

THE GEMINI PROJECT

Patrick S. Osmer

Gemini Project

RESUMEN

El Proyecto Géminis es una colaboración internacional para construir dos telescopios de 8 metros, uno en Mauna Kea y otro en Cerro Pachón. Los telescopios tendrán muy alta calidad en todas las longitudes observables desde tierra. El proyecto incluye un complemento inicial de instrumentos para imágenes y espectroscópicos. Se ha programado la primera luz para 1998 en Mauna Kea y para 2000 en Cerro Pachón.

ABSTRACT

The Gemini Project is an international collaboration to build two 8-m telescopes, one on Mauna Kea and one on Cerro Pachon. The telescopes will have very high performance at all wavelengths observable from the ground. The project includes an initial complement of imaging and spectroscopic instruments. First light is scheduled for 1998 on Mauna Kea and 2000 on Cerro Pachon.

Key words: **TELESCOPES**

1. INTRODUCTION

The Gemini Project is an international collaboration of Canada, Chile, the U.K., and the U.S. to build two 8-m telescopes, one on Mauna Kea, Hawaii, and one on Cerro Pachon, Chile. The main goal of the project is to achieve an unprecedented combination of light-gathering power and image quality over the infrared, optical, and ultraviolet spectral regions observable from the ground.

2. STATUS

To date, 95% of the funding has been identified. The U.S. will have a 50% share; the U.K., 25%; Canada, 15%; and Chile, 5%. The remaining 5% is being sought from several possible sources. The U.S. National Science Foundation is the Executive Agency for the Project. AURA manages the project for the NSF.

As of June 1 Sidney Wolff became Acting Director for the Project. Larry Randall is the Project Manager. Patrick Osmer was the Interim Project Scientist until November, 1992. Matt Mountain arrived in October, 1992 to take up the position of Project Scientist. There are Project Scientists in each of the three countries: Roger Davies for the U.K.; Richard Green for the U.S.; and Gordon Walker for Canada.

3. HIGHLIGHTS OF THE SCIENCE REQUIREMENTS

The Gemini Science Requirements are based on efforts in the partner countries, particularly the three national proposals by Canada, the U.K., and the U.S. to build 8-m telescopes, and the U.S. Astronomy and Astrophysics Survey Committee report. The requirements include:

Full sky coverage. The planned sites in the northern and southern hemispheres will enable objects at all declinations to be observed.

Location at excellent sites. Mauna Kea, at 4200m elevation, is regarded as the best site in the world in terms of infrared properties and excellent seeing conditions. A site survey at Cerro Pachon shows that it has

seeing conditions rivaling those of Mauna Kea, excellent IR properties for half the year, and the clear skies for which the Chilean sites are well known.

8-m aperture. An 8-m primary mirror has four times the light gathering power of a 4-m and, at wavelengths where diffraction limits the image quality, twice the angular resolution.

Image quality of 0.1 arcsec. The Gemini telescopes will use active optics and tip-tilt correction in a high-resolution configuration to achieve 0.1 arcsec (FWHM) image quality at a wavelength of 2.2 microns.

Wavelength coverage from 0.3 to 30 microns. The Gemini telescopes are to have high throughput over the ultraviolet, visible, and infrared wavelengths observable from the ground. This will require the capability for different mirror coatings.

Low-emissivity configuration. The Gemini telescopes will have a configuration that yields a telescope emissivity in the range 2 to 4%.

