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NATIONAL OBSERVATORY OF ATHENS

ASTRONOMICAL INSTITUTE

ANNUAL REPORT 1977

Staff: Prof. G. Contopoulos returned from the European Southern Observatory, where he spent a year on sabbatical leave and took over again the directorship of the Institute in September 1977. Assistant Professor M. Moutsoulas was acting director from December 1976 until September 1977.

Dr. E. Sarris received his Ph. D. from the University of Athens in October 1977.

Miss K. Stamoula and Mr. J. Douros, who did the solar patrol observations resigned and were replaced by Messrs. A. Lainas and P. Kannavos in November 1978.

Equipment: A plate holder with guiding system, constructed by Grubb Parsons, was delivered and tested on the 1.20 m telescope. An infrared photometer, constructed by the Royal Observatory of Edinburgh, was also tested on the 1.20 m telescope. An isodensity tracing system working with the Joyce Loebel microdensitometer was delivered.

Workshop: E. Sigalas, J. Zacharopoulos and Ch. Bourdas made the first aluminising of the 1.20 m mirror in November 1978. They also carried out all the technical and electronic work of the Institute. A. Vouzas carried out the technical work at the Pentele Station. J. Zacharopoulos constructed a new device for measuring the sunshine duration at the Pentele Station. An Antenna of 20 m for ΔT measurements was constructed at the Kryone-rion site.

Research

1. Planets: C. Banos studied various phenomena of the atmosphere of Jupiter. He also continued the photographic observations of Jupiter with the 1.20 m telescope. S. Sarris participated in this program of observations.

2. **Sun:** Th. Prokakis studied various phenomena of solar activity. D. Dialetis and Th. Prokakis determined the time of contacts of the 1966 solar eclipse. D. Dialetis continued his statistical analysis of solar flares. He started a theoretical project of signal analysis in collaboration with the laboratory of statistical mathematics of the «Pierre et Marie Curie» University in Paris.

3. **Stars:** P. Rovithis continued his work on the light curve of α Her and studied the $\frac{H\alpha}{NII}$ ratio in the NGC 2024 nebula. He also continued his observations of α Her, AR Lac, and the NGC 2024 nebula with the 63 cm refractor of the Pentele Station and the 1.20 m telescope of the Kryonerion Station. E. Kontizas continued his study of the intrinsic energy distribution of the early type stars in the visible and the ultraviolet spectra of giant stars in open clusters. He also started a program of photographic photometry of star clusters with the new plate holder constructed by Grubb Parsons for the 1.20 m telescope. D. Elias continued his observations of flare stars, novae, variable stars and occultations of stars with the 63 cm refractor of Pentele.

4. **Celestial Mechanics:** E. Sarris completed his thesis on the 3-dimensional elliptical restricted three body problem.

5. **Comets:** D. Elias performed systematic observations of the position and brightness of about 30 comets. He also continued his study of the influence of the solar wind on the absolute brightness of several comets.

6. **Seeing:** Th. Prokakis, D. Dialetis, G. Dimou and Miss Tsakali continued the ΔT observations at Pentele and Kryonerion. P. Rovithis and E. Kontizas carried out photoelectric measurements of the extinction in the Astronomical Stations of Kryonerion and Pentele. D. Elias studied the seasonal variation of the extinction coefficient at Pentele.

Routine observations: The Razdow flare patrol telescope was in continuous operation at the Pentele Station. $H\alpha$ filtergrams were systematically obtained during the whole year. These observations were carried out by K. Stamoula and J. Douros under the supervision of Th. Prokakis. Radiomonitoring of the Sun continued on 1415, 2695, 5000 and 8000 MHz. D. Elias continued almost daily observations of sunspots at the Pentele Station.

Time Service: D. Elias organised an automatic and autographic time service at the Pentele Station with an accuracy of 0.001 sec. Routine work was carried out by J. Zacharopoulos.

International cooperation: Th. Prokakis visited the Fraunhofer Institute and the Meudon Observatory, where he discussed problems of the solar telescope-spectrograph which is planned for the Astronomical Institute.

Meetings:

Th. Prokakis and E. Kontizas participated in the first meeting of the Greek Physicists' Union, which took place in Thessaloniki in April 1977. Th. Prokakis presented the activity of the solar research group of the Institute, and E. Kontizas presented a paper on the «Determination of T_{eff} of early type stars by comparison of observations with theoretical models».

Publications:

1. D. Elias: Nova Vul 1976, IAU circular No. 3096, 1977.
2. E. Kontizas: (In collaboration with K. Nandy and C. M. Humphries) Observations of luminous early type stars, *Memoirs Soc. Astron. Italiana* 47, 711, 1976.
3. Th. Prokakis and D. Dialetis: Zenith's photoelectric measurements, during the annular eclipse of April 29, 1976, *Solar physics* 53, 531, 1977.
4. P. Rovithis: (In collaboration with J. Meaburn). A new supernova remnant in the southern sky?, *Astroph. Space Science* 46, 7, 1977.
5. E. Sarris: Family of periodic orbits and new integrals of motion of the restricted three body problem (Thesis in Greek) 1977.

The activities of G. Contopoulos are described in the report of the Department of Astronomy of the University of Athens.

The director of the Institute
Professor G. CONTOPOULOS

DEPARTMENT OF ASTRONOMY

UNIVERSITY OF ATHENS

ANNUAL REPORT 1977

Staff: Professor G. Contopoulos returned from his sabbatical leave of absence at the European Southern Observatory, CERN, Geneva, at the end of September 1977.

During his absence he was replaced by the assistant Professor M. Moutsoulas.

Dr. P. Laskarides became «docent with teaching assignment» and resigned from his post as chief-assistant in November 1977.

Drs. M. Kontizas, D. Vaïopoulos, T. Papagiannopoulos and P. Niarchos were awarded their Ph. D. degrees during 1977.

