

Resultados del Concurso 2006B para Observaciones en Gemini-Sur

Propuesta: GS-2006B-C-2 (Conjunta con BR.)

Investigador Principal: Dra. Manuela Zoccali (PUC)

Título: "Oxygen Abundance in Bulge Stars"

Resumen: The Milky Way galaxy is a Sbc type. For this reason, there is a controversy as to whether its bulge originated in a short phase of star formation when the Universe was only a few Gyr old, likewise bulges of Sa and Sb galaxies, or if its bulge is in fact a pseudobulge, formed from the secular evolution of the disk driven by the development of a bar (Kormendy, J. & Kennicutt, R.C. 2004, ARA&A, 42, 603), that appears to be a dominant process in Sc galaxies. An answer to this question can be provided by extensive spectroscopic observations to obtain precise element abundance ratios, such as [O/Fe] and [Fe/H]. In the present proposal we intend to make observations of OH lines in the H band, in order to derive oxygen abundances, and in this way to have a definitive measure of the oxygen abundance in bulge stars with a range of metallicities of $-0.7 < [\text{Fe}/\text{H}] < +0.4$.

Tiempo asignado: 14.5 horas

Propuesta: GS-2006B-Q-8

Investigador Principal: Dr. Neil Nagar (UdC)

Título: "Probing The Environment of Gamma Rays Bursts in the Era of Rapid Followup"

Resumen: Gamma Ray Bursts are the most luminous and transient object in the Universe and represent the most significant new astrophysical phenomenon since the discovery of quasars and pulsars. In the era of rapid response followups to alerts from new gamma-X satellites such as Swift, we propose to acquire spectra of high redshift, short or spectrally-distorted GRBs driven by the results of quality prompt robotic observations performed with our fully-automated 2-m class telescopes (which are now performing very successfully). Our primary goals are to use the optical/IR light from the GRB counterpart as a time-variable background illuminating source to study the ISM in high redshift (and intervening) galaxies, determine the physical properties of the circum-burst medium and the burst energetics. In the event of the discovery of an optical/IR counterpart to a short-GRB by our robots, we propose to activate (quick response or QR) a multicolor imaging sequence on Gemini South (GMOS) with the goal of determining for the first time whether the origin of (all) short bursts is extragalactic and whether they occur in distant galaxies. This is a continuation of our Gemini proposal in the last semester: our proposal was accepted and is in the queue - but not yet active. Additional Chilean TAC time is crucial - Chilean QR programs on Gemini are active (i.e. allowed to be triggered) only during 10% of the semester (to reflect the Chilean share) - so additional active time is crucial to increase our chances of catching interesting bursts. Note that the overall Chilean time share on Gemini is not adversely effected by Chilean QR programs - if the program is not activated the Chilean-allocated (but unused) time is given back to Chile in the following semesters.

Tiempo asignado: 6 horas

Propuesta: GS-2006B-Q-41 (Conjunta con CA,US)

Investigador Principal: Dr. Dante Minniti (PUC)

Título: "Light Echoes from Supernovae and a Highly-Evolved Star in the Large Magellanic Cloud"

Resumen: The detection by the SuperMACHO Project of moving light echoes from centuries-old supernovae in the LMC, announced in 2005, opens up exciting avenues of investigation linking resolved supernova remnants with hitherto unobtainable photometric and spectroscopic data from the outburst itself. In this proposal, we build on the earlier success of Rest et al, Nature, 438, 1132 (2005) and the observations obtained with GMOS-S in semester 2005B in the following ways: 1) We will obtain MOS spectroscopy of SN1987A light echoes corresponding to a number of different dust sheet "heights" out to 1 kpc in front of the event to determine dust properties and a geometric distance to the LMC. 2) We will obtain spectra for a fourth ancient light echo system in the LMC, believed to be associated with a 1000 year-old SN remnant which had not yet been discovered when 2005B observations were proposed and obtained, and 3) We will obtain MOS spectroscopy of a highly-evolved late-type variable in the LMC, apparently similar to V838 Mon, which reveals moving light echoes in its immediate vicinity. This star was in one of the most densely observed MACHO Project fields and therefore a detailed lightcurve history between 1992 and 2000 exists. The Gemini spectroscopy will be complemented by proposed HST and SST observations. We emphasize that Gemini is uniquely suited to obtain the spectroscopy proposed herein and that the importance of this new observational technique in testing the limits of our understanding of all supernovae, but especially the Type Ia SN which provide the strongest evidence for an accelerating universe.

