, Geodetic and Practical Astronomy. Apart from field work a Laboratory for their practical training in the use of instruments, the methods of observations and their reduction is provided in the campus of the Technical University.

The Laboratory is under the direction of Professor Dr. John Argyrakos.

V. RESEARCH CENTER FOR ASTRONOMY AND APPLIED MATHEMATICS ACADEMY OF ATHENS

This Institut has been established in October 1959 as «Research and Computing Center, Academy of Athens» and since 1965 is named «Research Center for Astronomy and Applied Mathematics».

The Center is under supervision of Prof. Dr. J. Xanthakis, member of Academy of Athens and the direction of Docent Dr. C. Macris.

Scientific collaborators of the Center are: Prof. Dr. L. Mavridis, University of Thessaloniki and Prof. Dr. C. Goudas, University of Patras.

The Center has a rich library, a laboratory and a dark room.

The folloving instruments are also available:
An Iris - photometer, a Wide angl Zeiss stereomirocroscope, a Joyce - Loebl microphotometer, an Hewlet - Packard electronic computer, several photocinematographic apparatus and other auxiliary instruments for the reductions of the observations. The IBM360 computer is also used by the Center.

The Center is coorporating with several foreign Institutes each as: I) L' Institut d' Astrophysique, l' Observatoire de Meudon, l' Observatoire du Pic du Midi and l' Observatoire de Saint Michel à Haute Provence. 2) The Arcetri Observatory in Florence and the Capodi Monte Observatory in Napoli. 3) The Ondrejou Observatory in Czechoslovakia and 4) The Big Bear and Mount Wilson Observatories in the U.S.A.

The staff ot the Center is dealing with the following sectors of research.

1) The first sector which was started by the supervisor of the Center, Prof. J. Xanthakis comprises research in respect with the forecast of solar activity and the discovery of the respective indications of such phenomena as well as research in respect with the relations of solar and terrestrial phenomena.

2) The second sector refers to the solar physics and deals with its many branches such as the fine structure of the photosphere, the fine structure of the chromosphere, the corona, the eruptive phenomena etc.

3) The third sector refers to the stellar photometry and the structure of galaxy.

4) The fourth sector comprises research on the atmosphere of Mars and Venus and aims at the establishment of models on the basis of observations effected by the spacecrafts Venera, Mariners and Vikings.

Two series of publications are issued by the Center:

1) Contributions which contain original papers in foreign language (English or French) communicated and published the Practica or the Memoires of the Academy of Athens or in the Records of foreign Academies and in magazines of international authority. Since the foundation of the Center 65 original scientific papers and communications (Nos 1—65) were published.

2) Publications which comprise subjects of general interest in Greek (Nos 1—17).

VI. DEPARTMENT OF GEODETIC ASTRONOMY UNIVERSITY OF THESSALONIKI

The Department of Geodetic Astronomy, University of Thessaloniki has been established in October 1962 and belongs to the Faculty of Engineering, Division of Rural and Surveying Engineering of this University.

Dr L. N. Mavridis has been appointed Professor of Geodetic Astronomy and Head of the Department since February 1964

Facilities. The Department is housed in the Building of the Faculty of Engineering, in the Campus of the University of Thessaloniki.

The astronomical observations for the astrophysical research programs are mainly being carried out with the Department's 30-inch Cassegrain reflector on an asymmetric mount (focal ratio f/3 for the primary hyperbolic mirror and f/13,5 for the Cassegrain focus). It has been installed at the Stephanion Astronomical Observatoty in Peloponese ($\lambda = 22^0\,49'\,44''$, $\varphi = +37^0\,45'\,15''$, $H = 800$ m).

This reflector is equiped with a Johnson dual channel photoelectric photometer with offset guider unit including one RCA IP21 and one RCA 7102 refrigerated photomultipliers for measurements in the U, B, V, R, I colours of the Johnson international photometric systems and one Meinel plane grating spectograph with flat-field folded Schmidt camera f/2 focal ratio. The reflector, as the photoelectric photometer and the spectrograph have been constructed by Astromechanics.

Further more, the Department disposes the following equimpent: 1) One Astronomy Date Aquisition System Hewlett Packard DYMEC 6694, 2) One iris photometer Model W. Becker constructed by Askania, 3) One Grant series 800 comparator-microphotometer with mark III-R measuring engine of 250 mm × 100 mm X and Y travel and photoelectric setting device X-coordinate, 4) One standard frequency and time system Rohde and Schwarz CAC, 5) One Wild T4 and one Kern DKM 3A astronomical theodolites, 6) Two Wild T3

and eight Wild T2 theodolites, 7) Two gravity meters La Coste and Romberg, Model G, 8) Two torsion magnetometers Askania Model G f2 M, 9) Two levels Carl Zeiss, Oberkochen Ni 2 with astrolab.