Dr. P. Niarchos returned from his leave of absence in Manchester during December 1977.

Mr. J. Deliyiannis worked on solar spectroscopy in Meudon, France, during June-July, and since October 1977, after receiving a grant from the French Government and a leave of absence from the University of Athens.

Miss E. Antonopoulou returned from her leave of absence in Edinburgh during June 1977 and left again for Edinburgh in December 1977 after receiving a grant from the NATO Science Committee.

Dr. A. Zenios resigned from his post as research associate in March 1977.

Dr. C. E. Alissandrakis was appointed research associate with the Hellenic National Science Foundation in November 1977.

Research

I. Galactic Dynamics and Related Fields:

1) G. Contopoulos and C. Mertzaniades completed their work on the orbits and integrals of motion near the inner Lindblad resonance of barred

galaxies. A paper on this subject was published in «Astronomy and Astrophysics».

2) G. Contopoulos studied the periodic orbits near the particle resonance in galaxies. The connection between the orbits closing around the origin and the long — and short — period orbits librating around the Lagrangian points L_4 and L_5 was found, both theoretically and numerically. A family of orbits trapped around the inner Lindblad resonance, and reaching corotation was also found. A paper on this subject was accepted for publication in «Astronomy and Astrophysics».

3) G. Contopoulos studied the response of an initially axisymmetric galaxy to a spiral perturbation, including the region of the inner Lindblad resonance. The main effects contributing to the response density were discussed. A paper on this subject is prepared.

4) Mrs. E. Athanassoula and G. Contopoulos constructed a computer program that gives the response near the inner Lindblad resonance for any galactic model consisting of an axisymmetric background and a spiral perturbation.

5) P. Grosbol received his Ph.D. from the University of Copenhagen after submitting his thesis «Birthplaces of nearby early-type stars» that he had completed under G. Contopoulos.

6) Th. Papayannopoulos completed his thesis, under G. Contopoulos, on «Galactic Orbits near the Particle Resonances». He has begun an investigation of non-linear self-consistent solutions near the particle resonance in galaxies.

7) C. Terzides received his Ph.D. from the University of Bonn, after submitting his thesis on «Spiral Density Waves and Galactic Haloes», that he completed under G. Contopoulos. He has found what haloes allow a density wave, following the dispersion relation of Lynden-Bell and Kalnajs, to reach corotation. In general the halo within corotation should be rather small.

8) E. Spithas continued his study of the non-linear interaction of spiral modes. He also studied the quasilinear theory of density waves.

II. Integrals of Motion:

1) G. Contopoulos studied the reasons for the non-applicability of the integrals of motion (beyond the energy) in systems of three degrees of freedom. In general these integrals disappear if a parameter $\epsilon/\Delta\omega$ (where ϵ is the perturbation and $\Delta\omega$ the deviation from a double resonance condition)

is larger than a critical value. A paper on this subject was accepted for publication in «Celestial Mechanics».

2) G. Contopoulos studied the higher order resonances in dynamical systems. He exhibited some integrable systems where several higher order resonances (multiples of a basic resonance) are found. Therefore the hierarchy of resonances is not necessarily an indication of non-integrability. A paper on this subject has been prepared.

3) G. Contopoulos with L. Galgani and A. Giorgilli, of the Institute of Physics, University of Milan, studied some systems of three degrees of freedom that show a transition from integrability to ergodicity by increasing the perturbation ϵ . In some cases more than one ergodic regions were found that do not communicate, (at least for very long times), contrary to what one would expect. A paper on this subject is prepared. Further work, on an empirical «radius of convergence» for the perturbation ϵ is continuing.

4) The behaviour of some dynamical systems of three degrees of freedom was studied by L. Martinet and P. Magnenat of the Geneva Observatory in collaboration with G. Contopoulos.

5) P. Michaelidis continued his study of the 3:2 resonance in a system of two degrees of freedom (thesis under G. Contopoulos).

6) Ch. Varvoglis studied the particle orbits in the Astron machine for plasma confinement and found indications for the existence of a new integral besides the energy (thesis under G. Contopoulos).

7) M. Zikides started the study of the dissolution of the invariant curves in a 1:1 resonant system of two degrees of freedom.

III. Relativity:

1) G. Contopoulos and A. Zenios continued their study of the integrals of motion near a perturbed Kerr black hole.

2) D. Dionysiou studied various subjects in the post - Newtonian approximation scheme of General Relativity, namely the Lagrangian formalism of the N-body problem and the gravitational radiation of a perfect fluid and of a N-body system.

IV. Celestial Mechanics:

1) M. Zikides studied several families of periodic orbits in the circular and elliptical restricted three body problem and in the general three body problem.

V. Lunar and Planetary Studies — Remote Sensing

1) M. Moutsoulas was awarded a grant from the National Research Foundation for the study of problems of lunar topography and cartography.

2) M. Moutsoulas worked at the NASA Johnson Space Center and the Lunar Science Institute, in Houston, on problems of lunar and planetary orbiter imagery. He also studied problems of lunar photometry and constructed a lunar photometric ephemeris.

VI. Stellar Evolution

1) D. Vaïopoulos and A. Pinotsis continued their work, under P. Laskarides, on the evolution of stars with variable G. In particular A. Pinotsis calculated the isochrones for three particular ages.

VII. Spectroscopic and Photometric Observations

1) P. Laskarides, D. Vaïopoulos, A. Pinotsis, M. Zikides and Mrs. M. Tsoga started their spectrographic observations of double and variable stars, using the Richardson spectrograph attached to the 26-inch refractor of the Penteli Astronomical Station.

2) Mrs. M. Kontizas finished her thesis on «Photographic photometry of star clusters in the Small Magellanic Cloud» at the University of Edinburgh. She continued her study of star clusters and stellar fields in the Small Magellanic Cloud. In particular she did photographic photometry of the subgiants of the cluster 47 Tuc.

