UNIVERSITY OF CRETE
DEPARTMENT OF PHYSICS
SECTION OF ASTROPHYSICS & SPACE PHYSICS

ANNUAL REPORT FOR 2006

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Image Credit of Cover Page
Top: View of the Skinakas summit with the telescope domes and the housing quarters (see Sect. 3.1).
Middle: The receiving antennae of the SESCAT experiment near Chania (see Sect. 3.2).
Bottom: The 1.3m telescope of Skinakas Observatory inside its dome (see Sect. 3.1).

1. INTRODUCTION

The present document summarizes the activities of the members of the Section of Astrophysics and Space Physics at the Department of Physics of the University of Crete, during the 2006 calendar year. The staff of the Section consisted of 15 PhD research scientists, 5 graduate students and 4 technicians. Members of the Section were involved in teaching undergraduate and graduate courses at the University of Crete, while doing research in the fields of theoretical and observational Astrophysics, as well as in Atmospheric and Ionospheric Physics. Their work has been funded by national and international research grants, and in 2006 it resulted in 37 papers published in international refereed journals. Significant efforts were also devoted in the operation and improvement of the infrastructure and hardware at Skinakas Observatory and the Ionospheric Physics Laboratory. This document was prepared in January 2007, based on contributions from all members of the Section. The final editing was done by V. Charmandaris.

2. STAFF

The staff associated with the Section of Astrophysics and Space Physics consists of 15 PhD research scientists, 5 graduate students, and 4 technicians.

The 8 Physics faculty members of the Section during the whole period of the report were Vassilis Charmandaris (Assist. Prof.), Christos Haldoupis (Assoc. Prof.), Despina Hatzidimitriou (Assist. Prof.), Nikolaos D. Kylafis (Prof.), John Papamastorakis (Prof.), Iossif Papadakis (Assist. Prof.), Ilias M. Vardavas (Assoc. Prof.), and Joseph Ventura (Emeritus Prof.). Pablo Reig and Fotis Mavromatakis, who have tenure track positions at the Foundation for Research and Technology - Hellas (FORTH) and at the Technical Educational Institute (TEI) of Heraklion respectively, continued their affiliation with the Section. Researchers in non-tenure track positions holding a PhD degree were Dr. Angeliki Fotiadi, Dr. Zach Ioannou, Dr. Angelos Misiriotis, Dr. K. Pavlakis, and Dr. René J. Steiner. Support staff associated with the Skinakas Observatory were Anastasios Kougentakis, Dr. Eythymios V. Paleologou, George Paterakis, and Anna Stiakaki.

PhD students during this period were Valsamo Antoniou (with D. Hatzidimitriou), Panagiotis Lavvas (with I. Vardavas), and Agnes Mika (with C. Haldoupis), while masters students in astrophysics were T. Bitsakis and A. Manousakis. A. Manousakis also completed his senior diploma thesis entiled "Indetification of optical counterparts to HMXBs" (with P. Reig). S. Varkaris and N. Sakellaropoulos started working on their senior diploma thesis in March 2006, and E. Chatzopoulos in September 2006 (all three with I. Papadakis)

In Spring 2006, I. Vardavas was on sabbatical / academic leave. D. Hatzidimitriou was promoted to Associate Professor, J. Papamastorakis commenced his appointment as Full Professor, and J. Ventura was named Professor Emeritus. R. Steiner completed his postdoctoral term with the Ionospheric Physics Lab at the end of June 2006 and he is presently employed by Cosine Research B. V., a company located in Leiden, Holland.

3. FACILITIES

3.1. SKINAKAS OBSERVATORY

The Skinakas Observatory operates as part of a scientific research collaboration between the University of Crete, the Foundation for Research and Technology-Hellas (FORTH) and the Max-Planck-Institut für Extraterrestrische Physik in Germany. The Observatory has two fully operating telescopes: a Modified Ritchey-Chrétien telescope with a 1.3 m aperture (focal ratio of f7.6), which became operational in 1995, and a 30 cm telescope (focal ratio f3.2).