Research Programs. The research programs carried out by the Department so far can be divided in following groups i.e.

1. The research programs referring to Astrophysics i.e:

1.1. Two - color photoelectric photometry of Galactic Cepheids (L. N. Mavridis in collaboration with K. Bahner).

1.2. Three - colour photoelectric photometry of Galactic Cepheids (G. Asteriadis L. M. Mavridis, A. E. Tsioumis).

1.3. Period Changers of Galactic Cepheids (L. N. Mavridis in collaboration with R. Bahner).

1 4. Rotational Velocities of the Members of Selected Open Clusters (L. N. Mavridis in collaboration with R. Kraft).

1.5. Investigation of problems of Star Formation (L. N. Mavridis in collaboration with B. Strömgren and J. Xanthakis).

1 6. Distribution of the M - , S - and C - type Srars in Selected Areas of the Milky Way (L. N. Mavridis, A. C. Tsioumis).

1.7. Photoelectric Observations of Flare Stare Stars (D. Arabelos, G. Asteriadis M. E. Contadakis, G. Kareklidis, Farouk Mahmoud, L. N. Mavridis, D. Stavridis, H. Zervaki - Zoirou in collaboration with B. Lovell).

1.8. Photoelectric Observations of Suspected Flare Stars (G. Asteriadis. M. E. Contadakis).

1.9. Kinematics of Stellar Systems (G. Asteriadis, A. Tsioumis in collaboration with W. Fricke)

2. The research programs referring to Geodetic Astronomy i.e:

2.1. Study of the Deviation of the Vertical in various Areas of Greece (Ch. Kaltsikis, L. N. Mavridis, D. Stavridis, A. Tsioumis).

2.2. Propagation of Optical Radiation and Microwaves through the Earth's Atmosphere (A. Bandellas, A.Gounaris, L. N. Mavridis, A. Papademitriou, P. Savaidis, A. Tsioumis).

3. The research programs referring to Geodesy and Geophysics i.e:

3.1. Gravity Investigations in Greece (D. Arabelos, H. Dreves, J. Karrinti, L. N. Mavridis in collaboration with J. Macris, A. Menzel, A. Stavrou, W. Torge, G. Veis).

3.2. Magnetic Investigation in Greece (D. Arabelos A. Gounaris, J. Karrinti, L. N. Mavridis).

Publications. The Department publishes the following series of publications:

1. Contributions from the Department of Geodetic Astronomy, University of Thessaloniki (includes reprint of original papers puplished by the Department's staff and referring to Astrophysics).

2. Publications of the Department of Geodetic Astronomy, University of Thessaloniki (includes reprints of original papers publisched by the Department's staff and referring to Geodetic Astronomy, Geodesy and Ceophysics).

3. Annual Reports of the Department of Geodetic Astronomy, University of Thessaloniki.

Teaching. The Deparment is responsible for teaching the courses referring to Geodetic Astronomy and Geodecy to the undergraduates of the Division of Rural and Surveying Engineering, Faculty of Engineering of the University.

VII. UNIVERSITY OF IOANNINA, DEPARTMENT OF ASTRONOMY

The Department of Astronomy (chair and laboratory) was established officially, together with the University of Ioannina, on 1970, after operating as a branch of the University of Thessaloniki for four years. The Department is at present under the direction of Prof. Dr. G. Banos.

1. *Activities*

The activities of the Department are referred to: a) the teaching and b) the research in Astronomy. The courses include both lectures and exercises in Astronomy and Astrophysics, given to the third-year undergraduate students of Physics and Mathematics. The research, which is devoted to optical observational astronomy, is concerned with the study of the solar atmosphere, the photometry of galaxies, the flare stars, the Ap stars and the open clusters.