3) Mrs. M. Kontizas, together with E. Kontizas studied the extinction coefficient at the Kryonerion Astronomical Station.

4) Mrs. M. Kontizas studied the ultraviolet spectra of giant stars in open clusters.

5) Mrs. H. Rovithis - Livaniou made photoelectric observations of eclipsing binaries at the Astronomical Stations of Penteli and Kryonerion.

6) Mrs. H. Rovithis - Livaniou made the analysis of the light curves of some eclipsing variables.

7) P. Niarchos finished his thesis on «W Ursae Majoris Type Stars» at the Department of Astronomy of the University of Manchester.

8) P. Niarchos made photoelectric observations of eclipsing variables at the Royal Greenwich Observatory, and the Kryonerion Astronomical Station.

IX. Solar Observations

- 1) D. Papathanasoglou, J. Deliyiannis and Mrs. M. Tosga completed their analysis of the observations of the annular eclipse of 1976.
- 2) The same, with T. Prokakis and D. Dialetis of the National Observatory of Athens, completed their study of the site of the proposed new solar telescope and spectrorgraph.
- 3) C. E. Alissandrakis has continued his study of solar active regions in centimeter wavelengths.

X. Infrared Astronomy

- 1) Miss E. Antonopoulou worked on infrared photometry of close binary systems and on infrared techniques. She carried out infrared observations, in collaboration with Dr. M. Williams, using a photometer which was built at the Royal Observatory of the University of La Laguna on Tenerife. The interpretation of the data is in progress. She also collaborated with Dr. T.J. Lee and Mr. D. Beattie testing the new infrared photometer which was built at the Royal Observatory of Edinburgh for the 48" telescope of the Kryonerion Astronomical Station.

XI. Instruments

- 1) D. Papathanasoglou and J. Deliyiannis completed a study of the optical parameters of the objective of the Newall telescope in Penteli.

Publications

- 1) G. Contopoulos, «Stellar Dynamics» in N. Lebovitz, ed., «Theoretical Principles in Astrophysics and Relativity» Chicago Univ. Press, 1977.
- 2) G. Contopoulos and C. Mertzaniades, «Inner Lindblad Resonance in Galaxies. Nonlinear Theory. II Bars» *Astron. Astrophys.* 61, 477, 1977.
- 3) G. Contopoulos, «Disappearance of Integrals in Systems of More than Two Degrees of Freedom», European Southern Observatory, Preprint No. 11.
- 4) G. Contopoulos, «Periodic Orbits Near the Particle Resonance in Galaxies», European Southern Observatory, Preprint No. 14.
- 6) Z. Kopal, M. Moutsoulas and F. B. Waranius, (eds.), «Bibliography», *The Moon*, 16, 351, 465; 17, 179, 309, 1977.

6. M. Moutsoulas and D. Dionysiou, «Lectures in Dynamical Astronomy», Lecture Notes (in Greek) 1977.

- 7) D. Dionysiou, «Lagrangian Formalism up to the Fifth Order in the Einstein - Infeld - Hoffman Theory and Gravitational Radiation» *Let. Nuovo Cimento* 19, 383, 1977.

- 8) M. Kontizas, «Photographic Photometry of Star Clusters in the Small Magellanic Cloud», Ph.D. Thesis, University of Edinburgh, 1977.

- 9) D. Vaiopoulos, «Stellar Evolution with Variable G» (in Greek), Doctor's thesis, University of Athens, 1977.

- 10) T. Papagiannopoulos «Galactic Orbits near the Particle Resonance» (in Greek), Doctor's thesis, University of Athens, 1977.

- 11) H. Livaniou. «Fourier Analysis of the Light curves of Eclipsing Variable Stars. I. Photometric Perturbations for Total and Transit Eclipses», *Astrophys. Space Sci.* 51, 77, 1977.

- 12) P. Niarchos, «A Study of the W Ursae Majoris Type Stars», Ph.D. Thesis, University of Manchester, 1977.

- 13) P. Niarchos, «An Analysis of the Light Changes of the Eclipsing System AK Herculis in the Frequency Domain», *Astrophys. Space Sci.* 47, 79, 1977.

- 14) P. Niarchos (with E. Budding, A. R. Sadik and D. H. Jassur) «Observations of Eclipsing Binaries at the New National Observatory of Athens, Kryonerion, Greece», *Inf. Bull. Var. Stars*, No 1289, 1977.

- 15) C. E. Alissandrakis (with M. R. Kundu, J. D. Bregman and A. C. Hin) «6-centimeter Observations of Solar Active Regions with 6" Resolution», *Astrophys. J.* 213, 278, 1977.

Meetings — Lectures

G. Contopoulos was invited lecturer at the following Meetings: (1) «Stochasticity», Como, Italy, 19-23 June 1977, (2) «Christofilos International Summer School and Conference in Plasma Physics», Spetsai, Greece, 20-30 July 1977, (3) «The Chemical and Dynamical Evolution of our Galaxy», IAU Colloquium No. 45, Torun, Poland, 7-9 September 1977.

He also had invitations and gave lectures at:

Queen Mary College, London; Institute of Astronomy, Cambridge; Culham Laboratory, near Oxford; Besançon Observatory; Astronomisches Rechen-Institut, Heidelberg; Copernicus University, Torun; Geneva Observatory; and European Southern Observatory.

He also attended the European Southern Observatory Workshop on «Populations in the Magellanic Clouds», and meetings of the Executive Committee of the IAU, the board of Directors of the Journal «Astronomy and Astrophysics», the Astronomy Committee of the European Science Foundation, and the NATO Science Committee.