In 2006 a new Cassegrain telescope with a 0.6 m aperture (focal ratio of f/8) was installed next to the 1.3 m dome. The telescope will become fully operational next year. It will be run jointly by Skinakas and University of Tübingen (Germany), in a remotely controlled, robotic mode.

The main projects during the 2006 April-to-November observing period were:

- Photometry and Spectroscopy of Planetary Nebulae and Supernova Remnants.
- Photometry and Spectroscopy of Binaries with a compact star companion.
- Photometry of BL Lac objects.
- R and Hα band monitoring of the central region of M31 for the discovery of new Novae.

In May 2006 a new wide field (~7x7 arcmin) near-IR camera (1024x1024 CCD) was installed and commissioned on the 1.3m telescope.

In early June 2006 a fiber-fed, bench-mounted echelle, in white pupil arrangement, was installed at the 1.3m telescope. The spectrograph was commissioned with an engineering-class fiber of 100μm diameter. With the science fiber (of 50μm diameter) it is expected to achieve a resolution of up to 38,000.

In late June 2006 the improved version of the High Time Resolution OPTIMA Instrument ("OPTIMA BURST" http://www.mpe.mpg.de/OPTIMA/main.html) of the Max-Planck Institut für Extraterrestrische Physik was successfully installed at the 1.3 m telescope and it was in operation until the end of September 2006.

During 2006 the Observatory participated in the "Discovery Space project" (D-SPACE) whose prime purpose was to develop a network of robotic telescopes all over the world so that Europe's educational and science institutions have access to real time astronomical observations. As a result, the telescope and its basic instruments can now be controlled remotely. Live demonstrations of the remotely controlled use of the telescope were carried out in Bulgaria, CERN, and FORTH/Heraklion. Furthermore, two nights every month were devoted to observations (submitted by users through a web interface) related to the D-space project. Finally, a series of exercises, designed to cover the subject of Astronomy to an undergraduate university level, have been developed. They involve the use of the 1.3 m telescope, in a remotely controlled mode, and cover a broad spectrum of astronomical topics.

The tradition of "open nights" continued and the Observatory was open to the public for five nights during the 2006 observing season.

More details on the Observatory, the quality of the site, the telescopes, and the available instrumentation can be obtained from: http://skinakas.physics.uoc.gr

3.2. IONOSPHERIC PHYSICS LABORATORY

The Ionospheric Physics Laboratory (IPL), maintained operation of its main experimental facility, SESCAT (Sporadic E SCATter experiment), during the summer of 2006. SESCAT, which is the only ionospheric scatter radar that exists in Greece, operates at 50 MHz mostly as a Doppler radar but occasionally also as radio interferometer. It is observing the magnetic aspect of radio backscatter from electrostatic plasma waves in the E region of the ionosphere during times of strong dense layers of metallic ions, which form at altitudes of ~100 km and are subject to plasma instabilities. In addition, IPL in collaboration with Stanford University, continued (since 2003) the un-interrupted operation of a narrow-band very low frequency (VLF) receiver experiment throughout 2006, and maintained its VLF database. This experiment is used for studying VLF signatures and propagation effects in the lower ionosphere during times of intense atmospheric electrical activity and the occurrence of transient luminous events (sprites and elves) in the upper atmosphere. Also since the summer of 2005 IPL operates, in collaboration with the Eötvos-Lenard Budapest University, a second automatic VLF receiver system on a routine basis side by side with the Stanford receiver in the rooftop of the Physics Building.