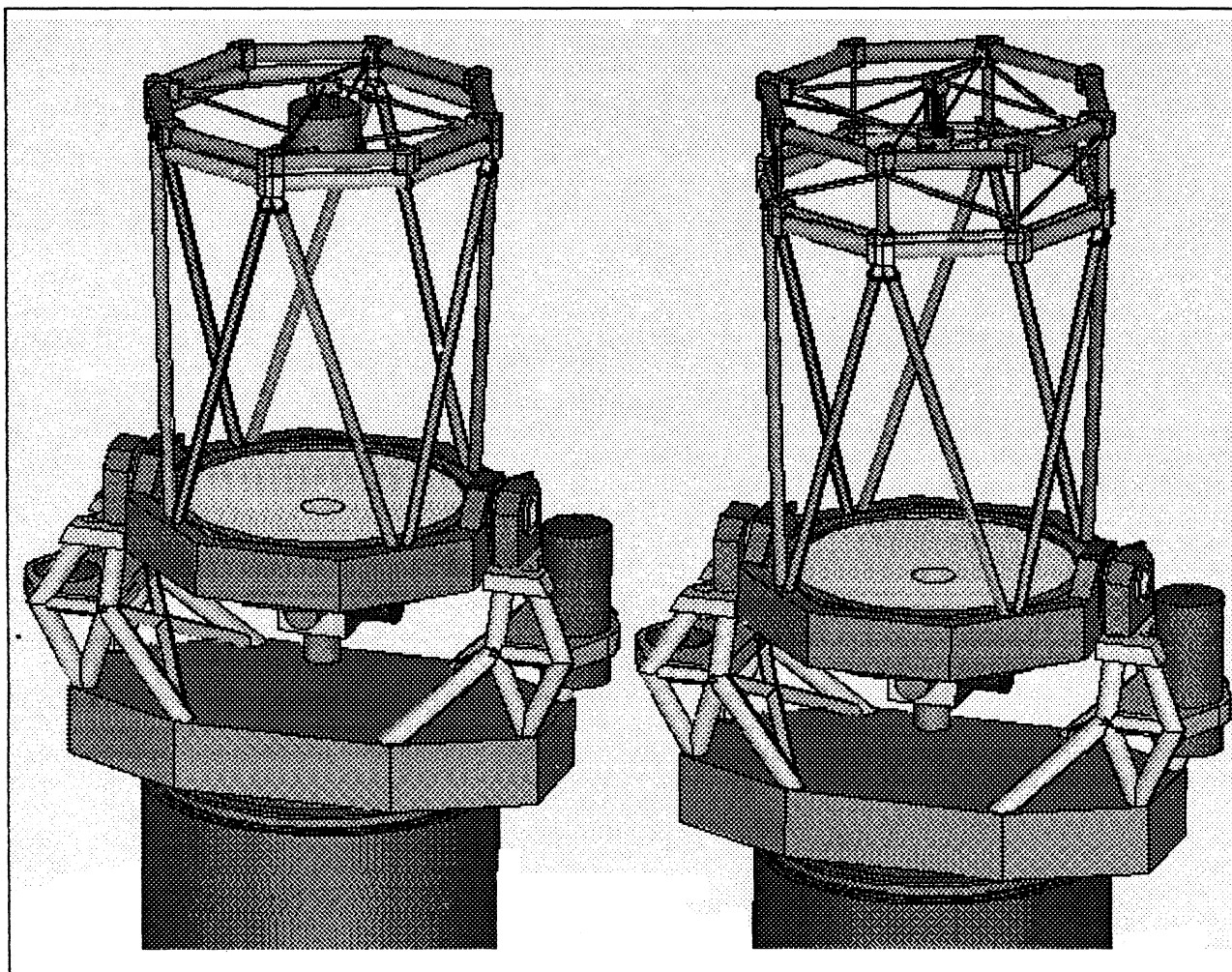


Fig. 1. - Design concepts for the Gemini Telescopes. Left panel - Telescope structure with the f/6 top end mounted. Right panel - Telescope structure with the f/16 top end.

Wide-field configuration. The Gemini telescopes will have a wide-field configuration covering a diameter of 45 arcmin for optical observations.

Flexible observing modes. Gemini will plan to support service observing and remote observing in addition to the traditional mode of having the observer at the telescope.

Cassegrain and Nasmyth focal stations. The telescopes will have Cassegrain and Nasmyth focal stations to accommodate the range of instruments that are planned.

Capability for rapid instrument changes. The telescopes will allow for rapid change between a prime and backup instrument to take advantage of changing weather conditions.

4. TELESCOPE CONFIGURATIONS

The above science requirements lead to three configurations of the telescopes: high angular resolution (IR optimized), wide-field optical, and optical/UV Nasmyth. They are based on the use of a f 1.8 primary with a 1.2-m diameter central bore.

High Angular Resolution (IR-optimized configuration). This configuration is planned to give the highest image quality and the lowest emissivity. It is to have a final focal ratio of f/16 and a 3.5 arcmin diameter unvignetted field of view. The primary spectral range will be 1 - 30 microns. It will also provide excellent performance at optical wavelengths down to at least 0.4 micron and could also be used at longer wavelengths out to 1 mm. The configuration will have a usable field of at least 10 arcminutes diameter. The focal surface is to be located approximately 4-m behind the vertex of the primary mirror.

Wide-field Optical/UV Configuration. This configuration will have a separate secondary mirror to produce a 45 arcmin diameter field at a final focal ratio of f/6. The primary spectral range is 0.3 to 1.2 microns, also usable out to 2.2 microns. The image quality specification is 0.25 arcsec FWHM, and the focal surface will be approximately 3.5-m behind the primary mirror vertex.

Optical/UV Nasmyth Configuration. A Nasmyth configuration is to be provided for instruments requiring a gravity-stable location. It will have focal ratio of approximately f/20 and a 3 arcmin field of view. The primary spectral range will be 0.3 to 2.2 microns at an image quality of 0.25 arcsec FWHM.

5. INSTRUMENTATION

The Gemini project includes an initial complement of instruments, which are to be procured on a competitive basis from institutions in the partner countries. Initial needs identified for testing and commissioning of the telescopes include:

- Acquisition and guiding capability
- Wavefront sensing capability
- f/16 secondary tip/tilt capability
- Space at Cassegrain for higher order adaptive optics correction
- High resolution imagers for the 0.4 to 5 micron and 8 to 30 micron regions.

