The following report covers the Department activities from November 2003 through October 2004.

1. HISTORY AND PERSONNEL

The Department of Astronomy (DA) was founded in late 1994 as part of the Physics Institute of “Universidad de Guanajuato” (UG), the university of Guanajuato state. The DA with its eight staff astronomers is located in the city of Guanajuato. Its main goals are teaching, research and public outreach. The members of the DA during the period covered were Heinz Andernach (current Head of Dept.), Hector Bravo-Alfaro (on sabbatical leave at IAP from Sept. 2004), Roger Coziol, Philippe Eenens (on sabbatical leave at Univ. of Liège until July 2004), Renée Kraan-Korteweg (Head of Dept. until June 2004; currently on sabbatical leave at CSIRO), Victor Migenes, Margarita Valdez-Gutiérrez, and Miguel Trinidad (since Sept. 2004). For additional information see the web site at http://www.astro.ugto.mx.

2. ACADEMIC PROGRAM

2.1 Undergraduate Program

Created in 1998, the Licenciatura en Física (BSc) offers a double-major in physics and astrophysics, and has produced the first two students with a BSc in astrophysics in mid-2004.

2.2 Postgraduate Programs

Since August 2004 the DA offers a graduate program in Astrophysics. This program incorporates, in addition to the more standard ones, new areas for research in Astro-Chemistry, Astro-Biology, Simulation, Modeling and Computation, in collaboration with the departments of Chemistry, Biology, Mathematics and Physics of the University. Occasionally staff members co-supervise MSc or PhD theses of students from other (Mexican or non-Mexican) universities, and teach courses in other Mexican astronomy programs, as well as in other non-astro programs of UG.

2.3 Theses supervised

In December 2003 Laura Cruz-Vazquez finished her MSc thesis on the OH maser emission in high-mass star forming regions, supervised by V. Migenes. In July 2004 two BSc theses were defended, one by I. Plauchu on H I observations of galaxies in the cluster A1367, supervised by H. Bravo-Alfaro, and the other by J.M. Islas-Islas on the H I detection of galaxies in the Zone of Avoidance, supervised by R. Kraan-Korteweg. V. Migenes is supervising the BSc thesis of A.E. Ruiz-Velasco on “High-spatial resolution observations of OH maser emission in Star Forming Regions.” The defense will be in December 2004.

2.4 Observatory

The DA owns the observatory “La Luz,” ~18 km W of Guanajuato city. It houses a 57-cm Ritchey-Chretien reflector, equipped with a spectrograph and a large (4008 x 2745) CCD camera with standard filter sets. A 2.3-m radio antenna with a digital receiver for radio astronomy is being implemented, and two further antennas are planned to permit interferometry. The telescopes are used as a laboratory for students and for research projects optimized for this kind of instrument.

2.5 Outreach

Since its foundation, the DA has organized two annual cycles of five talks to the public, every spring and autumn. These are delivered mostly by Mexican astronomers in the center of Guanajuato.

Twice a month from September through March, guided tours are offered to the public at the observatory “La Luz.” Both the 57-cm telescope and an 8-inch Celestron are used for stargazing. The roof of the central building of UG, equipped with an 8-inch Celestron, is supervised by two engineers and is open to the public every evening on weekdays.

2.6 Organization of Meetings

The 19th national meeting of astronomers in Mexico (Congreso Nacional de Astronomía) will be held March 16–18, 2005, in Guanajuato, and organized by members of the DA, headed by V. Migenes. Over 100 professional astronomers and students are expected from all over Mexico. P. Eenens is a member of the SOC of IAU Symp. 227 on “Massive Star Birth: A Crossroads of Astrophysics” to be held in Acireale (Catania), Italy, May 16–20, 2005.

3. RESEARCH

3.1 Stars and Star Formation

P. Eenens studies the physical characteristics, chemical composition and structure of winds of massive stars, as well as the parameters of variable stars and interactions between components of binary stars. The aim is to improve our knowledge of the fundamental parameters of massive stars and to understand the process of their evolution based on observable phenomena. He uses stellar spectroscopy to determine distances and abundances of some OB stars in clusters. He is a member of the Organizing Committee of IAU Commission 29 and of the IAU Working Group on Massive Stars, for which he edits the Massive Star Newsletter (see http://www.astro.ugto.mx/~eenens/hot).