4. COURSES

A number of elective undergraduate and graduate courses, directly related to the research areas covered by the Section, were offered as part of the teaching responsibilities of the faculty members. For 2006 these were:

- SPRING SEMESTER 2006
  - "Astrophysics II"
  - "Atmospheric Physics"
  - "Production and Propagation of Radiation in Astrophysics"
  - "Special Topics in Astrophysics"
  - "Topics of Ionospheric physics"

- FALL SEMESTER 2006
  - "Astrophysics I"
  - "Atmospheric Environment"
  - "Astrophysics III"
  - "Physics of Galaxies"
  - "Stellar Evolution and Nucleosynthesis"
  - "Plasma Astrophysics"

5. SCIENTIFIC RESEARCH

Here, we present a brief description of the major research projects in which members of the Section were involved in 2006. These are grouped by research area and the scientists associated with each project are indicated in parentheses.

The scientific publications that resulted from this work, over the same period, are presented at the end of the report in section 11.

5.1. THEORETICAL ASTROPHYSICS

- Black holes as X-ray sources: Modeling of the spectral states of black-hole X-ray binaries in order to explain their energy spectrum (from radio to X-rays) and the intricate time variability of their intensity. Compton up-scattering of soft photons seems to be the mechanism for producing the hard X-ray spectrum. (Researchers involved: N. Kylafis, P. Reig)

- Spectral energy distribution of spiral galaxies: A model for spiral galaxies which parameterizes their stellar and dust distribution and self consistently predicts their appearance in all the wavelengths can be used to constrain several physical parameters that are not directly observable. Such quantities are the Star Formation Rate, the dust opacity, the intrinsic Spectral Energy Distribution and the star formation history. (Researchers involved: N. Kylafis, A. Misiriotis)

- N-body simulation of Barred Galaxies: N-body simulations of spiral galaxies provide an insight on several dynamical mechanisms, which determine the morphology of barred Galaxies. The mass distribution of the halo, the resonant orbits, and the transfer of angular momentum from the disk to the halo, play a vital role on the long-term evolution of spiral galaxies, and they are examined in detail. (Researchers involved: A. Misiriotis)

5.2. OBSERVATIONAL ASTROPHYSICS

5.2.1. OBSERVATIONAL GALACTIC ASTROPHYSICS

- Optical observations of supernova remnants: Deep narrow band observations of supernova remnants are routinely performed with the 0.3m and 1.3m telescopes at Skinakas Observatory. The images are complemented by deep long slit spectra at selected positions of the target objects to study in detail the energy distribution. Supernova remnants contribute to the recycling of heavy elements in the galaxy and impart great amounts of energy to the interstellar medium. The use of interference filters isolating major optical emission lines allow the study of the morphology of these faint objects and the factors that contribute to their shaping. Furthermore, imagery in low and medium ionization lines offers a unique opportunity to study the different zones of emission behind the shock front. The spectra provide useful information about the extinction that the optical emission suffers, the electron density at the given location and the speed of the shock traveling into the interstellar clouds. In addition, estimates of the initial explosion energy can de made if the distance to the remnant is known. (Researchers involved: F. Mavromatakis, J. Papamastorakis, J. Ventura)

- Optical studies of Cataclysmic Variables: Cataclysmic Variables (CVs) are interacting binary systems where a low mass main sequence star orbits around a white dwarf star (WD). Mass transfer takes place from the main sequence star to the white dwarf through Roche lobe overflow. CVs can be classified into magnetic and non-magnetic systems depending on the magnetic properties of the WD. In systems where the WD magnetic field is low, an accretion disk is present and the WD accretes material through a boundary layer between the

surface of the WD star and the accretion disk. If the magnetic field of the WD is of intermediate strength then the inner part of the disk is truncated and accretion takes place via "accretion curtains" that transport material from the inner parts of the accretion disk to the magnetic poles of the WD. Finally, if the magnetic field strength is high enough ($B>10^8$ Gauss) it can prevent the formation of an accretion disk and material is trapped by the magnetic field lines and transported directly to the magnetic poles of the WD. The study of the physical processes occurring in these systems is crucial in our understanding of energy and angular momentum transport as well as magnetic viscosity in accretion flows. In 2005 the Skinakas Observatory took part in a worldwide multi-wavelength campaign involving observatories and satellites such as Chandra, GALEX, VLT and the VLA among others investigating the accretion properties of the magnetic CV system AE Aqr. (Researchers involved: Z. Ioannou)