The first instruments for subsequent science programs are now being identified. The long term goals are to provide instruments for:

- IR spectroscopy from low to high spectral resolution over the 1 to 5 and 8 to 30 micron regions
- Adaptive Optics
- Protected Silver Coatings
- High Resolution UV/Optical Spectroscopy
- High Throughput, Long-slit/Multi-slit Optical Spectroscopy
- Fiber-fed Spectroscopy with 45 Arcmin Field Coverage

6. TELESCOPE CONCEPT

The telescopes are to have an altitude over azimuth mount.

The design concept places the primary mirror just below the elevation axis. This has the advantages of reducing the mass of the overall structure, facilitating ventilation, and eliminating the need for a massive steel frame above the primary mirror.

Two interchangeable top ends will provide for the three telescope configuration described above, as shown in Figure 1. The f/6 top end is for the wide-field, optical configuration. The f/16 top end is for the high angular resolution (IR optimized) configuration; it will also serve for the Nasmyth configuration via the interchange of the secondary mirror assembly.

7. SCHEDULE

The Project Schedule calls for first light on the Mauna Kea Telescope in the year 1998 and on the Cerro Pachon Telescope in the year 2000.

Patrick S. Osmer, NOAO, Box 26732, Tucson, Arizona 85726-6732

LISTA DE RESUMENES/LIST OF ABSTRACTS

INTERSTELLAR MEDIUM AND STAR FORMATION

PHYSICAL PARAMETERS IN INTERSTELLAR MATTERS, Z. Abraham & J.W.S. Vilas Boas 93

INTERSTELLAR MATTER AROUND THE WOLF-RAYET STAR HD 50896, E.M. Arnal & C.E. Cappa 93

MOLECULAR MATERIAL ASSOCIATED WITH THE GALACTIC SUPERNOVA REMNANT G18.8+0.3, E.M. Arnal, G. Dubner, & W.M. Goss 93

CO IN SOUTHERN BARRED GALAXIES, E. Bajaja & R. Wielebinski 93

OBSERVAÇÃO DE MASERS DE METANOL, N. Beraldo e E. Scalise Jr. 94

YOUNG MASSIVE STARS IN THE GALACTIC DISK, L. Bronfman 94

BURBUJAS DE GAS NEUTRO ALREDEDOR DE ESTRELLAS DEL TIPO O, C. Cappa de Nicolau, V.S. Niemela, y P. Benaglia 94

COMPACT AMMONIA SOURCES TOWARD THE G10.5+0.0 H II REGION COMPLEX, G. Garay, L.F. Rodríguez, & J.M. Moran 95

THE ABUNDANCE OF CH⁺ IN TRANSLUCENT MOLECULAR CLOUDS: TESTING SHOCK MODELS, R. Gredel, E.F. van Dishoeck, & J.H. Black 95

SEARCHING FOR PROTOPLANETARY DISKS AROUND YOUNG STARS, J.F. Gómez, J.M. Torrelles, L.F. Rodríguez, J. Cantó, & P.T.P. Ho, 96

NUMERICAL MODELS FOR SHOCKS AND WAVE PROPAGATION IN DENSE CLOUD CORES, A. Hetem Jr. & J.R.D. Lépine 96

ALFVÉN WAVES AND TURBULENCE IN MOLECULAR CLOUDS, V. Jatenco-Pereira & R. Opher 96

EL POLVO INTERESTELAR EN LA REGION DE ETA CARINAE, H.G. Marraco, R. Martínez, y E.I. Vega 96

HVC 131+1-200: ¿COLISION DE UNA NUBE DE ALTA VELOCIDAD CON EL PLANO GALACTICO?, R. Morras, E.M. Arnal, y E. Bajaja 97

H I STRUCTURES IN OB ASSOCIATIONS, J.R. Rizzo, E.M. Arnal, & E. Bajaja 97

OBSERVATIONAL ANALYSIS OF TWO GLOBULAR FILAMENTS IN LUPUS, J.R. Rizzo, R. Morras, & E.M. Arnal 97

ON THE NATURE OF THE EXCITATION OF THE HERBIG-HARO OBJECT 2, J.M. Torrelles, L.F. Rodríguez, J. Cantó, G. Anglada, J.F. Gómez, S. Curiel, & P.T.P. Ho 97

PICO DOS DIAS SURVEY: A SEARCH FOR YOUNG STELLAR OBJECTS (YSO). PROGRESS REPORT, C.A.O. Torres, G.R. Quast, J.R.D. Lépine, T. Gregório-Hetem, & R. De la Reza 97

MOLECULAR GAS IN CENTAURUS A. THE ¹²CO J = 2-1 MAP, W. Wild, M. Cameron, A. Eckart, R. Genzel, H. Rothmel, G. Rydbeck, & T. Wiklund 98