2. *Equipment*

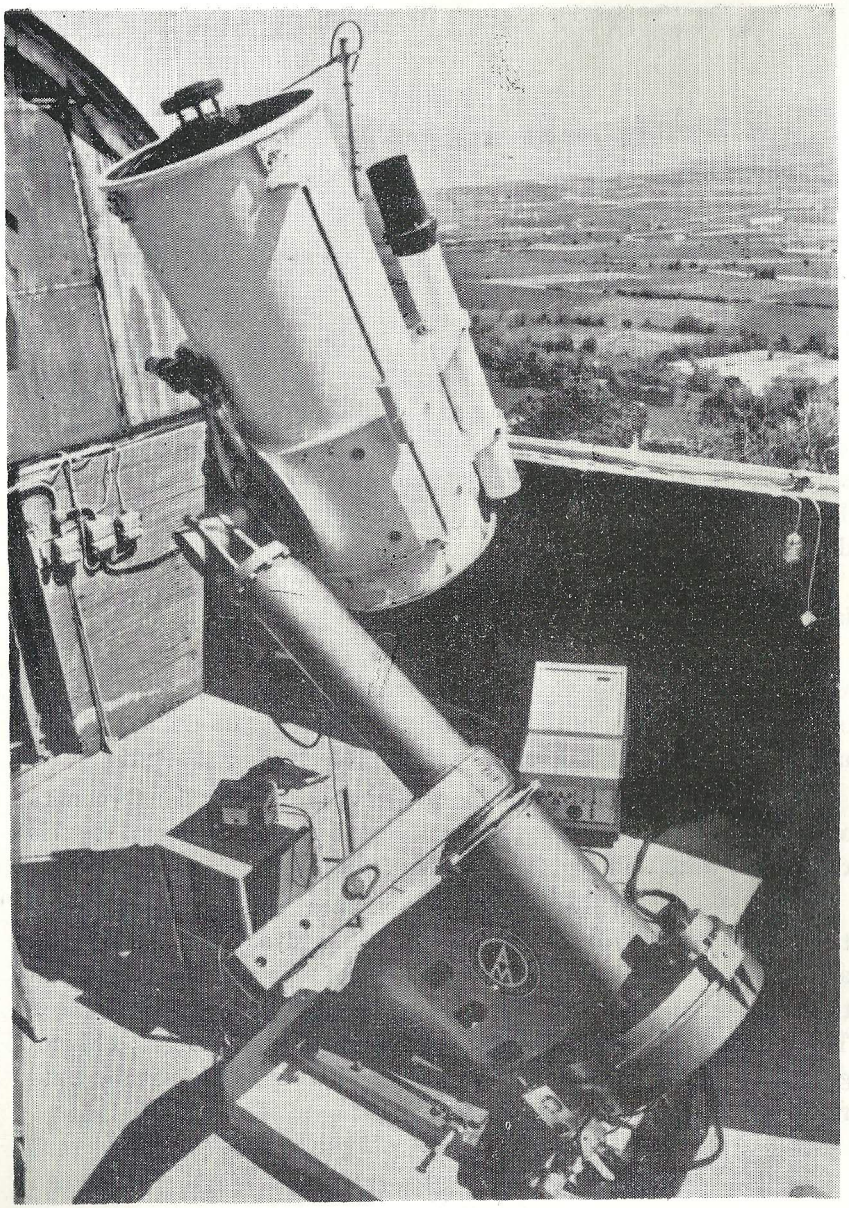
The equipment of the Department is the following: a) A 60 cm Cassegrain telescope (f/13, 5), b) An 20 cm Cassegrain telescope (f/12), c) An 20 cm Schmidt-Cassegrain telescope (f/10), d) A 0,75 A°-Aa solar filter, e) A microdensitometer, f) A stereocomparator g) A srereo-microscope, h) various auxiliary instruments, as photomultipliers, cameras, chronometers, high-voltage supplier, electrometer, mini-computer etc. i) A complete dark-room.

3. *Library*

The library contains about 1000 books. In addition more than fifty magazines are received regularly and classified, the volumes of which are nearly 1000.

4. *Publications*

The text-book «Astronomy and Astrophysics» by Prof. G. Banos has been recently published. In addition the magazine «Contributions from the Laboratory of Astronomy» appears occasionally.



The 60 cm Cassegrain telescope, by «Astro-Mechanics» Inc., Austin, Texas, U.S.A. (Department of Astronomy, University of Ioannina)

VIII. DEPARTMENT OF ASTRONOMY, UNIVERSITY OF PATRAS

This Department started in March 1969 after the appointment of the first professor Cr. B. Barbanis, who is the Director of this Institut.

The main instrumentation of the Department is a Hewlett Packard 9820A calculator, a stereomicroscop, Carl Zeiss, three marine chronometers Nardin, a frequency synthesizer, Fluke, a spectrum analyzer, Tectronix, a 20 cm heliostat, Carson, a measuring microscope Veb Carl Zeiss. A radio telescope of 7m is under construction. There are also a 15 cm reflector, a 10 cm reflactor, sextants and theodolites for educational purposes.