- X-ray variability of X-ray binaries (XRB): XRB consist of a compact star (neutron star or black hole) orbiting a regular star. When part of the material from the optical companion is accreted on the compact object the system brightens in X-rays. Hard X-ray observations provide a valuable probe of the emission region near the compact object. The goal here is to investigate their periodic/quasiperiodic/aperiodic variability. To achieve this goal different timing analysis techniques such as power spectra, Fourier-resolved spectra, phase-lag spectra are used. Data mainly come from RXTE and INTEGRAL. (Researchers involved: P. Reig, I. Papadakis)

- Optical/IR monitoring of Be/X-ray binaries (BeX): BeX consist of a neutron star orbiting a O9e-B2e main-sequence star. The letter "e" stands for emission, as instead of the normal photospheric absorption lines the optical spectra of Be stars display emission lines. Strong infrared emission is another defining characteristic of Be stars. The origin of these two observational properties (emission lines and infrared excess) resides in a gaseous, equatorially concentrated circumstellar disc around the OB star. This disc constitutes the main source of variability in BeX. The main objective of this project is to characterize the optical/IR variability time scales of Be/X-ray binaries. This objective is achieved by monitoring the evolution of the disc over many years. The main sources of data are the 1.3 m telescope of the Skinakas Observatory (optical) and the 1.5 m Carlos Sanchez Telescope in Tenerife (IR). (Researchers involved: P. Reig)

- Search for optical counterparts to HMXB: An optical identification is necessary to facilitate a complete study of these systems. Without a known counterpart, observations are limited to X-ray energies, and hence our understanding of the structure and dynamics of those systems that remain optically unidentified is incomplete. (Researchers involved: P. Reig)

- Interaction of the neutron star with the Be star's envelope: Be stars may have an isolated life or take part in binaries (the BeX systems). The difference is the presence, or not, of a neutron star. Here the objective is to investigate the effects of the compact object on the structure and evolution of the circumstellar envelope. One of the most interesting effects is the truncation of this envelope by the neutron star. One of the main goals is to find observational evidence of such truncation. (Researchers involved: P. Reig)

5.2.2. OBSERVATIONAL EXTRAGALACTIC ASTROPHYSICS

- Study of properties of carbon stars in the Magellanic Clouds: In collaboration with R. Cannon (AAO) and D. Morgan (ROE), optical spectra for 2300 carbon stars in the Magellanic Clouds were obtained, using the 2df spectroscopic facility at the Anglo-Australian Telescope. This dataset is the largest homogeneous sample of such stars ever studied, allowing detailed analysis and comparison against theoretical models of rare types of stars, such as cool R Coronae Borealis stars, Lithium-rich carbon stars, Merrill-Sanford band carbon stars etc. The spectra are in the process of being analysed to yield radial velocities of carbon stars in both the LMC and the SMC, with the purpose of providing a significantly improved dynamical descriprion of the intermediate age populations in these galaxies. (Researchers involved: D. Hatzidimitriou)

- Study of X-ray sources in M31: In collaboration with W. Pietsch (MPE/Germany) and the XMM-Newton -M31 consortium, we are performing an extensive study of the population of X-ray sources in M31. Two Large Telescope proposals with XMM Newton were awarded time during 2006, in connection to this project. Spectroscopy of optical counterparts has been obtained with the 1.3m Skinakas Telescope, and with the 3.5m telescope at the Apache Point Observatory. (D. Hatzidimitriou, P. Reig)

- Study of X-ray sources in the Small Magellanic Cloud: In collaboration with A. Zezas (CfA/USA), a study of the X-ray population in the Small Magellanic Cloud is underway, using Chandra observations of the central region of the Small Magellanic Cloud, dominated by a recent burst of star formation. Study of the optical counterparts and characterization of the star formation history in the specific areas of the Chandra sources, is being conducted using optical imaging and spectroscopy with the 6m-Magellan Telescope, and the 4m-Anglo-Australian Telescope (2df). (Researchers involved: D. Hatzidimitriou).