M. Moutsoulas attended the following Meetings: (1) The Annual Meeting of the Hellenic Physical Society (Thessaloniki, April 1-4, 1977), where he reported on the research activities of the Department, (2) The 20th Plenary Meeting of COSPAR, and the COSPAR Symposium on the Viking experiments (Tel Aviv, June 9-17, 1977), (3) The United Nations Conference on the Standardization of Geographical Names (Athens, August 1977), where he was elected Vice-Chairman of the Committee III (Exonyms, Maritime Features, Undersea Features, Extraterrestrial Features), (4) The Symposium on Remote Sensing Techniques with the use of Satellites, held at the «Institut Geographique National» (Paris, September 21-24, 1977), (5) The Annual Meeting of the International Astronautical Federation (Prague, September 25-30, 1977), where he presented a paper on the changes of martian surface features as observed in Viking Orbiter Imagery, and collaborated with Dr. J. Kleczek at the Ondrejov Observatory on aspects of solar radiation.

M. Moutsoulas took part in the Editorial Meeting of the Journals «Astrophysics and Space Science» and «The Moon» (Dordrecht, July 1977). It was decided that the subjects covered by «The Moon» Journal should be expanded, to include planetary research, with emphasis on comparative planetology. M. Moutsoulas will continue to serve this Journal as Associate Managing Editor.

J. Deliyiannis visited the Fraunhofer Institut, in Freiburg, and the Pic du Midi Observatory. He also attended the European Southern Observatory Meeting on «Optical Telescopes of the Future», Geneva, Switzerland in December 1977.

Miss E. Antonopoulou attended the Royal Astronomical Society Discussion Meeting held in Edinburgh, Scotland in April 1977.

S. Theodossiou attended the «International Summer School and Conference in Plasma Physics», Spetsai, Greece in July 1977.

M. Zikides and P. Michaelidis visited ESO for a few days during July 1977 in order to use the GERN computer for their work.

The Head of the Department
Professor G. CONTOPOULOS

ASTRONOMY DEPARTMENT UNIVERSITY OF THESSALONIKI

ANNUAL REPORT 1977

Staff: Since October 1, 1977, Dr. S. Persides is on leave of absence with an one year sabbatical at the Institute of Astronomy of the University of Cambridge, England, as a Senior Visiting Fellow. As Head of the Astronomy Department acts temporarily, since October 1977, Assistant Professor G. Bozis.

Dr. N. Spyrou spent three months at the Enrico Fermi Institute, University of Chicago, and visited the Center for Radiophysics and Space Research, Cornell University, New York, holding a three month Fulbright Hays grant for post doctoral research work in Astronomy and Relativistic Astrophysics at the above Institute. He returned to Greece in October 1977.

Dr. C. Mertzanides resigned in December 1977.

Thus the staff of the Department is at present as follows:

1) Dr. S. Persides, assistant professor, 2) Dr. N. Spyrou, chief assistant, 3) Mr. D. Papadopoulos, Mr. N. Caranicolas, Mr. P. Fylactopoulos, Mr. S. Avgoloupis and Mr. H. Varvoglis, assistants, 4) Mrs. F. Papageorgiou, Miss D. Mori and Mrs. C. Mertzanides, secretaries and 5) Mr. K. Papadopoulos, technician.

Research Programs:

I. General Relativity — Relativistic Astrophysics:

Prof. Persides continued his work in gravitational radiation, asymptotically flat space-times, etc.

Dr. N. Spyrou continued and completed his work on the post-New-

tonian general relativistic dynamical description of many-body systems of extended bodies with arbitrary internal structure and internal motions. Two papers were published and a third one was accepted for publication in the Journal of General Relativity and Gravitation.

Dr. N. Spyrou initiated a research program concerning various relativistic effects of astrophysical interest in many-body systems induced by the fact that the bodies of the system are not point-masses but realistic physical bodies of finite dimensions characterized by internal structure and internal motions. A paper has already been submitted in the Journal of General Relativity and Gravitation and another one is near completion.

Dr. N. Spyrou worked on the Newtonian dynamics of systems of extended fluid-bodies and derived the conditions under which the usual Newtonian theory of a system of point-masses can be applied to them. A paper has been accepted by the Journal Celestial Mechanics. Two more papers on related topics will appear in the Bulletin of the Greek Mathematical Society and Technical Annals, respectively.

Dr. N. Spyrou continued working on variational approaches to the energy in general relativity.

Dr. Persides and Mr. D. Papadopoulos continued the study of waves going through the horizon of a Schwarzschild black hole.

II. Galactic Dynamics and Related Fields:

Mr. N. Caranicolas is working on the existence of a third integral and applications in nearly spherical and nearly axisymmetric models of galaxies. A paper on «Models of Stellar Systems» has been submitted for publication in the Technical Annals.

III. Solar Physics:

Mr. P. Fylactopoulos and Mr. S. Avgoloupis continued their observations of various solar phenomena.

Publications:

1) S. Persides and I. Ioannides: Einstein-Maxwell Fields in Asymptotically Null-Spherical Coordinates, Progress of Theoretical Physics 58, 829, 1977 = Contr. Astron. Dept. Univ. Thessaloniki, No. 89.

2) N. Spyrou: Tensor Virial Equations for post-Newtonian Relativistic Stellar Dynamics, Gen. Rel. Grav. 8, 463, 1977 = Contr. Astron. Dept. Univ. Thessaloniki, No. 90.

3) N. Spyrou: On the Energy in Relativistic Stellar Dynamics, Gen. Rel. Grav. 8, 491, 1977 = Contr. Astron. Dept. Univ. Thessaloniki, No. 91.

Meetings:

Mr. H. Varvoglis participated in the N. C. Christophilos International Summer School and Conference in Plasma Physics, Island of Spetses, July 20-30, 1977.