STARS AND CLUSTERS

BLUE STRAGGLERS IN OPEN CLUSTERS, J. Ahumada & E. Lapasset 98

OPTICAL IDENTIFICATION OF ROSAT X-RAY SOURCES AT THE GUILLERMO HARO OBSERVATORY, I. Appenzeller, C. Chavarria, L. Corral, T. Fleming, G. Hasinger, J. Krautter, R. Mújica, M. Pakull, L. Terranegra, J. Trümper, & F.J. Zickgraf 98

CALIBRATIONS OF M_V, [Fe/H] AND LOG G FOR YELLOW SUPERGIANT STARS, A. Arellano Ferro & E.E. Mendoza V. 99

EVOLUTION OF HELIUM STARS IN MASSIVE CLOSE BINARY SYSTEMS, V. Avila Reese 99

THE TEMPERATURE SCALE FOR A-G SUPERGIANTS FROM 13-COLOR PHOTOMETRY, H. Bravo Alfaro, A. Arellano Ferro, & W.J. Schuster 100

METALLICITIES OF METAL-RICH STARS, S. Castro & B. Barbuy 100

THE SANDAGE PERIOD-SHIFT EFFECT FOR GALACTIC GLOBULAR CLUSTERS: AN ANALYSIS OF EVOLUTIONARY PREDICTIONS, M. Catelan 100

RIGOROUS TREATMENT OF THE RADIATIVE TRANSFER EQUATION IN A SPHERICALLY SYMMETRIC MEDIUM WITH VELOCITY FIELDS APPLIED TO LINE PROFILES OF Be STARS, L.S. Cidale & A.E. Ringuelet 101

NEW DDO ABUNDANCE CALIBRATIONS FOR POPULATION I AND II RED GIANTS: APPLICATION TO THE STUDY OF THE CHEMICAL EVOLUTION OF THE DISK, J.J. Clariá, A. Piatti, D. Minniti, & E. Lapasset 101

THE MOMENTUM PROBLEM IN WOLF-RAYET STARS, L.C. dos Santos, V. Jatenco-Pereira, & R. Opher 101

CCD PHOTOMETRY OF THE YOUNG OPEN CLUSTER NGC 1962-65-66-70, A. Feinstein, W. Seggewiss, R. Vázquez, & J.M. Will 102

THE ONSET OF CHROMOSPHERES AND CORONAS AT LATE A-TYPE STARS, R. Freire Ferrero 102

- PARTIAL REDISTRIBUTION OF RADIATION FOR THE 2 AND 3 LEVEL ATOM PLUS CONTINUUM, *R. Freire Ferrero & L. Cidale* 102
- A NEW FORMULATION OF THE LIMB-DARKENING EFFECT, *R. Freire Ferrero* 102
- METALLICITIES OF OLD OPEN CLUSTERS LOCATED IN THE THIRD GALACTIC QUADRANT, *D. Geisler, J.J. Clariá, & D. Minniti* 102
- ABUNDANCES FROM HIGH DISPERSION SPECTRA OF METAL-POOR GLOBULAR CLUSTER GIANTS, *D. Geisler, D. Minniti, R. Peterson, & J.J. Clariá* 103
- PHOTOELECTRIC PHOTOMETRY OF BLUE STRAGGLERS IN SOUTHERN OPEN CLUSTERS, *E. Lapasset & J. Ahumada* 103
- TIO BANDS IN EARLY TYPE GALAXIES, *A. Milone & B. Barbuy* 103
- A NEW DDO CALIBRATION OF EFFECTIVE TEMPERATURE FOR EVOLVED LATE-TYPE STARS, *A. Piatti & J.J. Clariá* 104
- A CATALOGUE OF NEARBY WIDE BINARY AND MULTIPLE STARS, *A. Poveda, M.A. Herrera, C. Allen, G. Cordero, & C. Lavalley* 104
- GLOBULAR CLUSTER SYSTEMS IN ELLIPTICAL GALAXIES, *M. Rabolli, R. Madejsky, G. Marani, I. Vega, & L. Bassino* 104
- OXYGEN ABUNDANCES FROM PERMITTED AND FORBIDDEN LINES, *S.C.F. Rossi, B. Barbuy, & S. Castro* 105
- CCD *BVRI* PHOTOMETRY OF STARS IN THE GALACTIC BULGE, *A. Ruelas-Mayorga, S. West, & A. Peimbert* 105
- DETECCION DEL P III EN HD 153919, *G.R. Solivella* 105
- ON THE ABSOLUTE MAGNITUDE OF THE METAL RICH RR LYRAE STAR V9 IN 47 TUC, *J. Storm, J. Andersen, B.W. Carney, B. Nordström, & C. Williams* 105
- STUDY OF THE IR EXCESS IN EARLY TYPE STARS. AN EXPANDING ATMOSPHERIC MODEL WHICH INCLUDES A CHROMOSPHERIC REGION, *A.C. Vázquez & L.S. Cidale* 106
- CATALOGUE OF OB TYPE STARS, *R. Vázquez, L. Etchemaite, R. Martínez, & A. Feinstein* 106
- POLARIMETRIC STUDY OF THE IC 2944 STELLAR AGGREGATE, *E.I. Vega, A.M. Orsatti, & H.G. Marraco* 106
- DIFFERENTIAL *wby* PHOTOMETRY OF SOUTHERN Be STARS. HIGHLIGHTS FROM THE RECENT ANALYSIS OF LTPV DATA, *N. Vogt & R. Mennickent* 107