- Nova monitoring in M31: In collaboration with W. Pietsch (MPE/Germany), we use the 1.3m Skinakas Telescope to monitor the central regions of M31, in search of novae. Follow-up spectroscopy of newly discovered novae is also conducted with the Skinakas 1.3m telescope. (D. Hatzidimitriou, P. Reig)

- X-ray variability study of AGN: The study involves the use of data from recent satellites (mainly RXTE and XMM-Newton). One of the main projects is to investigate the observed spectral and flux AGN variations with the new and powerful technique of Fourier resolved spectroscopy. Work is also done on high quality data of individual, nearby Seyferts (Akn 564 and Mkn 766). Finally, the study of the AGN variability properties and their evolution with cosmic time has been initiated, using the XMM-Newton archival data on Lockman hole. (Researchers involved: I. Papadakis, Z. Ioannou)

- Optical variability study of BL Lac objects: Using the Skinakas observatory, a number of "Low Frequency Peaked" BL Lacs is currently observed, in order to characterize their flux and spectral variations, and compare them with the respective UV/X-ray variations observed in the "High Frequency peaked" BL Lacs. Furthermore, we are active members of the "World Earth Blazar Telescope", participating in a couple of worldwide, multifrequency observational campaigns every year. (Researchers involved: I. Papadakis, J. Papamastorakis)

- Mid-infrared properties of Ultraluminous Infrared Galaxies (ULIRGs): This project uses observations of the Infrared Spectrograph on the Spitzer Space Telescope in order to explore the mid-infrared properties of ULIRGs. The main goal is to improve the understanding of the dominant mechanism of the energy source (accretion onto an active nucleus or a super-massive starburst) in these galaxies by developing a robust diagnostic between a starburst and AGN in dust-enshrouded galactic nuclei. (Researchers involved: V. Charmandaris)

- Star formation and stellar populations in Hickson Compact Groups: Based on mid-infrared observations of a sample of Hickson Compact Groups obtained with the Infrared Space Observatory and near-infrared imaging data of the Palomar 5 m telescope, this project attempts to map in detail the star formation activity and old stellar population of these systems. (Researchers involved: V. Charmandaris)

5.3. ATMOSPHERIC & IONOSPHERIC PHYSICS

- Earth Observation and climate Project: Research work on Earth Observation and the Earth's Radiation Budget is an ongoing project. Modelling work of the radiation forcing of aerosols on a planetary scale includes the effects of aerosols on the solar ultraviolet, visible and near-infrared radiation reaching the Earth's surface. Model input data include satellite data from the NASA EOS satellites, Aqua and Terra. Ground-based data include the AERONET (Aerosol Robotic Network) site operated in Crete and provided by NASA Goddard. Climate research includes the effects of the El Nino phenomenon on the surface radiation budget over the tropical Pacific ocean. Collaboration with NASA Langley and the Meteorological Institute of the University of Munich on the heat budgets of enclosed seas, such as the Mediterranean, Black and Red seas is ongoing.: (Researchers involved: I. Vardavas,, N. Hatzianastassiou (Univ. of Ioannina), C. Matsoukas (Univ. of the Aegean), K. Pavlakis, A. Fotiadi, C. Papademas (Univ. of Ioannina)).

- Modelling the Evolution of Planetary Atmospheres Project: Research on modelling the evolution of planetary atmospheres has focussed on the development of a radiative/convective-photochemical-microphysical model for the global mean vertical atmospheric structure of the Precambrian Earth and of Titan. The Titan model has been validated against data from the recent Cassini/Huygens mission to Titan. A model for the formation of the haze layer that surrounds Titan has been developed. Work on the evolution of ultraviolet and XUV radiation of G-type solar like stars, which affects the atmospheric chemical composition of planets orbiting such stars, is ongoing with planned applications to exoplanets around G-type stars. (Researchers involved: I. Vardavas, P. Lavvas)

