



Comisión Nacional de Investigación
Científica y Tecnológica - CONICYT

Resultados del Concurso 2011B para Observaciones en Gemini-Sur

Propuesta: G/2011B/05

Investigador Principal: Krzysztof Helminiak, Pontificia Universidad Católica de Chile

Título: Eclipsing binary stars as cutting edge laboratories for astrophysics of stellar structure, stellar evolution and planet formation

Resumen: We propose to search for and subsequently characterize with Subaru/HDS circumbinary planets around a sample of eclipsing double-lined binary stars using our own novel cutting edge radial velocity technique for binary stars. We will also derive basic parameters of these binaries components with an unprecedented precision. In particular for at least half of our sample we expect to deliver masses of the components with an accuracy 10-1000 times better than the current state of the art. This will be accomplished using the spectra collected with HDS, and other high-resolution echelle spectrographs with iodine cells (Keck/HIRES, VLT/UVES, SALT/HRS), and the high cadence, high precision light curves of the targets collected with our new global network of four 0.5-meter robotic telescopes. Our project will provide unique constraints for the theories of planet formation and evolution and an unprecedented in quality set of the basic parameters of stars to test the theories of the stellar structure and evolution. To our knowledge, this is the only research of this kind in the world, which brings the Chilean astronomical community to the frontiers of stellar astrophysics and planetary sciences.

Tiempo asignado: 2 noches

Propuesta: G/2011B/13

Investigador Principal: Felipe Barrientos, Pontificia Universidad Católica de Chile.

Título: Mass Calibration of a Sample of ACT SZE-Selected Galaxy Clusters

Resumen: We propose to continue our Gemini/GMOS program to obtain spectroscopic redshifts and dynamical

Tiempo asignado: 2 noches

Propuesta: G/2011B/25

Investigador Principal: Markus Rabus, Pontificia Universidad Católica de Chile.

Título: Search for warm dust and sub-stellar companions at the astronomical unit scale around "Vega-like" main-sequence stars: Tau Ceti

Resumen: Planetary formation has still many open questions, when do planets form by core accretion and when by gravitational collapse. Also, the presence of close-in giant planets, the so-called Hot Jupiters, requires a migration mechanism -- disc-planet interaction, or planet-substellar object scattering. We intend to look for already formed systems with sufficient residual dust to allow to trace their dynamical properties and set constraints on planet formation models. In order to resolve the inner complex environment, we propose to acquire coronagraphic direct images of nearby "Vega-like" main sequence stars with infrared excess. We will detect asymmetries and clumps of the inner dust which will give us constraints on the formation and migration models of planets.

Tiempo asignado: 4 horas

Propuesta: G/2011B/03

Investigador Principal: J. Jenkins, Universidad de Chile

Título: Imaging companions from the Anglo-Australian Planet Search

Resumen: We have been implementing NICI ASDI (Angular Spectral 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. These 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) allow 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: 6.4 horas

Propuesta: G/2011B/26

Investigador Principal: Giuliano Pignata, Universidad Andres Bello

Título: Characterizing subluminoous Supernovae Ia through nebular spectroscopy

Resumen: During the last year our knowledge of type Ia supernova (SNe Ia) physics has experienced a clear acceleration from both the theoretical and observational view-points. The study of Maeda et al. (2010) has finally set a direct link between the fundamental physics of the explosion and some well defined observables. These authors suggest tha theoretically predicted asymmetries of the initial deflagration can be traced by velocity shifts of well defined lines present in type Ia nebular spectra. They have also found a clear correlation between these shifts and some spectroscopic features at early epochs. In the Maeda el al. sample only two SN Ia are subluminoous leaving this subclass poorly defined. We request 5 hour of GMOS south to obtain nebular spectra of two additional subluminoous SNe Ia for which we have a good early time photometric and spectroscopic data set. To our knowledge, the proposed observations will double the current sample of subluminoous SNe Ia for which nebular spectroscopy at sufficient late time is available. Taking into account the low

frequency with which this faint objects are detected, the proposed experiment is a rare opportunity to quick increase the statistical constraints on the properties of these objects.

Tiempo asignado: 5 horas

Propuesta: G/2011B/16

Investigador Principal: Neil Nagar, Universidad de Concepción.

Título: Tracing gas flows in Active Galactic Nuclei down to the innermost few parsecs: Completion of a statistically meaningful "sample"

Resumen: We propose GMOS IFU emission-line spectroscopy of the extended H α gas in the inner kiloparsec of nearby active galactic nuclei (AGN) hosts, selected for having dusty nuclear spirals, in order to test the hypothesis that these spirals trace the channels through which the nuclear supermassive black hole is being fed. This is a continuing study for which we have already data for 5 LINERs, 3 Seyfert 2 and 3 Seyfert 1 galaxies. The data in hand show that the H α kinematics within the inner kiloparsec presents streaming motions towards the nucleus with speeds of the order of 50 km/s. This result suggests that dusty nuclear spirals do trace inflows, and we now aim at correlating the mass inflow rates with the strength (luminosity) of the nuclear activity, in order to characterize the black hole accretion and growth in a statistically significant sample of galaxies, spanning a range of nuclear power. We thus need to include in our sample a range of AGN luminosities and, towards this goal, we now propose to use Gemini/GMOS-IFU to map the gas kinematics in the nearby Seyfert galaxies NGC1386, NGC1566 and NGC7213. Part of this sample will also be proposed to ALMA (Cycle 0).