LATE STAGES OF STELLAR EVOLUTION

- OSCILLATORY LUMINOSITY PROFILES AND PULSARS, *R.O. Aquilano & L.A. Núñez* 107
- SOUTHERN RS CVN SYSTEMS *UBVRI* PHOTOMETRY, *M.L. Berrios S., M. Maldini S., J. Fernández L., & S. Char C.* 107

- OPTICAL STUDY OF LMXBs WITH HIGH TEMPORAL RESOLUTION FROM CASLEO. EVIDENCE OF NON-THERMAL FLARES FROM MXB 1735-44, *G. Beskin, S. Neizvestny, V. Plokhhotnichenko, M. Popova, A. Zhuravkov, O. Benvenuto, C. Feinstein, & M. Méndez* 108
- IDENTIFICATION OF NEW SYMBIOTIC STARS, *D. Cieslinski, F. Elizalde, & J.E. Steiner* 108
- FURTHER OCCULTATIONS OF THE CENTRAL STAR IN NGC 2346?, *R. Costero, M. Peña, W.J. Schuster, M. Tapia, & J. Echevarría* 108
- HIGH RESOLUTION TIME-RESOLVED UCLES SPECTROSCOPY OF AE AQR, *J. Echevarría, F. Diego, D. Mills, & R.C. Smith* 109
- MODELING PHOTOIONIZED ASTROPHYSICAL NEBULAE, *F. Elizalde & J.E. Steiner* 109
- ON THE SPECTRUM OF BL 3-14, *A. Gutiérrez-Moreno & H. Moreno* 109
- CHEMICAL ABUNDANCE BEHAVIOR OF TYPE I PLANETARY NEBULAE, *J.L. Jiménez O., & M. Faúndez-Abans* 110
- H₂ V=1-0 (S1) IMAGES OF SOUTHERN PLANETARY NEBULAE, *J.A. López, M. Roth, & M. Tapia* 110
- EPISODIC SYMMETRIC JETS IN THE PLANETARY NEBULA FG 1, *J.A. López, M. Roth, & M. Tapia* 110
- TIME EVOLUTION OF GALACTIC ABUNDANCE GRADIENTS, *W.J. Maciel & J. Köppen* 110
- DIFFERENTIAL CCD PHOTOMETRY OF WX CET, AQ ERI AND CU VEL, *R. Mennickent & N. Vogt* 111
- ULTRAVIOLET AND OPTICAL SPECTRA OF CENTRAL STARS OF HALO PLANETARY NEBULAE, *M. Peña, S. Torres-Peimbert, & M.T. Ruiz* 111
- COMPOSITION OF THE ATMOSPHERES OF COOL WHITE DWARFS, *M.T. Ruiz, P. Bergeron, & S.K. Leggett* 112
- SPECTROPHOTOMETRY OF SELECTED PLANETARY NEBULAE OF TYPE I IN THE MAGELLANIC CLOUDS, *S. Torres-Peimbert, M. Peimbert, M.T. Ruiz, & M. Peña* 112

NOVAE AND SUPERNOVAE

- NOVA V2214 OPHIUCHI 1988. A SLOW MAGNETIC NOVA INSIDE THE PERIOD GAP, *R. Baptista, F.J. Jablonski, D. Cieslinski, & J.E. Steiner* 112
- RAPID OPTICAL VARIABILITY OF THE X-RAY PULSATOR GX 1+4, *J. Braga, F.F. Jablonski, F. Elizalde, & J.E. Steiner* 113
- EVOLUCION DE LA POLARIZACION DE LA SN 1987A, *O. Benvenuto, C. Feinstein, y M. Méndez* 113
- VLA OBSERVATIONS OF THE SUPERNOVA REMNANT 3C400.2, *G. Dubner, E. Giacani, W.M. Goss, & P.F. Winkler* 113
- THE 1990 CALAN/CTIO SUPERNOVA SEARCH, *M. Hamuy, J. Maza, M.M. Phillips, N.B. Suntzeff, M. Wisniewsky, R. Antezana, L.A. Wells, L.E. González, P. Gigoux, M. Navarrete, F. Barrientos, R. Lamontagne, M. Della Valle, J.E. Elias, A.C. Phillips, S.C. Odewahn, J.A. Baldwin, A.R. Walker, T. Williams, C.R. Sturch, F.K. Baganoff, B.C.*