Lectures:

Dr. N. Spyrou gave lectures at the Relativity Group of the Enrico Fermi Institute, University of Chicago, the Center for Radiophysics and Space Research, Cornell University, Ithaca, New York, and the Research Center for Astronomy and Applied Mathematics of the Academy of Athens.

Drs. Spyrou and Mertzanides gave seminars on various topics of mathematical physics at the Department of Astronomy of the University of Thessaloniki.

Prof. Y. Terzian of the Cornell University, U.S.A., gave a seminar for the staff of the Department and the students of Physics on «The Progress in the Interstellar Medium» in November 1977.

Teaching:

During the academic year 1976-77 Prof. S. Persides delivered lectures on Spherical Astronomy, Celestial Mechanics, General and Relativistic Astrophysics and Cosmology to the third and fourth year students of Physics and Mathematics.

During the same academic year Chief Assistant Dr. N. Spyrou delivered lectures on General Astrophysics to the third year students of Physics and Mathematics.

The Head of the Department
Asst. Professor G. BOZIS

DEPARTMENT OF ASTRONOMY
TECHNICAL UNIVERSITY OF ATHENS

ANNUAL REPORT 1977

Staff: During the year 1977 Mr. Gregory Missas was appointed Technician for a three years treaty. Thus the present staff consists of: 1) Professor John Argyrakos, Chairman, 2) Dr. M. Kyriakopoulos, Chief Assistant, 3) Mrs. K. Loukidelis, Assistant, 4) Mrs. K. Babilis, Assistant, 5) Mr. B. Kyriakou, Assistant, 6) Miss E. Cheretis, Assistant, and 7) Mr. G. Missas, Technician.

Teaching and Training: During the academic year 1976-1977, Prof. J. Argyrakos, Head of this Department, assisted by his Chief Assistant Dr. M. Kyriakopoulos and Assistants K. Loukidelis, K. Babilis, B. Kyriakou, and E. Cheretis, delivered a course on General, Spherical, Practical and Geodetical Astronomy. A seminar was likewise held for the benefit of the last-year graduates, on special subjects. The courses were attended by 127 + 29 students of the fifth and seventh six-month respectively of the rural and survey engineer School of this University. During this year Dr. C. Spyropoulos taught the obliging lesson of computers for the forth six-month students of this School.

Scientific Activities: During this academic year the Department continued his effort for acquisition a library of Computers' programs for automatically computation of Geodeticoastronomical observations.

The Head of the Department
Professor J. ARGYRAKOS

RESEARCH CENTER FOR ASTRONOMY
AND APPLIED MATHEMATICS

ACADEMY OF ATHENS

ANNUAL REPORT 1977

Staff: There have been no changes in the staff which, as in the previous year, consists of: 1) Ass. Prof. Dr. C. J. Macris, Director, 2) Dr. C. P. Poulakos, Chief Assistant, 3) Dr. B. P. Tritakis, Chief Assistant, 4) Mrs. H. C. Dara-Papamargariti, Assistant, 5) Mr. Th. G. Zachariadis, Assistant, 6) Dr. B. C. Petropoulos, Assistant, 8) Mr. M. C. Chondros, Secretary, 8) Mr. E. St. Tsioros, Technician, and 9) Mrs. E. D. Panoussi - Kountourioti, Assistant of Secretariat.

Research Programs: During the year 1977 the following programs were carried out:

- 1) Study on a new index of solar activity and its relation to other indices of Solar activity by Professor J. Xanthakis and Dr. C. Poulakos.
- 2) Solar Activity and Terrestrial Phenomena by Professor J. Xanthakis, and Drs. B. Tritakis and B. Petropoulos.
- 3) Study on the photospheric granulation by Dr. C. Macris.
- 4) Study on the Atmospheres of the planets Mars and Venus by Drs. C. Macris and B. Petropoulos.
- 5) Study on the Solar Prominences and study of the fine structure of the K chromosphere by Dr. C. Macris and Mrs. H. Dara - Papamargariti.
- 6) Flare stars and Galaxies by Dr. C. Poulakos.
- 7) Stars with strong emission in the Hz spectral Region by Dr. C. Poulakos and Mr. Th. Zachariadis.

8) Study on the Etesian winds in relation to the solar rotation and the interplanetary magnetic field by Dr. B. Tritakis.

9) Study on the Dynamics of the Solar Surges by Mrs. H. C. Dara-Papamargariti.

Publications: The following publications appeared in 1977 as contributions from the Research Center for Astronomy and Applied Mathematics, Academy of Athens, Series I Astronomy:

1) C. Poulakos: New flare Stars in the Vicinity of W3 (Contribution No. 49).

2) J. Xanthakis — B. Tritakis: Analytical Expression of the Mean Annual Variation of Precipitation within Various Latitude Zones of the Earth (Contribution No. 50).

3) C. Poulakos: New Flare Stars in Camelopardalis (Contribution No. 51).

4) C. Poulakos — R. Weinberger: A Photographic Survey for New Flare Stars (Contribution No. 52).

5) J. Xanthakis — C. Poulakos: Preliminary Results on the Discovery of Two Possible Galaxies in Cepheus. (Contribution No. 53).

6) C. Poulakos: Very Red Objects on the Palomar Observatory Sky Survey. (Contribution No. 54).

7) C. J. Macris — Th. G. Zachariadis: Measurements of the Zenith Brightness during the Annular Solar Eclipse of April 29, 1976 at Thera-Greece. (Contribution No. 55).

8) H. C. Dara — C. J. Macris: Study of the Motion of three Solar Prominences. (Contribution No. 56).

9) J. Xanthakis — C. Poulakos: Forecast for the 21st Solar Cycle. (Contribution No. 57).

10) C. J. Macris — B. Petropoulos: Les Parametres Physiques pour l'Atmosphère de Mars. (Contribution No. 58).

11) J. Xanthakis — C. Poulakos: A Microdensitometer Tracing of a New Elliptical Galaxy in Cepheus (Contribution No. 59).