Tiempo asignado: 10 horas

Propuesta: GS-2006B-C-1

Investigador Principal: Dr. Sebastián López (U.Ch)

Título: "GMOS-IFU Search of Gas-rich Starforming Galaxies at $z > 2$ "

Resumen: Damped Lyman-alpha absorption systems (DLAs) contain roughly enough neutral gas at redshift $z = 3.5$ to form the bulk of the stars in present-day galaxies. Recent studies also suggest that these systems contribute an equal amount of star formation rate density at $z \sim 3$ as the starburst population selected by their luminous ultraviolet fluxes. However, little is known regarding the physical properties of the absorbing galaxies because only a handful of DLA galaxies at high redshifts have been firmly identified. With this program we propose to conduct a novel search of DLA galaxies using the Integral Field Unit (IFU) on GMOS South. The IFU allows us to search for Ly-alpha emission from DLA galaxies at small angular distances to the sightline without prior knowledge of the impact orientation of the absorbing galaxies. It serves as a tunable narrow-band filter which, when centered at the known DLA trough, removes the glare of the background QSO. The IFU therefore offers a higher efficiency than traditional imaging/spectroscopic surveys of DLA galaxies. The scientific objectives of the project are (1) to examine the morphologies and impact geometry of DLA galaxies using the 2D emission-line features reconstructed from individual IFU elements, and (2) to obtain measurements (or upper limits) of the star formation rates of these galaxies based on emission-line strengths and compare with known properties of field galaxies at the same epoch. --- Note: this is the third submission of this proposal. Last two semesters the program has been awarded time in band 3 but has not been executed. We are now requesting 2 nights in classical time, which require at least one more classical program approved to fulfill the Gemini policy of 3-nights minimum blocks. Otherwise we would opt for 20 hours queue mode.

Tiempo asignado: 2.0 noches

Propuesta: GS-2006B-C-3

Investigador Principal: Dr. Daniel Christlein (UCH)

Título: "Are Galaxy Warps an Accretion Phenomenon? A Spectroscopic Perspective".

Resumen: Although warps in the disks of galaxies have been known for decades, their origin and evolutionary role are unclear: are they disk material perturbed by tidal effects, or material of extragalactic origin? A prominent hypothesis is that they are signatures of accretion of cold gas from the halo. In that case, they would play a critical role in the lives of galaxies and be important to understanding how galaxies acquire their gas. This hypothesis can be tested by measuring the kinematics of warps to determine whether they are corotating at the rotational velocity of the galaxy (and thus likely simply perturbed disk material) or lagging behind (as would be expected of low-angular-momentum material in the process of accretion). This test requires kinematic measurements of gas in the outer disk with good spatial resolution. 21-cm radio observations, though a possible way, require enormous efforts to simultaneously achieve good kinematic and spatial resolution with sufficient sensitivity. Here, we propose an alternative route: Gas at sufficiently large scale heights in the warped outer disk is irradiated and partially ionized by the UV flux from star formation in the inner disk. It therefore emits H-alpha at a surface brightness $\sim 10^{-18}$ erg s⁻¹ cm⁻² arcsec⁻². This is well within the reach of optical spectroscopy with GMOS-S. We propose to target 6-12 edge-on spiral galaxies with a long-slit _offset_ from the major axis to intercept the outer-disk warps and measure their velocity within $\sim 10\%$. Comparison to the rotational velocity of the galaxy will then show if the warp material is kinematically a part of the disk or not. Kinematic measurements of accreting gas may also potentially discriminate between traditional hot-mode accretion and the novel cold-mode accretion model.

Tiempo asignado: 1.0 Noche

Propuesta: GS-2006B-Q-69

Investigador Principal: Dr. Tom Richtler (UdC)

Título: The "star pile" in Abell 545

Resumen: We propose to perform a long-slit observation of the "star pile" in Abell 545, discovered by Struble (1988). This rich galaxy cluster hosts no dominant cD in its center but a diffuse object of low surface brightness, presumably an intergalactic stellar population assembled in the deep potential well of the cluster. This will be the first spectroscopic investigation of this apparently "forgotten" but highly interesting object. A low baryonic matter density permits to analyse the dark matter profile much more accurately than it is possible with the presence of a dominating cD galaxy. Moreover, this object could be an ideal test object for the controversy CDM versus Modified Newtonian Gravity.