- Ionospheric and Upper Atmospheric Physics: The research topics under study relate to the plasma physics and electrodynamics of irregular ionospheric phenomena occurring at midlatitude, and problems associated with the interaction and coupling of the neutral mesosphere and lower thermosphere with the earth's ionosphere. During 2006 our research focused on the following topics : 1) the properties and mechanisms relating to the formation and destabilization of midlatitude sporadic E plasma layers (Es), and the role of

wind shears and atmospheric tidal, gravity and planetary waves on sporadic E layer morphology and variability. 2) the electrodynamic coupling between the unstable Es plasma and midlatitude ionospheric "spread F" and the generation of large electric fields in patchy sporadic E plasma layers, 3) the role of plasma density gradients on the generation of short scale electrostatic plasma waves in the ionospheric E region, 4) the effects on VLF (very low frequency) electromagnetic wave propagation and VLF response signatures associated with "transient luminous events", such as sprites and elves, which are atmospheric electricity (thunderstorm and lightning) phenomena in the upper atmosphere and lower ionosphere, 5) meteor trail plasma instabilities and unusually long-lasting meteor echoes observed with VHF (very high frequency) and HF radars, and 6) studies of ionospheric resonance phenomena observed in ultra low frequency (ULF) electromagnetic noise recordings with sensitive coil magnetometers. (Researchers involved: C. Haldoupis)

6. RESEARCH FUNDING

The following projects, funded by national and international agencies, enabled the research activities of the Section during the period of the report.

- EU funded Transfer of Knowledge grand for the "Development of an Astrophysics Center in Crete", (P.I.: N.D. Kylafis, budget: €741,000, duration: 2006-2010)
- Europlanet: Partners to a network funded by the European Union involving European institutes perfoming research on planets. (P.I. for Greece: I. Vardavas, total network budget: €2,000,000, duration: 2004-2008)
- IKYDA 2004 funded research project between Greece and Germany. Title: "Determination of the mean spectral energy distribution of nearby active galaxies" (P.I.: I. Papadakis, budget: €10,000, duration: 2005-2006)
- GSRT funded research project within the "Scientific and Technological Cooperation between RTD organizations in Greece and USA" program of GSRT. Title: "Fourier Frequency Resolved X-ray spectroscopy of AGN, using Newton-XMM data". (P.I.: I. Papadakis, budget: €60,000, duration: 2005-2006)
- Pythagoras II Post-Doctoral Project Award. Two year funding for the research project of Dr. A. Misiriotis entitled: "Morphology and Dynamics of Spiral Galaxies" under the supervision of Prof. Kylafis. (budget: €50,000, duration: 2005-2006)
- Pythagoras II Post-Doctoral Project Award. Research funding for the project of Dr. a. Fotiadi "The Impact of Aerosol Radiative Forcing on the Energy and Water Budget of the Eastern Mediterranean" under the supervision of Prof. Vardavas (budget: €80,000, duration: 2004-2007)
- Herakleitos Doctoral Project: Research funding for the doctoral thesis project of P. Lavvas entitled: "Spatial and Temporal Variations in the Properties of the Atmosphere and Surface of Titan: Simulations and Interpretation through Space and Ground Obseravtions" under the supervision of Prof. Vardavas and Dr. A. Coustenis (Paris Observatory, France), (budget: €33,000, duration: 2002-2006)
- PENED Doctoral Projet: Research funding for the doctoral thesis of C. Papademas entitled: "Aeorosol forcing climatic impacts on the Mediterranean Region", under the supervision of Prof. Vardavas and Prof. N. Hatzianastassiou (Univ. of Ioannina)), (budget: €60,000, duration: 2006-2008)
- Platon: French-Greek scientific exchange on the topic of Titan's atmosphere. (P.I. I. Vardavas, budget: €12,000, duration: 2006-2008)

