



Comisión Nacional de Investigación
Científica y Tecnológica - CONICYT

Resultados del Concurso 2012B para Observaciones en Gemini-Sur

Propuesta: G/2012B/02

Investigador Principal: Alberto Rebassa-Mansergas, Universidad de Valparaíso.

Título: Towards a global understanding of close compact binary evolution: further constraining common envelope theories.

Resumen: Close binaries containing a compact object make up a wide variety of objects and include SN Ia progenitors and black hole binaries. The most important but also least understood phase of close compact binary star formation is common envelope (CE) evolution. Over the past six years we carried out observational population studies of post-common envelope binaries and provided the first clear observational constraints on current theories of CE evolution. However, our survey was limited to lowmass (M type) secondary stars and it might well be that the outcome of CE evolution depends strongly on the secondary star mass. We therefore here propose to extend our survey towards systems containing more massive (FGK-type) companions. Apart from providing further observational constraints for CE evolution theories, the present project will provide a crucial test for the single degenerate channel towards SN Ia.

Tiempo asignado: 8 horas

Propuesta: G/2012B/08

Investigador Principal: Sebastián López, Universidad de Chile.

Título: Rapid observations of GRBs with Gemini.

Resumen: Rapid observations of gamma-ray bursts are critical to probing their exotic physics and using GRBs themselves as probes of the universe. Our collaboration discovered GRB090423 at $z=8.2$, breaking the record for the most distant known object, and continues to use Gemini to observe distant and extreme bursts, and explore the diversity of their hosts and progenitors. Our approach is to both study individual key events and build up statistical samples. Primary goals remain (i) to observe GRBs at very high- z , where they provide luminous backlights with which to explore the IGM during reionization and also a means to identify and characterise their faint hosts; (ii) to detect afterglows and measure redshifts for the class of short-duration bursts, whose nature remains enigmatic, but which may be the best candidates as electromagnetic signatures for gravitational-wave sources; (iii) to construct a larger, more complete redshift sample of GRBs; (iv) to observe exceptional bursts, such as unusually low- z or Fermi-LAT detections that require redshift measurements in order to test theories of quantum gravity. Gemini is a cornerstone facility of global GRB research and we will continue to use it in combination with a large network of other facilities.

Tiempo asignado: 2 horas

Propuesta: G/2012B/11

Investigador Principal: Francisco Förster, Universidad de Chile.

Título: Late time spectral evolution of Type Ia supernova.

Resumen: Progenitor scenarios of type Ia supernovae can be divided in two classes: those where the progenitor WD has a high central density at ignition ($\sim 10^9$ g cm⁻³) and those where the WD has a relatively low central density at ignition ($\sim 10^7$ g cm⁻³). The former can only occur in systems that reach the Chandrasekhar mass before ignition accreting matter stably in the envelope. Differences in central density at ignition should mainly affect the nucleosynthesis of the inner layers of SN Ia ejecta, which can be studied in the nebular phase of SNe Ia evolution. Thus, we propose to study the spectral evolution of type Ia supernova in their nebular phase, when forbidden lines of iron group elements synthesized in the central regions of the ejecta dominate: e.g. Ni, Co and Fe. The shape and position of individual lines are a reflection of the physics of the ignition and explosion (Maeda et al. 2010a), and the evolution of the different IGEs lines could reflect the pre-supernova ignition density (Motohara et al. 2006).

Tiempo asignado: 13.8 horas

Propuesta: G/2012B/07

Investigador Principal: Sebastián López, Universidad de Chile.

Título: Exceptional Swift and Fermi GRBs: Gemini Standard Targets of Opportunity.

Resumen: We propose to make late-time observations of gamma-ray burst (GRB) counterparts, complementary to our companion "Rapid ToO" program. High priority science goals include (a) monitoring of low-redshift ($z < \sim 0.5$) GRBs to search for photometric or spectroscopic evidence of (or place limits on) emission from accompanying supernovae; (b) observations to help confirm and characterize high-redshift GRB candidates, which, led by our Gemini observations, are providing a unique new window on $z > 6$ star formation and the reionization of the Universe; (c) observations of short-duration bursts, which are likely connected to compact object mergers; and (d) afterglow monitoring for "jet break" burst-collimation measurements, to constrain the total energy output for the highest energy bursts detected by Fermi-LAT. We emphasize that our long-running Gemini campaign, which has allowed us to respond flexibly to rare GRB events, has been very successful and has contributed an essential legacy for Swift: late-time observations have been a key component of this.