Tiempo asignado: 7 hrs.

Propuesta: G/2011B/23

Investigador Principal: Joseph Anderson, Universidad de Chile

Título: Rapid ToO spectroscopy of very young supernovae

Resumen: We request 10 hours of GMOS spectroscopy to observe very young supernovae discovered by our CHilean Automated Supernova sEarch (CHASE). CHASE has found its niche in discovering very young supernovae using high cadence observations of target galaxies. Hence we request rapid ToO observations to obtain early phase spectra for a variety of supernovae types. These data will enable us to measure (for Type Ia and Type Ib/c supernovae) the abundances of various elements in the outer ejecta, which can be used to constrain explosion models. Moreover, early spectroscopy can reveal signatures related to the interaction of the SN ejecta with circumstellar material and give insights into the progenitor systems. In the case of hydrogen-rich core-collapse (Type II) supernovae, early observations can also provide important information regarding the physics of shock-breakout, and the pre-supernova density structure. Finally, spectra of supernovae at the earliest epochs will enable spectral classification necessary to enable efficient planning on various observational SN projects.

Tiempo asignado: 10 hrs.

Propuesta: G/2011B/18

Investigador Principal: Veronica Motta, Universidad de Valparaíso.

Título: Isothermal or not isothermal: Discriminating different density profiles in the galaxy cluster MS 0440.5+0204

Resumen: We propose a study of density profiles for MS0440.5+0204, combining strong lensing modeling and dynamical studies. MS0440 at $z=0.19$ has several arc systems including two radial lensing features, and looks "elliptical" from the symmetry of the distortion pattern of the gravitational arcs, making this galaxy cluster the ideal candidate to probe different mass profiles. We will use the GMOS instrument in multi-slit-spectroscopic mode to measure the redshifts of the brightest arcs and the galaxies in the cluster. We will use the data to test distinct density profiles on MS0440 by building a mass reconstruction from the strong lensing features observed with the HST/WFPC2 and reported by previous authors. Combining strong lensing modeling with the analysis of the kinematical structural parameters of the cluster member galaxies, we will 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: 5.4 hrs.

Propuesta: G/2011B/12

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

Título: Star formation in the intragroup medium and metallicity gradients in galaxy groups

Resumen: Compact groups are great laboratories to study the effect of galaxy-galaxy interactions in the intragroup medium (IGM), which is rich in HI gas. We have started a program to search for star-forming objects within HI clouds in the IGM by using multiwavelength data (UV/GALEX, HI, Fabry-Perot and GMOS data) of groups of galaxies. We already found several tidal dwarf galaxies (TDGs) and intergalactic HII regions (IHII) in the IGM of groups (de Mello et al. 2008, Torres-Flores et al. 2009, Urrutia-Viscarra et al. 2011) and an inverted metallicity gradient in a merger remnant (Torres-Flores et al. 2011). In this proposal we will be probing the IGM of three dynamically evolved groups: NGC92, Arp314 and NGC6845. All of them have gaseous tidal tails with plenty of candidates to either TDGs or IHII regions. We ask for GMOS time to obtain images/spectra of these candidates in order to: obtain their masses, ages and estimate their metallicities. If a number of those are confirmed intragroup star-forming objects, as we predict they will be, we will evaluate their role in enriching the IGM and we will study the existence of metallicity gradients in these strongly interacting galaxies.

Tiempo asignado: 8 hrs.

Propuesta: G/2011B/15

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 11 southern candidates observable during period 2011B. 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 program 2011-A-Q53.

Tiempo asignado: 22 hrs.

Propuesta: G/2011B/009

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

Título: Searching for close double white dwarfs in the Sloan Digital Sky Survey

Resumen: We aim for a joint proposal to use the Sloan Digital Sky Survey for searching a large and homogeneous sample of close double white dwarfs (CDWDs). CDWDs are compact double white dwarf binaries that are supposed to descend from main sequence binaries through two stages of common envelope evolution. In addition, CDWDs are considered to be progenitors of Supernovae Type Ia, and are of key importance for detecting and accurately measuring gravitational waves. However, the evolution and formation of CDWDs is still subject to several uncertainties. Only with a large number of homogeneous CDWDs we will be able to observationally constrain the evolution of all CDWDs and understand how they form.

Tiempo asignado: 10 hrs.

Propuesta: G/2011B/14

Investigador Principal: Tom Richtler, Universidad de Concepción.