V. Migenes studies the physical and kinematical conditions in star formation regions, late-type stars and AGNs,
using radio interferometry of the line and continuum emission. He uses the maser lines of OH, H$_2$O and SiO and their properties to probe the sources’ most active regions with sub-arcsecond resolution in order to better understand the processes involved in star formation, the chemical composition and structure of the winds and mass loss processes in late-type stars, and finally the existence of black holes in the nuclei of galaxies. He also uses radio-interferometry to study the origin and nature of the non-thermal emission from radio stars.

M.A. Trinidad uses radio-interferometric and single-dish observations to study the line and continuum emission from high-mass star formation regions and infer their physical and kinematical conditions. In particular he uses the H$_2$O maser line at sub-arcsecond angular resolution to understand the processes involved in high-mass star formation.

### 3.2 Formation and Evolution of Galaxies

H. Bravo-Alfaro uses multi-wavelength observations of spiral galaxies in clusters, e.g. 21-cm and radio continuum as well as NIR imaging, to study environmental effects on galaxies in clusters, and dynamical stages of clusters themselves. He participates in a team observing nearby ($z$<0.2) clusters of galaxies in H I which has been allocated more than 500 h of VLA time. He also collaborates in the study of star forming dwarf galaxies based on H I (VLA) and CO (OVRO) data as well as in a multifrequency study of groups of galaxies, including VLA-H I, NIR photometry and optical spectroscopy.

R. Coziol investigates the formation and evolution of galaxies, by studying the relation between nuclear activity and environment in compact groups of galaxies (with H. Bravo-Alfaro), in clusters of galaxies (with H. Andernach), and in the field. He also studies the chemical evolution of galaxies and the process of dust formation. He recently began a multifrequency study of extragalactic masers (with V. Mignenes and M. Trinidad) in order to understand the origin of this phenomenon and its relation to starbursts and AGN.

M. Valdez-Gutiérrez studies the kinematics of ionized gas in irregular galaxies and its relationship with the adjacent stellar component by means of optical and NIR Fabry–Perot interferometry and NIR photometry. In collaboration with H. Bravo-Alfaro and others (INAOE, IAUNAM), she investigates whether typical values can be assigned to the radial velocity dispersion of the ionized gas associated to the star forming regions and to the diffuse ionized gas in irregulars.

### 3.3 Observational Cosmology

R.C. Kraan-Korteweg, in a number of international collaborations, works on the uncovering of the obscured galaxy distribution behind the Milky Way using various systematic multi-wavelength observations (optical, NIR, and H I) to obtain a better understanding of the peculiar velocity of the Local Group (to be compared to the dipole anisotropy in the CMB radiation), other streaming motions (such as in the Great Attractor region), and the possible continuation (or existence) of superclusters across or behind the Milky Way. Particular emphasis is given to the clustering in the Great Attractor region.

H. Andernach is involved in a collaboration on a radio-X-ray study of relic radio sources in clusters of galaxies to determine their morphology and radio spectral shapes, as well as their cosmic ray content via the inverse-Compton effect. He maintains a compilation of published redshifts of Abell clusters of galaxies (as well as their member galaxies) and, with colleagues at Tartu Observatory, he explores the distribution of superclusters in the nearby Universe. With Coziol he studies the relation of compact groups with the large-scale structure. Over the past 15 years he has collected (and prepared with OCR techniques) source lists in machine-readable format from ~1800 published articles of which only a third are available at astronomical data centers. With collaborators at SAO (Russia), he maintains the largest radio source database (CATS, http://cats.sao.ru). He is a member of the IAU WG on Designations.

### PUBLICATIONS

Refereed papers by department members (published and accepted), edited books, as well as contributions to conference proceedings (published or submitted), and abstracts from Nov. 2003–Oct. 2004, are included.


Donley, J.L., Staveley-Smith, L., Kraan-Korteweg, R.C., Islas-Islas, J.M., Schröder, A., Henning, P.A., Korbil-

Eenens, P., “Rotation of B[e], LBV and Wolf-Rayet stars,” in Stellar Rotation, IAU Symposium 215, eds. A. Maeder & P. Eenens, p. 97, in press


Migenes, V., Cruz-Vazquez, L., Ruiz-Velasco, A.E., Slysh, V.I., & Val’tts, I.E., 2003, “Interesting Sources from the VLBA OH MASER Survey,” BAAS, 35, 1360 (#94.05)


H. Andernach and Department members