Tiempo asignado: 1 hora

Propuesta: G/2012B/19

Investigador Principal: Giuliano Pignata, Universidad Andrés Bello.

Título: Typing the discoveries of the SUDARE survey.

Resumen: The rate of SNe is linked to some of the basic ingredients of the galaxy evolution such as mass, star formation history, metallicity and environment. When this information can be derived from an accurate characterization of the galaxy sample, the evolution of the supernova rate with cosmic time can be used to probe the SN progenitor scenarios. With the aim to provide a new measurement of the rates of the different type of SNe in the redshift range 0.2-0.6 and test for a possible evolution of the SN diversity with redshift and with the properties of the parent stellar population, we are carrying out a five season survey of the COSMOS field with VST+OMECAN call SUDARE (Supernova Diversity and Rate Evolution). A crucial ingredient for the success of experiment is the possibility to differentiate the SNe discovered in their subclasses (Ia, Ib, Ic, IIP, IIb etc). With this goal we request 13 hours of GMOS time.

Tiempo asignado: 15 horas

Propuesta: G/2012B/06

Investigador Principal: J. Jenkins, Universidad de Chile

Título: Imaging Anglo-Australian Planet Search companions

Resumen: We are implementing NICI ADI (Angular Differential Imaging) observations of 30 stars from the Anglo-Australian Planet Search target list. These stars show evidence for a long-period companion, at unresolved orbital periods of longer than the current 12 year span of our precision Doppler data. NICI observations allow us (1) to determine whether these long-period companions have very long periods (>20yr) and high masses (ie. brown dwarf or M-dwarf masses), or shorter periods (12-20yr) and planetary masses; (2) to do so without the "sin i" inclination degeneracy that afflicts Doppler observations; and (3) allows any T- or Y-dwarfs so detected to be targetted for follow-up as benchmark brown dwarf systems of known age and metallicity.

Tiempo asignado: 8.3 horas

Propuesta: G/2012B/09

Investigador Principal: Timo Anguita, Pontificia Universidad Católica de Chile

Título: Mass to light ratios and evolution of galaxy scale lenses from the RCS2

Resumen: We have built a catalog of ~ 60 strong galaxy-galaxy lensing systems at intermediate redshift from fields of the RCS2. Here, we propose to obtain spectroscopic observations of 7 southern candidates observable during period 2012B. The lens galaxies in our catalog are particularly interesting because the sample they constitute is complementary in redshift to the SLACS and COSMOS sample, with brightnesses similar to that of the SLACS lenses ($V \sim 19$ mag). With spectroscopic information of these candidates we will be able to confirm their lens nature and perform mass models. The mass models will allow us to measure the total mass and dark matter fraction of galaxies at their redshift range putting a clear constraint on galaxy evolution models. As our lens models will benefit from the environmental information already at hand, we will additionally be able to measure the influence of this environment and its redshift evolution. This proposal is a continuation of programs 2011-A-Q53 and 2011-B-Q39.

Tiempo asignado: 14 horas

Propuesta: G/2012B/15

Investigador Principal: Matias Gomez, Universidad Andrés Bello.

Título: Towards an understanding of galaxy assembly: the Black Hole-Globular Clusters Connection.

Resumen: A surprisingly tight correlation between the total globular cluster mass in a galaxy and its central black hole has recently been discovered. This correlation undoubtedly contains important clues to the intricate co-evolution of galaxies and black holes. However, the sample of galaxies for which both direct determination of the black hole mass and a thorough census of the globular cluster system is limited to roughly 40 galaxies, the large majority being ellipticals, and leaving the correlation for spiral and lenticular galaxies largely unconstrained. We intend to study the dependence of the globular cluster/central black hole connexion with the morphological type of their parent galaxy. We propose here to systematically study globular cluster systems of spiral and lenticular galaxies for which the central black hole mass has been determined.