Chaboyer, R.A. Schommer, H. Tirado, M. Hernández, P. Ugarte, P. Guhathakurta, S.B. Howell, P. Szkody, P.C. Schmidtke, & J. Roth 114

THE 1992 OUTBURST OF THE SU UMA-TYPE DWARF NOVA HV VIRGINIS, E.M. Leibowitz, H. Mendelson, A. Bruch, H.W. Duerbeck, W.C. Seitter, & G.A. Richter 114

SEARCHING FOR EXTRAGALACTIC SUPERNOVA REMNANTS, R.C. Smith, W.P. Blair, R.P. Kirshner, K.S. Long, & P.F. Winkler 114

OBSERVATIONS OF SN1987A FROM 0.15 TO 2.00 MeV, T. Villela, R.C. Cesta, N. Figueiredo, & U.B. Jayanthi 115

GALACTIC STRUCTURE AND MAGELLANIC CLOUDS

THE TRANSVERSAL MOTION OF THE LARGE MAGELLANIC CLOUD, C. Anguita & J. Maza 115

SOME REFINEMENTS IN CHEMICAL EVOLUTION MODELS. I. A DERIVATION OF THE PRODUCTION TERM, L.I. Arany-Prado 115

THE MACHO EFFECT OF BINARIES AND PLANETARY SYSTEMS, A.D. Bolatto & E.E. Falco 116

BAR INDUCED PERTURBATIONS ON THE LMC DISK, H. Dottori, E. Bica, J.J. Clariá, & I. Puerari 116

PROPAGATION OF STAR FORMATION SOUTH OF 30 DOR?, E.K. Grebel & J. Melnick 116

SPACE DISTRIBUTION AND METALLICITIES OF GLOBULAR CLUSTERS. THE DISTANCE TO THE GALACTIC CENTRE, W.J. Maciel 117

MOLECULAR CLOUDS IN THE OUTER SOUTHERN GALAXY, J. May, H. Alvarez, & L. Bronfman 117

STATISTICAL REQUIREMENTS FOR A GALACTIC STRUCTURE STUDY, R.A. Méndez, I. Platais, T.M. Girard, & W.F. van Altena 117

SMALL MOLECULAR CLOUDS TOWARD THE GALACTIC CENTRE, A. Moneti 118

ON THE ORIGIN OF THE RADIAL ORBIT INSTABILITY, J.C. Muzzio, P.M. Cincotta, & J.A. Núñez 118

THE STELLAR CONTENT OF THE OB ASSOCIATION LH 47 IN THE LMC, V.S. Niemela, G. Testor, & M.-C. Lortet 118

ENCOUNTERS WITH GIANT INTERSTELLAR CLOUDS AND MASS EXTINCTIONS, C.A. Olano 118

OXYGEN ABUNDANCES IN THE LMC, J.A. de Freitas Pacheco & B. Barbuy 119

PHYSICAL CONDITIONS IN H II REGIONS OF THE SMALL MAGELLANIC CLOUD AND THE PREGALACTIC HELIUM ABUNDANCE, M. Peimbert, S. Torres-Peimbert, & M.T. Ruiz 119

THE NEUTRAL PHASES IN THE LOCAL INTERSTELLAR MEDIUM AT $|b| \geq 10^\circ$ AND LOW VELOCITIES, W.G.L. Pöppel, P. Marronetti, & P. Benaglia 119

SOME REFINEMENTS IN CHEMICAL EVOLUTION MODELS. II. A ONE-ZONE MODEL WITH REFUSES, H.J. Rocha-Pinto, L.I. Arany-Prado, & W.J. Maciel 120

KINEMATICS OF THE IONIZED HYDROGEN IN THE SMALL MAGELLANIC CLOUD, M. Rosado, E. Le Coarer, Y.P. Georgelin, & A. Viale 120

MOLECULAR CLOUDS IN THE SMC, M. Rubio 120

ACTIVE GALACTIC NUCLEI AND QUASARS

VLBI OBSERVATIONS OF 3C273 AND 3C279, Z. Abraham & E.A. Carrara 121

OPTICAL SPECTRAL CHARACTERISTICS OF THREE AGN CANDIDATES, E.L. Agüero 121

PHOTOMETRY AND INCLINATION STUDY OF THE SEYFERT GALAXIES OF THE CALAN-TOLOLO SURVEY (CTS), L.F. Barrientos & J. Maza 121

MBG02223-1922: A NEWLY IDENTIFIED LUMINOUS SEYFERT GALAXY, R. Coziol, M. Peña, S. Demers, & S. Torres-Peimbert 122

MEPSICRON SPECTROPHOTOMETRY OF SEYFERT GALAXIES, I. Cruz-González, J. Guichard, L. Carrasco, & A. Serrano 122

PROGRAMA DE CONSULTA DEL CATALOGO DE CUASARES DE HEWITT Y BURBIDGE 1989, J. Espinoza G. y L.E. Campusano 122