The library consits of 1300 volumes, various astronomical Catalogs and the Palomar Sky Atlas.

The following text books, in Greek, were published by Prof. B. Barbanis. Lectures on General Astronomy, Patras 1973. 2) Lectures on Differential Equation, Patras 1970. 3) Exercises on General Astronomy, Patras 1972. 4) Lectures on Stellar Dynamics, Patras 1975.

Lectures on General Astronomy, Astrophysics, Stellar Dynamics and Cosmology are given to the students of Mathematics and Physics during the third and the fourth year of their studies.

The research activity of the Department is devoted to theoretical studies mainly on problems of stellar dynamics and plasma astrophysics. There are two series of scientific publications: 1) «Contributions from the Department of Astronomy, University of Patras». The numbers 1—7 of this series have already appeared. 2) «Monographs of the Department of Astronomy, University of Patras». Until now 5 monographs have been published.

IX. LABORATORY OF ASTROPHYSICS, UNIVERSITY OF ATHENS

When in 1935 Professor S. Plakidis was appointed in the chair of Astronomy at the University of Athens, he realized that Astronomy had reached such a growth that one chair of Astronomy was not enough to handle the relative subjects for the students at the University of Athens. Hence he was planning of founding and other chairs of the relative sciences. The second World War with the horrible occupation of Greece, the followed civil war and the for years economic disturbances in Greece had postponed the realization of his plans.

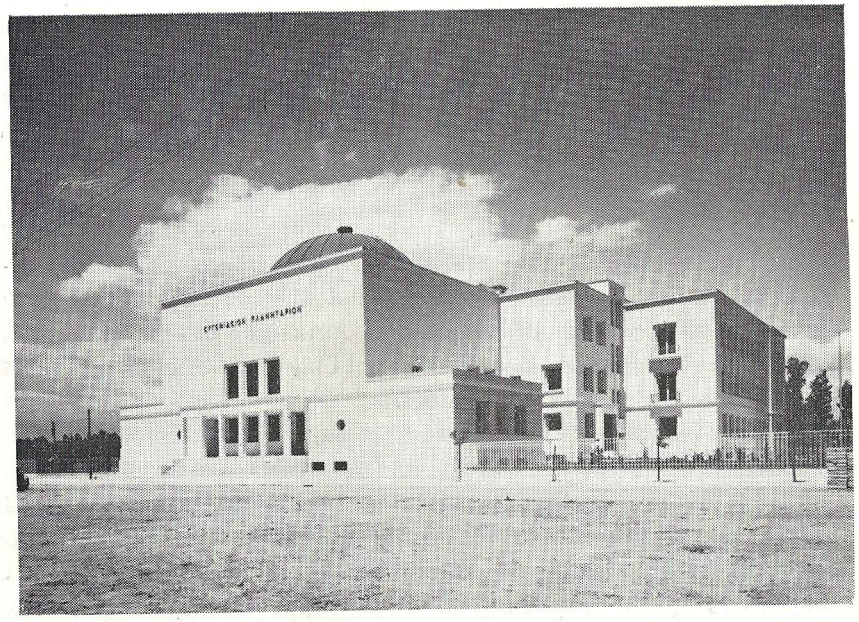
However, the continiously increasing number of the students at the Universities of Greece with the years, together with the increasing rate in the growth of sciences and the development of new dimensions in the Scientific Education during the last years obliged the Greek Government in founding not only new Universities, but Laboratories in the old Universities.

After a proposal of Professor D. Kotsakis, successor of Prof. Plakidis to the chair of Astronomy, a new chair of Astrophysics was founded by the Government in 1972, at the Faculty of Physics and Mathematics at the University of Athens. Purpose of this chair is to serve in the teaching of Astrophysics to the undergraduate students of Physics at the University of Athens, in the development of postgraduate studies in Astrophysics and finally to independent astrophysical research.

Lately, in 1977, by a new Government decree a Laboratory of Astrophysics was founded under the directorship of the chair of astrophysics. Laboratory is at present under the direction of Professor of Astrophysics Dr. Sotirios Svolopoulos. By the same decree the following positions were created: 2 positions for Chief Assistants, 3 assistanships and one for a Laboratory Technician.