Título: The dark halos of isolated elliptical galaxies

Resumen: The nature of dark matter is one of the deepest mysteries in modern astrophysics. The cold dark matter paradigm has its success in cosmology down to the galaxy cluster scale, although recent observations cast doubts on the predicted cuspy nature of cluster dark halos. Alternative concepts like Modified Newtonian Dynamics have their successes in disk galaxies, modeling disk rotation curves and the tight baryonic Tully-Fisher relation. Elliptical galaxies, due to their missing disk symmetry and the associated model uncertainties, are until now not claimed by either side. Elliptical isolated field galaxies, not being exposed to external fields and without interactions, are key objects in this respect. Simulations predict individually different dark halo properties. Finding one isolated elliptical with a dark mass definitely higher than predicted by MOND would put the entire concept in jeopardy. We propose to investigate the dark halos of the isolated ellipticals NGC1162 and

NGC7796 out to 3 effective radii by the technique of ultra-deep mask spectroscopy of its diffuse light.

Tiempo asignado: 13.85 hrs.

Propuesta: G/2011B/17

Investigador Principal: Ricardo Salinas, Universidad de Concepción

Título: Galactic taphonomy: kinematics, stellar populations and dark matter content of fossil groups

Resumen: With their anomalous luminosity functions, fossil groups are believed to be very old systems where all L^* galaxies have merged into a single bright central galaxy due to dynamical friction. These old ages clash with the X-ray observations which show an absence of cool cores, and with preliminary stellar population analyses which show rather intermediate ages. The high dark matter concentrations also found with X-ray observations, although in agreement with an old formation, are hard to reconcile with the simulation expectations for their masses. Relatively little is known in the optical regime. Hereby we propose deep spectroscopic observations of two central fossil group galaxies, which are also among the nearest fossil systems: ESO552-G020 and ESO306-G017. With these observations we will address several unexplored subjects such as the internal kinematics, dark matter distribution through dynamical analysis, ages, metallicities and the timescale of the stellar formation, giving the first detailed optical portrait of these systems.

Tiempo asignado: 12.5 hrs.

Propuesta: G/2011B/24

Investigador Principal: Rodolfo Angeloni, Pontificia Universidad Católica de Chile.

Título: Resolving Symbiotic Nebulae in the Magellanic Clouds: a GMOS survey

Resumen: We propose Gemini-S/GMOS narrow-band imaging of a few carefully selected Symbiotic Stars in the Magellanic Clouds. Because of their proximity, Magellanic Symbiotic Stars are the ideal sample both for studying the symbiotic population within a same astrophysical environment (with the great advantage of knowing the exact distance, and sidestepping the issue of galactic extinction) and for characterizing the symbiotic phenomenon at different metallicity, allowing a first direct comparison with their galactic counterparts. This study proposes a deep narrow-band imaging in H α + [NII], [OIII] and [SII] of six Magellanic Symbiotic Stars, for which we have gathered indirect though strong evidence of the presence of extended (over parsec-scale) ionized nebulae, likely in the form of collimated bipolar outflows. By naturally complementing our spectro-photometric data-set of Symbiotics in the Magellanic Clouds, the requested observations would provide a unique chance for constraining the evolutionary status of these objects (that are crossing the fast phase from AGB to pre-PN), studying the effects of binary interactions in producing highly collimated nebulae and jets, and highlighting morphological similarity and difference with the corresponding Planetary Nebulae and other related objects (such as Novae) in the Milky Way.

Tiempo asignado: 4 hrs.

Propuesta: G/2011B/06

Investigador Principal: Andre-Nicolas Chene, Universidad de Concepción

Título: Search for new Galactic LBV candidates

Resumen: Luminous Blue Variable (LBV) stars represent an extremely rare class of very luminous and massive stars. Only about a dozen confirmed Galactic LBV stars are known to date, which precludes us from determining a solid evolutionary connection between LBV and other evolved massive stars. We identified a sample of possible LBV candidates from the Spitzer 24-micron archival data via detection of their circumstellar nebulae. Spectroscopic followup of central stars associated with some of these nebulae showed that they are either candidate LBVs or related evolved stars. We propose spectroscopic observations of the remaining stars of our southern sample to determine their nature and discover additional LBV candidates.

Tiempo asignado: 12 hrs.

Propuesta: G/2011B/07

Investigador Principal: Andre-Nicolas Chene, Universidad de Concepción.

Título: Spectroscopic Follow-Up Observations of Bow Shock-Producing Stars

Resumen: Observations show that young star clusters lose a significant fraction of their initial content of massive stars owing to dynamical processes in their dense cores. The ejected (runaway) stars generate bow shocks, whose geometry allows us to back-trace the orbits of the stars to parent clusters. Search for bow shocks in star-forming regions and subsequent identification of their associated stars serve as a useful tool for constraining the dynamical evolution of their parent clusters. In the current project, we propose spectroscopic follow-up of 22 bow shock-producing stars, detected around the young clusters (NGC 6611, Pismis 24, etc) using the Midcourse Space Experiment satellite and Spitzer Space Telescope archival data. With the spectroscopic data, we will be able to determine the spectral types, luminosities and masses of the stars, to measure their radial velocities and thereby to determine their cluster membership. Together with the proper motion measurements for our program stars, the results of the spectroscopic follow-up will provide novel constraints on the modeling of young star clusters, which in turn would have profound consequences for understanding the origin of the field OB stars.

Tiempo asignado: 5 hrs.