12) C. Poulakos: Extraordinarily Red Stars on the Palomar Observatory Sky Survey, *Astron. — Astrophys. Suppl.* 17, 249-253, 1977.

13) C. Poulakos: Discovery of Five New Flare Stars and their Photographic Photometry. *Acta Astronomica* Vol. 27. No. 1, 1977.

14) C. Poulakos: Solar Activity and a Global Survey of Precipitation (In Greek. *Dimosievmata* Nr. 7).

15) C. Zerefos, D. Repapis, B. Tritakis: On the Power Spectrum of Inferred Interplanetary Magnetic Structure. *Praktika of the Academy of Athens*, Vol. 52, 1977.

16) H. Mantis, C. Zerefos, P. Repapis, B. Tritakis: On the Etesians over the Aegean. *Praktika of the Academy of Athens*, Vol. 52, 1977.

Library: 160 new volumes and 2.000 reprints, mostly from foreign Institutions on an exchange basis, were secured by the library.

Meetings - Scientific Missions: Dr. Macris, participated in the 1st National Meeting of Greek Physicists held in Thessaloniki from 1 to 4 April 1977 and gave a lecture over «the last Conquests of Astrophysics».

Dr. B. Petropoulos, participated: 1) in the International Symposium on Plasma Physics held on the island of Spetses from 20 to 30 July 1977, where he communicated a paper on «Plasma Spectroscopy, as a Diagnostic Tool in the Study of the Solar Spectrum and the Ionospheric Plasma of Comets», and 2) in the International Astronautical Congress, held in Prague of Czechoslovakia from 20 to 30 September 1977 where he communicated a paper on «Etudes des Phénomènes de Predissociation et Photodissociation qui Intervient Pendant la Combustion».

Dr. C. Macris, worked for one and a half month in the Pic-du-Midi Observatory (Bagnères de Bigorre) of France.

Dr. C. Poulakos worked for fifteen days in the Saint Michel Observatory of Haute Provence of France and collected photometric material to be used in a research program on very red stars and stars emitting in the H α spectral region.

Equipment (Laboratory). The Center has installed a full-equipped photographic chamber (dark room) in an apartment offered by the Academy of Athens.

National Scientific Committees. The Center continued offering secretarial facilities to the following Committees: 1) National Astronomical Committee, 2) National Committee for Space Research, 3) National Mathematical Committee. President of the mentioned committees is the Academician Prof. J. Xanthakis, Supervisor of the Center, and Secretary Mr. M. Chondros, also secretary of the Center. These committees are in contact with the

respective International Committees and coordinate the scientific research in Greece.

Cooperation with foreign Institutes: The Center has continued its cooperation with various foreign Institutes. The Astrophysical Institute of Paris as well as the Pic-du-Midi Observatory have loaned material of excellent quality.

Various: This year Prof. Homer Mantis of the University of Minnesota, USA, visited the Center for three months accepting our invitation, and cooperated with Drs. B. Tritakis, Ch. Zerefos and P. Repapis on the Etesian winds of the Aegean Sea.

The National Astronomical Committee continued the yearly Astronomical Seminars for the Greek Astronomers. Chairman of the meetings was Prof. Xanthakis, President of the Committee. Many interesting scientific subjects were presented.

The Director of the Center
Ass. Prof. Dr. C. J. MACRIS

DEPARTMENT OF GEODETIC ASTRONOMY
UNIVERSITY OF THESSALONIKI

ANNUAL REPORT 1977

Staff: Mr. C. Rizos, Technician was appointed Secretary of the Department, effective June 21, 1977. Furthermore: 1) Mrs. H. Zervaki - Zoirou, resigned from her post as Assistant of the Department, effective February 2, 1977, and 2) Mr. P. Kanakis, resigned from his post as Secretary of the Department, effective March 8, 1977.

Thus, the staff of the Department on December 31, 1977 consisted of the following: 1) Professor L. N. Mavridis, Head of the Department, 2) Dr. A. C. Tsioumis, Chief Assistant, 3) Dr. G. Asteriadis, Chief Assistant, 4) Mr. M. E. Contadakis, Assistant, 5) Mr. G. Kareklidis, Assistant, 6) Mr. D. Stavridis, Assistant, 7) Miss J. Karrinti, Assistant, 8) Mr. D. Arabelos, Assistant, 9) Mr. Ch. Kaltsikis, Assistant, 10) Miss P. Kyriakidou, Secretary, 11) Mrs. M. Spyropoulou - Topatsi, Secretary, 12) Miss M. Stamatelou, Secretary, 13) Mrs. E. Pilidou - Rossiou, Secretary, 14) Mr. C. Rizos, Secretary, 15) Mr. Ch. Papantoniou, Technician and 16) Mr. P. Domvros, Driver.

Equipment: The following equipment was acquired in 1977: 1) Five Hewlett - Packard, type 25A, scientific programable pocket calculators, 2) One Hewlett - Packard, type 7132A, 2-pen recorder and 3) One thermo-hydro-barograph, type 3007/1, constructed by Franz Ketterer.

Research Programs: The following research programs were carried out during 1977:

1) Period Changes of Galactic Cepheids (Professor L. N. Mavridis in collaboration with Dr. K. Bahner). The investigation of period changes of selected galactic Cepheids reported last year, was continued.

2) Rotational Velocities of the Members of Selected Open Clusters (Professor L. N. Mavridis in collaboration with Professor R. Kraft). The study of the rotational velocities of 50 stars in the area of the open cluster NGC 6633 reported last year, was continued.

3) Investigation of Problems of Star Formation (Professor L. N. Mavridis in collaboration with Professors B. Strömberg and J. Xanthakis). The survey of the stars with ultraviolet excess contained in an area of 2.000 square degrees in high galactic latitudes reported last year, was continued.