- ESA funded project on the "Support to Development of a Standard Product Generation Pipeline and a Quality Control Framework for Data Products within the Advanced Data Processing System for Herschel", ESA/Herschel Mission. (P.I.: V. Charmandaris, budget: €271,000, duration: 2006-2009.)
- European Union (EU) Research Training Network (RTN) project, entitled "Coupling of Atmospheric Layers", (P.I.: C. Haldoupis, budget: €181,000, duration: 2003-2007).
- Collaborative research program between GSRT and the Russian Academy of Sciences, entitled "Investigation of the Electrodynamics and Plasma Physics of Ionospheric Phenomena at Midlatitude". (P.I.: C. Haldoupis, budget: €11,700, duration: 2004-2007).

7. COLLABORATIONS WITH OTHER INSTITUTES

Members of the group are actively collaborating with scientists affiliated with the following universities and research institutes:

- GREECE
  - Foundation for Research and Technology – Hellas (FORTH), Heraklion
  - National Observatory of Athens, Athens
  - Technical Education Institute of Crete, Dept. of Electrical Engineering, Heraklion
  - University of the Aegean, Dept. of Environment, Mytilene
  - University of Ioannina, Dept. of Physics, Ioannina

- INTERNATIONAL
  - Anglo-Australian Observatory, Australia
  - California Institute of Technology, Spitzer Science Center, Pasadena, CA, USA
  - CEA/Saclay, Service d'Astrophysique, France
  - Cornell University, Astronomy Department, Ithaca, NY, USA
  - Danish Space Research Institute (DSRI), Denmark
  - East Tennessee State University, TN, USA
  - Eötvos-Lenard University, Budapest, Hungary
  - ETH, Zurich, Switzerland
  - Free University of Berlin, Germany
  - Harvard University, Center for Astrophysics, Cambridge, MA, USA
  - Imperial College, UK
  - Institut d'Astrophysique de Paris, France
  - Institute of Physics of the Earth, Russia
  - Iowa State University, Dept. of Physics & Astronomy, Ames, IA, USA
  - Lawrence Livermore National Lab, CA, USA
  - Max-Planck-Institut für Extraterrestrische Physik, Garching, Germany
  - Max-Planck-Institut für Kernphysik, Heidelberg, Germany
  - NASA Goddard Space Flight Center, Greenbelt, MD, USA
  - NASA Langley Division of Atmospheric Sciences, Langley, VA, USA
  - NASA Marshal Space Flight Center, Huntsville, AL, USA
  - Nagoya University, Japan
  - National Space Science and Technology Center, Huntsville, AL, USA
  - Observatoire de Marseille, France
  - Observatoire de Paris, France
  - Royal Observatory Edinburgh, UK
  - San Diego State University, CA, USA
  - Stanford University, Palo Alto, CA, USA
  - Université de Rennes, France

- University of Alicante, Spain
- University of Arizona, Tucson, AZ, USA
- University of Bath, UK
- University of Nagoya, Solar-Terrestrial Environment Laboratory, Japan
- University of Oulu, Finland
- University of Saskatchewan, Canada
- University of Southampton, UK
- University of Texas at Austin, TX, USA
- University of Valencia, Spain

8. National & International Committees

During the period covered by this report, members of the Section were in a number of national and international committees. More specifically:

Prof. V. Charmandaris was elected as the Secretary of the Hellenic Astronomical Society for the 2006 – 2008 term. He also continued his duties as the Editor of the European Astronomical Society Newsletter (since 2005), Editor of the Newsletter of the Hellenic Astronomical Society (since 1997), as well as the Editor of the Physics Panel of the Annals of the "Marie Curie" Fellowship Association (since 2002).

Prof. C. Haldoupis, was appointed Associate Editor of the Journal Of Geophysical Research (JGR), of the American Geophysical Union (2006-2008)

Prof. D. Hatzidimitriou was the Vice President of the Hellenic Astronomical Society for the 2004 – 2006 term. She was a member elect of the Organizing Committee of the IAU Commission 37: "Star Clusters and Associations" for the period 2003 – 2006, and became the president of the Commission for the 2006-2009 term. She was also elected as the Vice-President of the IAU Division VII: "Galactic System" for the 2006-2009 term.