Tiempo asignado: 4 horas

Propuesta: GS-2006B-Q-45

Investigador Principal: Dr. Luis Campusano (UCH)

Título: "The Galaxy Environment of a $z=1.233$ Quasar Lying at the Confluence of Two Merging Clusters"

Resumen: The largest large-scale structures (super-LSSs, SLSSs) provide essential tests for models of structure formation and allow the very efficient study of large numbers of galaxies, clusters and other mass markers such as quasars. In a sky area extending several degrees and through deep multicolor imaging, we have found evidence for 'superposed' SLSS $> \sim 20$ -30 Mpc at both $z \sim 0.8$ and $z \sim 1.2$ (Haines, Campusano & Clowes, 2004). The $z \sim 0.8$ structure has been spectroscopically confirmed by GMOS observations in 2005A (Soechting et al. 2006). It is in this region that we are proposing follow-up spectroscopy over a GMOS FOV, centered on a $z \sim 1.2$ cluster (J104656.6 +054150) diagnosed to have two substructures and possibly in the process of merging. At the confluence of these substructures lies a $z=1.233$ quasar, where there is also a band of 'red outlier' (bluer) galaxies possibly dusty star-forming galaxies. We plan to obtain medium resolution spectroscopy of galaxies on this 5'x5' field ($\sim 4 \times 4$ Mpc² at $z=1.2$) basically selected using the criteria $I-K > 3.6$ and $K < 19.5$. The aims are, to: (1) measure spectroscopic redshifts of ~ 30 galaxies mostly belonging to the SLSSs at $z \sim 1.2$; (2) confirm the merging substructures of the J104656.6 +054150 cluster; and (3) characterize the environment of the $z=1.233$

quasar (J104420.8 +055739).

Tiempo asignado: 15 horas

Propuesta: GS-2006B-Q-18 (Conjunta con AR)

Investigador Principal: Dr. Rodolfo Barba (ULS)

Título: "Herbig-Haro outflows and pre-main sequence stars in M8: deep Gemini South-GMOS imaging"

Resumen: Although the specific knowledge of star formation in Orion has been systematically growing during the last decade, the fact of having high quality observations in only this region prevents a full progress in the general comprehension of this matter. M8 is an excellent example of active star forming region that can provide important insights into the birth and development of protostars under different physical conditions. This would help in turn to a better testing of our current theoretical models. Four HH objects have been recently identified in HST images of the core of M8. Strong additional evidence of outflows and other signatures of star formation in the region comes from the analysis of archival ground-based images. Furthermore, a recent spectroscopic study lead us to confirm dozens of new pre-main sequence objects. We therefore propose to acquire high resolution GMOS images of three selected fields, which contain these newly detected small- and parsec-scale HH features and several of the new T Tauri stars. These images will allow us to find the structures of the target flows, as well as to investigate the presence of more star formation features, such as microjets, proplyds, and silhouette disks. They will also be used to survey emission objects identifiable of T Tauri stars down to 0.4 Msun, potential driving sources of the HH jets.

Tiempo asignado: 2.5 horas

Propuesta: GS-2006B-Q-53

Investigador Principal: Dr. Gaspar Galaz (PUC)

Título: "Stellar velocity dispersion in bulges and disks of low surface brightness galaxies"

Resumen: Low surface brightness galaxies (LSBs) form one of the most enigmatic kind of galaxies observable in the universe. Their low stellar density, low stellar formation rate, and the observational fact that many of them actually present a significant fraction of old stellar populations, challenge both stellar formation theories as well as galaxy formation theories in general. Here, we propose to investigate the kinematics of the different stellar populations lying a specially selected sample of face-on LSBs, already studied in broad-band optical and near-IR imaging and long-slit optical spectroscopy. These results, already published, show that small bulges of LSBs tend to be metal poor, compared to those larger bulges hosted by LSBs. These conclusions are in agreement with those by other authors claiming that secular evolution could explain the bulge formation of some spiral galaxies. We propose to use GMOS-IFU in order to measure the velocity dispersion of the stellar component of the bulges hosted by a selected sample of 7 LSBs, for which broad properties are known. We estimate that we can achieve reasonable high S/N IFU spectra for the disk of one of the selected galaxies. The IFU spectra will also be useful to estimate the metallicity gradient of bulges (from the Mgb absorption line), as well as the mass-to-light ratio from the measurement of the disk velocity dispersion (σ_z), assuming isothermal equilibrium and computing directly σ_z thanks to the face-on geometry of the sample. Using the GMOS-IFU exposure time calculator, we estimate that we need approximately 1 hr and 20 min on-source exposure per target, yielding S/N approx. 12. The total observing time is about 14 hrs.