4) Distribution of the M-, S- and C-type Stars in Selected Areas of the Milky Way (Professor L. N. Mavridis). The photographic photometry and the study of the space distribution of the M-, S- and C-type stars found in the four areas centered on the open clusters NGC 188, NGC 752, NGC 7790 and M25 reported last year, was continued.

5) Photoelectric Observations of Flare Stars (Professor L. N. Mavridis in collaboration with Drs. G. Asteriadis, A. C. Tsioumis and V. Tsikoudi and Messrs. G. Kareklidis, Farouk Mahmoud, D. Stavridis and P. Varvoglis), Photoelectric observations of the Flare Stars: 1) UV Cet, 2) BY Dra and 3) EV Lac were carried out with the 30-inch reflector of the Department installed at the Stephanion Observatory. The results are being prepared for publication.

6) Photoelectric Observations of Suspected Flare Stars (Dr. G. Asteriadis and Mr. P. Varvoglis). Photoelectric Observations of the Flare Star candidates: 1) Gliese 526, 2) Gliese 752A and 3) Gliese 835 were carried out with the 30-inch reflector of the Department installed at the Stephanion Observatory. The results are being prepared for publication.

7) Kinematics of Stellar Systems. A study of the kinematical behaviour of the G and K stars was initiated by A. C. Tsioumis. Another study of the Kinematics of the Flare Stars in the solar neighborhood was completed by Dr. G. Asteriadis and the results are being prepared for publication.

8) Gravity and Magnetic Investigations in Greece (Professor L. N. Mavridis in collaboration with Mr. D. Arabelos and Miss J. Karrinti). The discussion of the gravity and magnetic measurements carried out by the Department in various areas of Greece during the last years was continued.

9) Propagation of Optical Radiation and Microwaves Through the Earth's Atmosphere. The study of lateral refraction in the area of Thrace reported last year was continued (Professor L. N. Mavridis in collaboration with Mr. A. Gounaris). Also the study of the seasonal variation of the

refractivity N of the air for microwaves in the area of Thessaloniki reported last year was continued (Professor L. N. Mavridis in collaboration with Drs. A. Bandellas and A. C. Tsioumis and Mr. P. Savaidis) and the first results are being prepared for publication.

10) Study of the Deviation of the Vertical in Northern Greece (Professor L. N. Mavridis in collaboration with Dr. A. C. Tsioumis and Mr. D. Stavridis). The study of the deviation of the vertical in various areas of Northern Greece reported last year was continued. The first results are being prepared for publication.

The research programs Nos. 3 and 4 were carried out in co-operation with the Research Center for Astronomy and Applied Mathematics, Academy of Athens.

Publications:

The following publications appeared in 1977:

Contributions from the Department of Geodetic Astronomy, University of Thessaloniki:

No. 14: K. Bahner and L. N. Mavridis, Photoelectric Photometry of Selected Galactic Cepheids: Two - Color Observations of 12 Cepheid Variables. *Praktika*, Academy of Athens, vol. 51, 486-516, 1977.

No. 15: G. Asteriadis, L. N. Mavridis and A. Tsioumis, Photoelectric Three-Color Observations of the Galactic Cepheids CD Cyg, X,Z,RR Lac and U Vul. *Praktika*, Academy of Athens, vol. 51, 540-576, 1977.

No. 16: G. Kareklidis, F. Mahmoud, L. N. Mavridis, D. Stavridis, H. Zervaki - Zoirou, Photoelectric Observations of the Flare Star BD+13° 2618 in 1973, 1974. Commission 27 of the IAU, *Information Bulletin on Variable Stars*, No. 1354, 1977.

No. 17: G. Kareklidis, F. Mahmoud, L. N. Mavridis, D. Stavridis, H. Zervaki - Zoirou, Photoelectric Observations of the Flare Star BD+16° 2708 in 1973, 1974. Commission 27 of the IAU, *Information Bulletin on Variable Stars*, No. 1355, 1977.

No. 18: G. Kareklidis, L. N. Mavridis, D. C. Stavridis, Photoelectric Observations of the Flare Star BD+55° 1823 in 1974. Commission 27 of the IAU, *Information Bulletin on Variable Stars*, No. 1356, 1977.

Publications of the Department of Geodetic Astronomy, University of Thessaloniki:

No. 4: A. Bandellas and L. N. Mavridis, The Accuracy of Microwave Distance Measurements. Proceedings of the International Symposium on Terrestrial Electromagnetic Distance Measurements and Atmospheric Effects on Angular Measurements held at the Royal Institute of Technology, Stockholm, Sweden 19-24 August 1974, vol. 1: Instrumentation, Field Procedures.

Also the following publication:

G. Asteriadis: Determination of Precession and Galactic Rotation from the Proper Motions of the AGK 3. Astronomy and Astrophysics, vol. 56, 25 - 38, 1977.

Teaching: Professor L. N. Mavridis delivered during the academic year 1976-1977 courses in Geodetic Astronomy to the third-year undergraduates and in Higher Geodesy to the fourth-year undergraduates of the Division of Rural and Surveying Engineering, Faculty of Technology of the University. Chief Assistant Dr. A. Tsioumis delivered during the same academic year courses in Higher Geodesy to the third-year undergraduates of the same Division.

Visitors: Mr. Farouk Mahmoud, Helwan Observatory worked at the Department during 1977. Also Dr. H. Kahmen from the Geodätisches Institut, Technische Universität Karlsruhe, visited the Department.

Miscellaneous: Professor L. N. Mavridis continued acting as President of the Administrative Council, Democritus University of Thrace and of the Administrative Council, State Scholarship Foundation. Professor L. N. Mavridis was the President of the Third United Nations Conference on the Standardization of Geographical Names, held in Athens August 17 — September 7, 1977. He also participated in the meeting of the Working Group of the Council of Europe, Division for Higher Education and Research on the «Reform and Development of Tertiary (Post-secondary) Education in Southern Europe» held in Ankara, September 22-23, 1977.