Under the present possibilities the activities of this Institut are limited to optical Astrophysics and Radioastrophysics. There is an increasing collaboration with other relative Institutes in Greece as

well as abroad. Studies of stellar spectra from plates taken abroad are underway. Similarly surveys of stellar cluster are undertaken on borrowed photographic plates. Meanwhile received from radio Observarories data help the research on topics of radio Astrophysics in this Institute. Finally there is an increasing collaboration for studies in Space Astrophysics.



The Eugenides Planetarium.

X. EUGENIDES FOUNDATION, DEPARTMENT OF ASTRONOMY

Athens – Sygrou Ave., Tel. (01) 941-1181

1. *Purpose*

The Eugenides Foundation has as one of its main purposes the educational enrichment of students and laymen alike in the fields of astronomy, astrophysics, planetology, astronautics and space and earth sciences in general. Its activities are carried out by Planetarium shows for the general public, elementary and secondary school students, special shows for University and technical school students, lectures, scientific exhibitions and publications on popular science subjects, and the operation of a small telescope for educational purposes. During each academic year (8 months) over 100.000 persons attend the Planetarium's educational and public shows. The activities of the department are planned and executed by a staff of twelve full-time and six part-time professional astronomers, electronic engineers, audio visual specialists and clerks.

2. *Instruments*

The Planetarium includes a Zeiss/Oberkochen Universal projector which is made up of 150 individual projectors. The dome is fifteen meters in diameter and about ten meters high at the center.

A small Zeiss/Oberkochen 15 cm Coudé refractor is also available. It is equiped with a Hα filter and various other accessories and is used mainly for solar observations and educational presentations.

This Center is under the direction of Mr. Dion. P. Simopoulos.

LIST OF MEMBERS OF THE INSTITUTIONS

I. NATIONAL OBSERVATORY OF ATHENS, ASTRONOMICAL INSTITUTE

Athens (306). Tel. (01) 3461 - 191. Stations : Pentele Tel. (01) 8040 - 619, Kryonerion Tel. (0742) 51-222.

Em. Prof. Dr. S. Plakidis, Hon. Director (Address : Sardeon Str. 6, Nea Smyrni, Athens (612).

Em. Prof. Dr. D. Kotsakis, form. Director (Address: Hippocrates str. 189, Athens (708).

Prof. Dr. G. Contopoulos, Director
Dr. C. Banos
Dr. Th. Prokakis
Dr. E. Sarris
Dr. P. Rovithis
Dr. E. Kontizas
Mr. D. Dialetis
Mr. D. Elias
Mr. E. Sigalas
Mr. J. Zacharopoulos
Mr. A. Vouzas
Mr. Ch. Bourdas } Technicians
Mr. S. Mantadis, Guardian.

II. DEPARTMENT OF ASTRONOMY, UNIVERSITY OF ATHENS

Panepistimiopolis, Athens (621), Tel. (01) 743-211

Em. Prof. S. Plakidis (Address: see above)
Em. Prof. D. Kotsakis (Address : see above)
Docent Dr. W. Abbot (Address: Michalakopoulou 42, Athens (612)
Docent Dr. C. Macris (Address: see below)
Prof. Dr. G. Contopoulos, Director
Assist. Prof. Dr. M. Moutsoulas

Docent Dr. P. Laskarides
Dr. M. Zikides
Dr. D. Dionysiou
Dr. E. Spithas
Dr. D. Papathanasoglou
Dr. H. Livaniou - Rovithis
Dr. D. Vaiopoulos
Dr. P. Niarchos
Dr. Th. Papayannopoulos
Mr. J. Deliyannis
Mr. A. Pinotsis
Miss E. Antonopoulou
Mrs. M. Stathopoulou - Tsoga
Mr. E. Theodossiou
Miss J. Manoussoyannaki
Mrs. G. Kotsaki - Zounta
Miss A. Papadopoulou } Secretaries
Mr. M. Kourvaras, Technician

III. ASTRONOMY DEPARTMENT, UNIVERSITY OF THESSALONIKI, Thessaloniki, Tel. (031) 991-2357.

Em. Prof. Dr. J. Xanthakis (Address : see below)
Em. Prof. Dr. G. Contopoulos (Address : see above)
Assist. Prof. Dr. S. Persides, Acting Director
Dr. N. Spyrou
Mr. D. Papadopoulos
Mr. N. Caranicolas
Mr. P. Fylactopoulos
Mr. H. Varvoglis
Mr. S. Avgopoulis
Mrs F. Papageorgiou
Miss D. Mori } Secretaries
Mr. K. Papadopoulos, Technician
Mr. A. Karatzas, Janitor

IV. LABORATORY OF ASTRONOMY, TECHNICAL UNIVERSITY OF ATHENS, Polytechnioupolis, Zografou Str. 9 Athens, Tel. (01) 7707-550.