Tiempo asignado: 14 horas

Propuesta: GS-2006B-Q-77 (Conjunta con US,CA)

Investigador Principal: Dr. Ezequiel Treister (UCH)

Título: "GNIRS Spectroscopy of Extreme X-ray to Optical sources in the E-CDFS field"

Resumen: We propose to use GNIRS on Gemini-South to obtain near-infrared spectroscopy of 4 Extreme X-ray-to-Optical flux ratio (EXOs) sources found in the Extended Chandra Deep Field-South field, one of the fields of the Multiwavelength Survey by Yale-Chile (MUSYC). EXOs are a new class of X-ray emitters about which almost nothing is known. In particular, no EXO has measured spectroscopic redshift. These moderately bright X-ray sources are undetected in very deep (mag ~ 27) BVR images obtained as part of our MUSYC survey. These sources, however, have ~ 5 -sigma detections in our K-band images (~ 20.5 Vega) and are clearly detected in the four Spitzer IRAC bands, implying very red colors of $V-K > 7$. Given that they are clearly detected in X-rays and that they have a very red optical-IR spectrum, these sources are thought to be either very high redshift AGN ($z > 6$), or obscured AGN with old or dusty host galaxies at $z \sim 2-3$. These sources have brighter fluxes than GOODS EXOs, hence NIR spectroscopy is possible. NIR spectroscopy is crucial to distinguish between these two hypotheses. Only Gemini-S/GNIRS observations can shed light on the true nature of this new class of highly unusual sources.

Tiempo asignado: 10 horas

Propuesta: GS-2006B-Q-66

Investigador Principal: Dr. Nelson David Padilla (PUC)

Título: "Unveiling Growth of Spheroids and Black Holes in Dusty Cocoons upto $z=2$ "

Resumen: We intend to obtain the spectra of massive star-forming galaxies using GMOS/Gemini-South to unveil the hidden connection between the star formation in young massive spheroids and the growth of their central super massive black holes. The targeted galaxies were selected as Mid-InfraRed(MIR) or/and Submm or/and radio bright sources from the SIRIUS/SXDS field which was observed in multiband photometry (B,V,R,i',z',J,H, and K_s) with the Subaru/Suprime-Cam and UH2.2m/SIRIUS. The proposed GMOS observations explore the following key issues that will shed light on the co-evolution of star formation and AGN activities in young massive spheroids; 1) The star formation rate derived from the strong emitting nebula lines [OII] $\lambda 3727$ for galaxies at $z < 1.6$; 2) The study of AGN activity in young spheroids using H β at $z < 0.6$, Mg II at $z > 0.6$ or other emission lines from narrower broad-line regions around the AGNs; 3) The confirmation and determination of redshifts for massive star forming galaxies such as SMGs, BzKs, and MIR bright galaxies near the edge of the redshift desert. Redshift determinations are extremely important for the study of young massive spheroids since their redshift distribution is still not well known.

Tiempo asignado: 20 horas

Propuesta: GS-2006B-Q-75 (Conjunta con GS)

Investigador Principal: Dr. Marcio CaTalan (PUC)

Título: "Rotation and Flattening of Globular Clusters: NGC 121"

Resumen: We wish to conclusively establish whether rotation can be a main cause of non-sphericity in globular clusters. Galactic globulars are constantly interacting with the strong gravitational potential of the Milky Way,

hence it is nearly impossible to identify the primary reason for their observed morphologies, even if internal velocity information exists. What is needed to test the various scenarios of globular cluster flattening is a non-spherical, yet isolated extragalactic globular cluster. Our recent analysis of the lone globular associated with the low-mass dwarf irregular WLM has recently indicated that, at least in the case of that old globular cluster, rotation is not the culprit. Is WLM-1 an anomaly, or is rotation generally not the primary cause of globular cluster flattening? Here we propose to provide insight into this problem by using GMOS-S to study the lone, old globular cluster associated with the Small Magellanic Cloud, NGC 121. The resulting velocity profile will definitely answer the question of whether rotation can be a cause of the extreme flattening that is observed in this fairly isolated globular cluster. Note that this program qualifies as a "poor weather proposal" as outlined in the 2006B call for proposals.

Tiempo asignado: 11 horas