Prof. N. Kylafis was an ordinary member of the Greek National Committee for Astronomy (GNCA) and a substitute to the representative of Greece to the Optical Infrared Coordination Network for Astronomy (OPTICON).

Prof. I. Papadakis was elected in the Governing Council of the Hellenic Astronomical Society for the 2006 – 2008 term.

Prof. J. Papamastorakis was a substitute member of the Greek National Committee for Astronomy.

9. Conference & Workshop Organization

Profs. V. Charmandaris and N. Kylafis in collaboration with Dr. Dimitra Rigopoulou (Oxford University, UK) organized an international conference (101 participants from 10 different countries) entitled "Studying Galaxy Evolution with Spitzer and Herschel". The conference took place in the Mirabello Hotel of Agios Nikolaos, Crete, from May 28 to June 2, 2006 (see http://galev06.physics.uoc.gr).

Prof. C. Haldoupis was appointed to host and organize the 12 International Symposium on Equatorial Aeronomy, which is to be held in Crete, from 18 – 24, May, 2008 (see http://isea12.physics.uoc.gr)

Prof. D. Hatzidimitriou was the chair of the organizing committee for the 2006 physics summer school organized for the 18th consecutive year by the Physics Department. The summer school provides introductory graduate level courses in various areas of modern physics to 4th year physics students from all Universities of Greece. The theme for this year was "Quantum Optics and Quantum Information" (see http://summer.physics.uoc.gr/)

Prof. J. Papamastorakis was the chair of the organizing committee of the "Onassis Foundation Science Lecture Series", which take place at the premises of FORTH every summer. The lectures are principally sponsored by the Onassis Benefit Foundation and selected students from across Europe are financially assisted to attend. A Nobel laureate, surrounded by leading scientists in the same field, presents intensive lectures to students for a week. Typically two and occasionally three lecture series are organized every summer since 2001. The 2006 lectures addressed two topics, one in Biology: "Braing Plasticity: from Molecules to Behavior" and one in Computer Science: "Robots Intelligently Interacting with People" (see http://www.forth.gr/onassis).

10. VISITORS

A number of scientists visited our Department in order to collaborate with staff members of the Section and/or give seminars. During the 2006 calendar year these individuals were: Dr. P. Blay (Univ. of Valencia, Spain), Dr. T. Bösinger, (Univ. of Oulu, Finland), Prof. A. Bourdillon, (Université de Rennes, France), Dr. W. Brinkman (MPE– Garching, Germany), Dr. D. Giannios (MPA-Garching, Germany), Prof. M. Griffin (Cardiff Univ., UK). Dr. G. Kanbach (MPE– Garching, Germany), Prof. T. Krimigis (Academy of Athens & Johns Hopkins Univ. USA), Dr. D. Kazanas (NASA/GSFC, USA), Prof. C. Norman (Johns Hopkins University, USA), Dr. A. Paizis (INAF-IASF, Milano, Italy), Dr. V. Pavlidou (Univ. of Chicago, USA), Dr. P. Papadopoulos (ETH Zurich, Switzerland), Prof. M. Rowan-Robinson (Imperial College, UK), Dr. H. Spruit (MPA – Garching, Germany), Dr. K. Tassis (Univ. of Chicago, USA), A. Zezas (CfA Harvard Univ., USA).

11. PUBLICATIONS

The following 37 publications of the members of the Section appeared in print in international refereed journals during the 2006 calendar year. This corresponds to ~2.5 refereed publications per PhD researcher. For each publication, the names of the members of the Section are underlined.

1. Arévalo, P., Papadakis, I. E., Uttley, P., McHardy, I. M., Brinkmann, W. "Spectral-timing evidence for a very high state in the narrow-line Seyfert 1 Ark 564", 2006, MNRAS, 372, 401
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