Dr. G. Asteriadis visited in September 1977 the Astronomisches Rechen - Institut, Heidelberg and discussed scientific problems of common interest with Professor W. Fricke, Mr. M.E. Contadakis received, effective October 1, 1977 a second one-year leave of absence from the Department and continued

working at the Max-Planck Institut für Astrophysik, Heidelberg. Mr. Ch. Kaltsikis received effective October 1, 1977 a one-year leave of absence from the Department and is working at the Lehrstuhl für Geodäsie, Technische Universität München.

The Head of the Department

Professor L. N. MAVRIDIS

DEPARTMENT OF ASTRONOMY

UNIVERSITY OF IOANNINA

ANNUAL REPORT 1977

Staff: The staff of the Department on December 31, 1977 consisted of the following persons:

1) Professor G. Banos, 2) Mr. Ph. Krommydas, Assistant, 3) Mr. D. Rizos, Assistant, 4) Mrs. H. Drossou, Secretary, 5) Mr. Ch. Nakas, Technician.

Mr. Ph. Krommydas received his Master's degree in Astronomy from the University of Sussex, England. Since October he is at the University of Innsbruck, Austria preparing his thesis.

Teaching: Prof. G. Banos held courses in Astronomy to the third-year undergraduate students of Physics and Mathematics.

Mr. D. Rizos held tutorial courses and exercises in Astronomy to the same students.

Research: Prof. G. Banos worked on solar activity and related phenomena. Mrs. H. Dara and Mr. Th. Zachariades continued their work on the solar prominences and the fine structure of the solar chromosphere respectively, under the supervision of Prof. G. Banos.

Equipment: The following equipment were acquired: a) A 8'' Cassegrain telescope ($f/12$), through Star-Liner Co., b) A H α solar filter (0.75 A HBW, 1/3 A tun.), through Carson Astr. Inst. Co., c) A «Satellite 2000» radio receiver, through Grundig Co., d) A TI-59 programmable calculator with a PC-10DA printer, through Texas Inst.

Miscellaneous: Mr. D. Rizos and Mr. Ch. Nakas spent 10 days, in September, at the Stephanion Observatory of the Department of Geodetic Astronomy, University of Thessaloniki, where they followed the technique of photoelectric observations.

Publications: G. Banos: Astronomy and Astrophysics, Part 2 (completed), University of Ioannina, Ioannina 1977.

The Head of the Department

Professor G. BANOS

DEPARTMENT OF ASTRONOMY

UNIVERSITY OF PATRAS

ANNUAL REPORT 1977

Staff: Dr. E. Evangelidis received an eight-month leave of absence and left on November 1st, 1977 for research work in the Department of Theoretical Physics, University of Oxford. Dr. Evangelidis has been accepted as member of Magdalen College, Oxford.

Mr. B. Zafiroopoulos is on leave of absence from this Department. He left on October 1st, 1977 for postgraduate studies (University of Manchester).

Teaching: Prof. B. Barbanis held courses in General Astronomy, Dynamical Astronomy and Cosmology to the students of Mathematics and Physics. Associate Prof. G. Antonacopoulos held courses in General Astronomy and Analytical Geometry, Dr. E. Evangelidis, Mr. P. Antonopoulos, Mrs. C. Flogaiti and Mr. B. Zafiroopoulos held example classes in these courses as well as Laboratory classes in Astrophysics.

Research Program: Dr. Barbanis studied the trapping effects on various time dependent potentials. Dr. Antonacopoulos continued his work on the equilibrium solutions and their stability of the secular variations in the restricted 3-body problem. Dr. Evangelidis continued working on Galactic Structure and General Relativity. Two papers have been accepted for publication. Mr. Antonopoulos continued his work on the trapping of particles in a time dependent Hamiltonian under the supervision of Dr. Barbanis.

Publications: 1) B. Barbanis: Lectures on General Astronomy (Text Book in Greek), Patras, 1977. 2) E. Evangelidis: Density Wave-Star Interaction in the Theory of Spiral Galaxies, *Astrophysics and Space Science* **46**, 309-319,

1977. 3) E. Evangelidis: The Dispersion Relation of a Gravitating Spiral System, *Astrophysics and Space Science* **49**, 481-495, 1977. 4) E. Evangelidis: The Behaviour of the Magnetic Lines of a Rotating System, *Astrophysics and Space Science* **51**, 319-327, 1977.

The Head of the Department

Prof. B. BARBANIS

DEPARTMENT OF ASTROPHYSICS

UNIVERSITY OF ATHENS

ANNUAL REPORT 1977

Following a proposal by the Faculty of Physics and Mathematics of the University of Athens a new Department of Astrophysics has been formed at the University of Athens under government Decree. One Chief assistant and one assistant will be appointed under the chair of Astrophysics. Besides a Laboratory of Astrophysics was founded. One chief assistant, two assistants and a Laboratory technician will man this Laboratory.

Teaching: Prof. S. Svolopoulos held courses on Astrophysics to the fourth-year undergraduates of Physics. Also he held courses on Space-Physics to the third-year undergraduates of Physics. About 20 students worked their thesis on Astrophysics for obtaining B.Sc. in Physics.

Research: Prof. Svolopoulos continued his studies on B stars from spectra taken at the observatory of Haute Provence.

Meeting: Prof. Svolopoulos participated to the Third United Nations Conference on the Standardization of Geographical Names held in Athens between August 17 and September 7.

Publications:

S. N. Svolopoulos: X Ray Astronomy and interstellar Space (in greek). Technical Chronics 46, 43, 1/1977.

The Head of the Department

Professor S. SVOLOPOULOS