SYSTEMATICS OF SPIRAL GALAXY ROTATION FROM TIDAL TORQUING. COMPARISONS WITH THE DATA, R. Flores 123

ALFVÉN WAVES IN THE FORMATION OF QUASAR CLOUDS, D.R. Gonçalves, V. Jatenco-Pereira, & R. Opher 123

MOLECULAR GAS IN FIVE SOUTHERN ACTIVE GALAXIES, N. Loiseau & F. Combes 123

FAR INFRARED AND OPTICAL PROPERTIES OF A SAMPLE OF SEYFERT GALAXIES, M.G. Pastoriza, C.J. Bonatto, T. Storchi-Bergmann, & E. Bica 124

QSO ABSORPTION LINE SYSTEMS, S.M. Viegas & R. Gruenwald 124

THE LY α FOREST AT $4.2 < z < 4.5$, G.M. Williger, J.A. Baldwin, R.F. Carswell, C. Hazard, M.J. Irwin, & R.G. McMahon 124

THE LY α FOREST AT $4.2 < z < 4.5$, G.M. Williger, J.A. Baldwin, R.F. Carswell, C. Hazard, M.J. Irwin, & R.G. McMahon 124

GALAXIES AND CLUSTERS OF GALAXIES

IDENTIFICACION OPTICA DE LA RADIOGALAXIA 0409-752, H. Alvarez, J. Aparici, J. May, y M. Navarrete 125

CCD IMAGERY OF NGC 4861. DYNAMICAL AND EVOLUTIVE IMPLICATIONS, C.S. Barth, H. Dottori, J. Cepa, & J. Vilchez 125

HOW DO GIANT GALAXIES EAT DWARFS?, L.P. Bassino, J.C. Muzzio, & M. Rabolli 125

THE RADIOGALAXY CENTAURUS A, L.C.L. Botti & Z. Abraham 125

ADVANCES IN STELLAR POPULATION SYNTHESIS, G. Bruzual A. 126

MODELADO SEMIAUTOMATICO DE SISTEMAS DE LENTES GRAVITACIONALES, G.F. Carballo y E.E. Falco 126

LIMITS ON THE PRIMORDIAL FLUCTUATION SPECTRUM, *L.N. da Costa* 126

MULTI-DIAPHRAGM PHOTOELECTRIC PHOTOMETRY OF SPHERICAL GALAXIES, *M. de Oliveira-Abans, R. de Souza, & M. Faúndez-Abans* 127

SEARCH FOR STRUCTURES IN THE COSMIC MICROWAVE BACKGROUND RADIATION, *A. de Oliveira Costa & T. Villela* 127

OBSERVACIONES DE LENTES GRAVITACIONALES CON EL TELESCOPIO HUBBLE, *E.E. Falco* 127

ANÁLISIS DE LA FUNCIÓN DE LUMINOSIDAD $H\alpha$ DE REGIONES H II, *C. Feinstein y J.C. Forte* 128

REGIONES H II EN GALAXIAS AUSTRALES, *C. Feinstein y J.C. Forte* 128

TURBULENT MIXING LAYERS VERSUS SELF-IRRADIATING MODELS FOR OPTICAL FILAMENTS IN COOLING FLOWS, *A.C.S. Friaça & S.M. Viegas* 128

ANGULAR CORRELATION FUNCTION OF FAINT GALAXIES, *L. Infante* 128

DEPENDENCE OF THE GALAXY CORRELATION FUNCTION ON MORPHOLOGY AND CIRCULAR VELOCITY, *D.G. Lambas, M.A. Nicotra, & M.G. Abadi* 128

POPULATION SYNTHESIS ANALYSIS OF THE UV SPECTRUM OF ELLIPTICAL GALAXIES, *G. Magris C. & G. Bruzual A.* 129

EVOLUTION OF GALAXY LUMINOSITY IN THE Λ CDM MODEL, *M. Mosconi, P. Tissera, & D. García Lambas* 129

WIDE BAND PHOTOMETRY OF H II GALAXIES, *M. Peña & S. Ayala* 129

COLLISIONS OF SPHERICAL GALAXIES, *M.M. Vergne & J.C. Muzzio* 130

MERGERS OF SPHERICAL GALAXIES, *M.M. Vergne & J.C. Muzzio* 130

ASTROMETRY

THE RIEMANN SPHERE AS SURFACE OF REFERENCE IN CELESTIAL MECHANICS, *C.A. Altavista* 130

THE IMPORTANCE OF THE CHILEAN MERIDIAN OBSERVATIONS IN THE FK5 CATALOGUE, *C. Anguita, G. Carrasco, P. Loyola, A. Nemiro, D. Polojentsev, V. Shishkina, & M. Zverev* 131