Tiempo asignado: 6 horas

Propuesta: G/2012B/05

Investigador Principal: Verónica Motta, Universidad de Valparaíso

Título: Strong lensing and dynamical constraints to study different density profiles

Resumen: We propose to use GMOS spectroscopy data to study different density profiles in the galaxy cluster MS0440.5+0204. This cluster at $z=0.19$ has several lensing features, including two radial arcs, and looks "regular" from the symmetry of the distortion pattern of the gravitational arcs, making this object the ideal candidate to probe different mass profiles. We will use the GMOS instrument in multi-slit spectroscopic mode to measure for the first time the redshifts of at least 15 gravitational arcs and 90 galaxies in the cluster. Note that the 4 masks have already been designed. The data obtained will be used to test distinct density profiles on MS0440 by building a mass reconstruction from the strong lensing features observed with the HST/WFPC2. The analysis of the velocity distribution of some 130 cluster members (90 new measurements and 40 from the literature) will give us new constraints, which added to the lensing ones, will allow us to characterize the density profile from the strong lensing region of the cluster up to "medium scales", discriminate quantitatively between different mass models and probe the slope of the mass profile.

Tiempo asignado: 6 horas.

Propuesta: G/2012B/16

Investigador Principal: Sergio Torres-Flores, Universidad de La Serena

Título: Metallicity gradients and intergalactic star-formation in galaxy groups

Resumen: Compact groups are great laboratories to study the effect of galaxy-galaxy interactions in the intragroup medium (IGM). We have started a program to search for star-forming objects in the IGM and in the tidal tails of interacting galaxies by using multiwavelength data (UV/GALEX, HI, Fabry-Perot and GMOS data). We already found several tidal dwarf galaxies (TDGs) and intergalactic HII regions (IHII) in the IGM of groups (de Mello et al. 2008,2012, Torres-Flores et al. 2009) and an inverted metallicity gradient in a merger remnant (Torres-Flores et al. 2012). In this proposal we will study the metallicity gradients in a sample of interacting galaxies in three compact groups of galaxies: Arp314, VV304 and NGC6845. All of them have tidal tails with several objects that are either IHII regions or TDGs candidates. We ask for GMOS time to obtain images/spectra of these candidates in order to obtain: their metallicities, their ages and the internal extinctions. This analysis will help us to determine if interacting galaxies present flat and/or inverted metallicity gradients, as has been suggested from simulations. Also, if a number of intragroup star-forming objects are confirmed, as we predict they will be, we will evaluate their role in enriching the IGM.

Tiempo asignado: 8.5 horas.

Propuesta: G/2012B/14

Investigador Principal: Adal Mesa-Delgado, Pontificia Universidad Católica de Chile.

Título: Chemical Content of Orion Protoplanetary Disk

Resumen: Protoplanetary disks (proplyds) are landmark objects in the study of how circumstellar disks and eventually planetary systems form and survive in the vicinity of massive stellar clusters. At the moment our knowledge about the chemistry and elemental content of proplyds is very poor. Analysis of their forbidden and permitted optical emission lines can provide a window into their properties and can yield a measure of the unknown metallicity of photoevaporating planet-forming media. We propose to perform deep integral-field spectroscopy with GMOS-S on 12 proplyds in the Orion Nebula with a view to obtaining a direct measure of their elemental abundances (He, C, N, O, Ne, Ar, Cl, S, Fe) and physical conditions from a variety of emission line diagnostics. This programme will provide the first census of proplyd metallicities in the benchmark Orion HII region.

Tiempo asignado: 20.6 horas.

Propuesta: G/2012B/17

Investigador Principal: Adele Plunkett, Universidad de Chile

Título: Accretion rate versus protostellar mass in intermediate mass clusters: The case of M8

Resumen: How the star formation process, specifically the accretion rate, depends on final stellar mass or characteristics of nascent environment is not yet well understood. Within nearby cluster M8 are hundreds of young, intermediate-mass protostars accreting gas from the surrounding environment, and we propose GMOS observations of H α towards these protostars. We will measure the H α line profile widths and calculate mass accretion rates, as well determine age and mass of the protostars using HR diagrams and isochrones. Gallardo et al. (2012) showed a relation between mass accretion rate and stellar mass based on observations of 8 sources in M8, and we propose observations of a statistically significant (at least 100) sample in order to verify the relation, as well as determine how accretion rate depends on age. Thus, we will distinguish between steady and episodic star formation models.

Tiempo asignado: 7 horas.