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Mr. M. Kyriakopoulos
Mrs. K. Babilis
Mrs. K. Loukidelis
Mr. B. Kuriakou
Miss E. Cheretis

V. RESEARCH CENTER FOR ASTRONOMY AND APPLIED MATHEMATICS, ACADEMY OF ATHENS, Anagnostopoulou Str. 14 Athens (136), Tel. (01) 3613-589.

Prof. Dr. J. Xanthakis, Member of Academy of Athens
Docent Dr. C. Macris, Director
Dr. C. Poulakos
Dr. B. Petropoulos
Mrs. H. Papamargariti - Dara
Mr. Th. Zachariadis
Mr. M. Chondros, Secretary
Mr. E. Tsiros, Technician
Mrs. E. Pannoussi - Kountouriotou, Ass. of Secretariat

VI. DEPARTMENT OF GEODETIC ASTRONOMY. UNIVERSITY OF THESSALONIKI, Thessaloniki Tel. (031) 5912-690, Stephanion Tel. (0741) 98-481.

Prof. Dr. L. Mavridis, Head
Dr. A. Tsioumis
Dr. G. Asteriadis
Mr. M. Contadakis
Mr. G. Kareklidis
Mr. D. Stavridis
Miss J. Karrinti
Mr. D. Arabelos
Mr. Ch. Kaltsikis

Miss P. Kyriakidou
Mrs. M. Spyropoulou - Topatsi
Miss M. Stamatelou
Mrs. E. Pilidou - Rossiou
Mr. C. Rizos
} Secretaries
Mr. Ch. Papantoniou, Technician
Mr. P. Domvros, Driver

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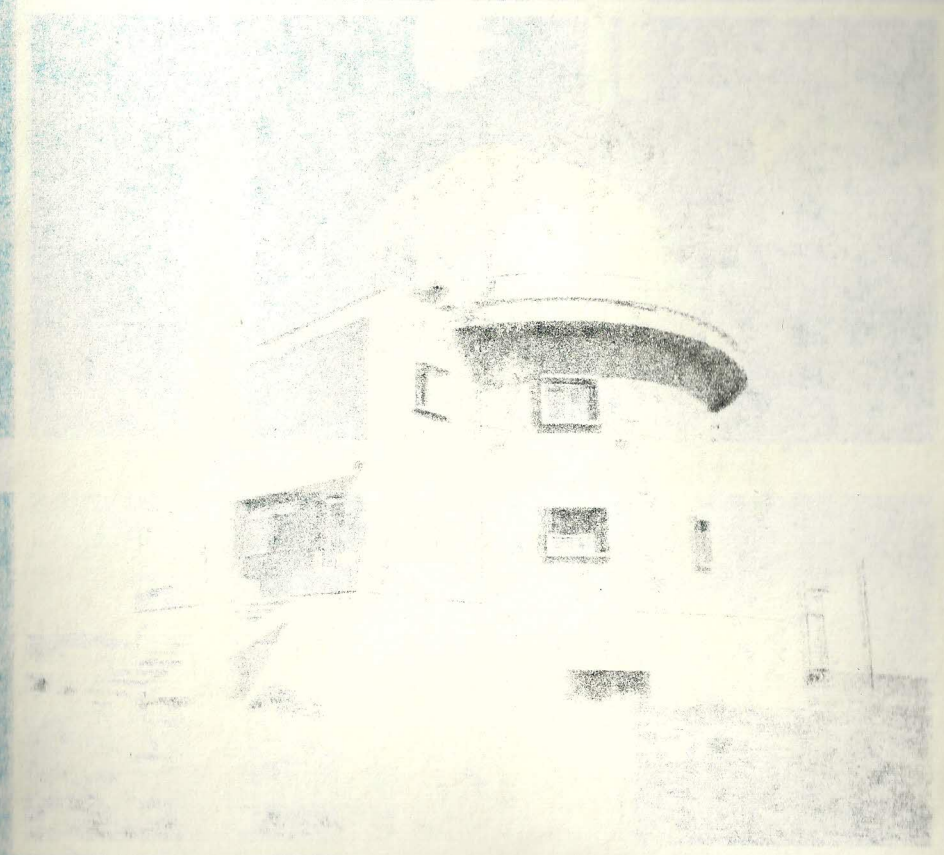
ASTRONOMY IN MODERN GREECE



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