A HARD WAY TO PRECISION. 30-YEAR LONG STORY OF THE EXPERIENCE WITH THE ZVEREV PHOTOGRAPHIC VERTICAL CIRCLE, *B.K. Baguidinsky, G.A. Goncharov, E.V. Kornilov, V.A. Naumov, D.D. Polojentsev, S.P. Puliaev, V.D. Shkutov, E.G. Zhilinsky, & C. Torres* 131

SLOW IMAGE MOVEMENT, *P. Benevides-Soares, R. Teixeira, & Y. Réquière* 132

CATALOGO PRELIMINAR DE RADIO-ESTRELLAS. I. J2000.0, *R.A. Carrestia, C.C. Mallamaci, y J.A. Pérez* 132

OPTICAL ASTROMETRY OF COMPACT EXTRAGALACTIC RADIOSOURCES, *E. Costa, P. Loyola, & M. Wischnjewsky* 132

PRELIMINARY RESULTS OBTAINED WITH PA II OF BEIJING ASTRONOMICAL OBSERVATORY IN SAN JUAN, *Lu Lizhi, W.T. Manrique, & R. Pedomo* 133

REDUCTION OF MERIDIAN PHOTOELECTRIC OBSERVATIONS AT THE BORDEAUX OBSERVATORY, *R. Teixeira, P. Benevides-Soares, Y. Réquière, & S. Rousseau* 133

INSTRUMENTATION

CALIBRATION AND PERFORMANCE OF THE HARD X-RAY IMAGING TELESCOPE TIMAX, *J. Braga, F. D'Amico, T. Villela, J.A. Neri, A.M.R. Alves, & E.R. Silva* 133

LARGE SOUTHERN RADIO TELESCOPE (LSRT), *L.N. da Costa* 134

SECOND ORDER UV CONTAMINATION IN ASTRONOMICAL SPECTRA, *H. Moreno, A. Gutiérrez-Moreno, S. Heathcote, & M. Hamuy* 134

MAKING MAPS OF THE LOW-FREQUENCY SKY BRIGHTNESS, *T. Villela, G. Smoot, G. De Amici, & C. Tello* 134

A BALLOON-BORNE IMAGING TELESCOPE FOR HIGH ENERGY ASTROPHYSICS, *T. Villela, J. Braga, F. D'Amico, & J.A. Neri* 135

SOLAR SYSTEM

MULTIWAVELENGTH OBSERVATIONS AND MAGNETIC FIELD MODELLING OF A SOLAR FLARE, *L.G. Bagalá, M.G. Rovira, C.H. Mandrini, P. Démoulin, & J.-C. Hénoux* 135

LA CAPTURA DE COMETAS DE LA FAMILIA DE JUPITER. ESTUDIOS NUMERICOS, *J.A. Fernández y T. Gallardo* 135

DYNAMICAL BEHAVIOR OF ASTEROIDS WITH HIGH ECCENTRICITY, *S. Fernández & F. López-García* 136

C₂ SCALE LENGTH AND GAS VELOCITY IN COMET KOHOUTEK 1973 XII, *I. Ferrín & A. Carrasco* 136

PYRAMID OF THE LIGHT CURVE OF COMET KOHOUTEK 1973F, *I. Ferrín & A. Carrasco* 136

MONOCHROMATIC OBSERVATIONS AT THE TOTAL SOLAR ECLIPSE OF 1991 JULY 11, *J. Galindo Trejo, S. Cuevas, & S. Tinoco* 137

PHOTOELECTRIC PHOTOMETRY OF ASTEROIDS 58 CONCORDIA, 122 GERDA, 326 TAMARA AND 441 BATHILDE, *R. Gil Hutton* 137

PHOTOELECTRIC PHOTOMETRY OF PERIODIC COMET FAYE, *R. Gil Hutton & J. Licandro* 137

WAVE SPECTRUM BREAK IN AN ALFVÉN WAVE DRIVEN SOLAR WIND, *V. Jatenco-Pereira, R. Opher, & L.C. Yamamoto* 137

TOPOLOGICAL ANALYSIS OF AN ACTIVE REGION MAGNETIC FIELD WITH DIFFERENT SOURCES, *M.G. Rovira, C.H. Mandrini, P. Démoulin, & J.-C. Hénoux* 137

1993RMxAA...26...830

THEORETICAL MODELS OF SOLAR PROMINENCES,
M.G. Rovira & J.M. Fontenla 138

ASTROMETRIC MEASURES OF ASTEROIDS,
J.A. Naranjo & J. Stock 138

TEACHING OF ASTRONOMY

DOS EDICIONES DE UNA EXPERIENCIA DOCENTE
DE PRE-GRADO EN ASTRONOMIA,
S.A. Acero y R.O. Aquilano 138

LA ENSEÑANZA DE LA ASTRONOMIA EN LA EDU-
CACION MEDIA EN URUGUAY, *G. Vicino* 139

HISTORY OF ASTRONOMY

EL PRIMER OBSERVATORIO DE MONTEVIDEO,
G. Vicino 139

