



Comisión Nacional de Investigación
Científica y Tecnológica - CONICYT

Resultados del Concurso 2012A para Observaciones en Gemini-Sur

Propuesta: G/2012A/06

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 (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: 1.0 nights

Propuesta: G/2012A/17

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

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

Resumen: We propose to continue and complete our Gemini/GMOS program to obtain spectroscopic redshifts and dynamical mass estimates for a large redshift-independent sample of galaxy clusters detected by the Atacama Cosmology Telescope (ACT) via the Sunyaev-Zeldovich effect (SZE) for multiple high-impact science goals. The proposed GMOS observations of 10 additional newly-discovered SZE massive clusters combined with the scheduled observations (Oct 24-28) of 10 clusters will provide a 50% improvement on our current calibration of the SZE signal (Y) vs. mass correlation at redshifts out to 1. With this calibration, our existing SZE-selected cluster sample should enable an improved measurement of σ_8 and Ω_M . The observations will also allow us to study the evolution, star formation rates and stellar populations in the most massive clusters over $0.3 < z < 1$. The proposed observations represent a complete, SZE-selected sample of massive clusters over all redshifts within a cosmologically-significant survey volume. The final overall sample of ~ 35 massive clusters will be used to calibrate the Y -mass scaling relation, with a scatter of around 10% on the slope, which in turn allows us to constrain the dark energy via cluster mass function, in conjunction with a cluster correlation function analysis.

Tiempo asignado: 2.0 nights

Propuesta: G/2012A/10

Investigador Principal: Ricardo Salinas, Universidad de Concepción

Título: The globular cluster systems of isolated elliptical galaxies

Resumen: Globular cluster systems (GCSs) show "universal" color bimodality. This bimodality is commonly interpreted as the co-existence of a metal-rich and a metal-poor sub-population. In models of GCS formation that are consistent with hierarchical merging, the accretion of clusters plays a central role. In underdense environments, where accretion processes are expected to be less important than in high-density environments, the predicted properties of GCSs can be compared with one(!) galaxy only. We therefore propose deep GMOS g'i' imaging of five GCSs around isolated ellipticals. The properties of these GCSs, among them the ratio of blue to red clusters as a probe of the type of accretion, will allow us to put tighter constraints on GCS formation models.

Tiempo asignado: 10.7 horas

Propuesta: G/2012A/15

Investigador Principal: Sebastian Lopez: Universidad de Chile

Título: Exceptional Swift and Fermi GRBs: Gemini South Rapid Targets of Opportunity

Resumen: Swift and Fermi have sparked a renaissance in the study of GRBs, discovering an unprecedented number of events with rapid, accurate localizations. However, it is in the follow-up, particularly at optical/infrared (OIR) wavebands, where the full scientific potential of these missions is realized. As we did very successfully in the past semesters, our three teams have merged proposals in order to optimize GRB science using the OIR instrument suites on both Gemini telescopes. Our focus is on extreme and rare GRBs that hold the greatest potential as unique probes of the early universe and stellar death: (1) high-redshift bursts ($z > 6$), offering spectroscopic probes of the universe during reionization; (2) low-redshift bursts ($z < 1$), the keystone events for understanding the nature of the GRB progenitor; (3) short GRBs, with the goal of constraining their still-mysterious progenitors; and (4) Fermi-LAT bursts, which can constrain theories of quantum gravity and place limits on the Lorentz factor of the outflow. Gemini has emerged as the cornerstone facility of global GRB research and we will continue to use our proprietary access on smaller facilities and our wide network of collaborators to maximize the return of Gemini observations.

Tiempo asignado: 2.0 horas

Propuesta: G/2012A/12

Investigador Principal: Simon Casassus, Universidad de Chile

Título: Planet search in gas-rich transition disks

Resumen: Disk-planet interaction has been observed in debris disks harboring large gaseous giant planets which have imprinted gaps and eccentricity on the host disk. Observations of accreting protoplanets in younger systems are required to 1- constrain the timescale for planet formation, and 2- observe early planet migration. No bona-fide planet has so far been detected while still embedded inside a gas-rich disk. However, disk-planet interaction in gas-rich systems is expected to produce similar sign posts as in the more evolved debris disks. Two conspicuous gas-rich disks show tell-tales of planet accretion: HD142527 exhibits an eccentric ring, reminiscent of that in Fomalhaut. HD100546 hosts a gap at 10AU which may be explained by a $\sim 10M_{\text{jup}}$ companion. NICI is ideal for this planet search.

Tiempo asignado: 7.0 horas

Propuesta: G/2012A/13

Investigador Principal: Thomas H. Puzia Pontificia Universidad Católica de Chile

Título: The Total Mass of Virgo Cluster Dwarfs as traced by their Globular Cluster Systems

Resumen: This proposal aims at carrying out a GMOS multi-object spectroscopic survey of the globular cluster systems (GCSs) in three Virgo dE galaxies. These low-mass galaxies are all located well within the harsh cluster environment, but nonetheless contain very rich GC populations with rather extended spatial distributions - strongly suggesting that they might be shielded by massive dark matter haloes that prevent the GCS disruption. We propose to use the GCS kinematics to constrain the dE total mass content at large galactocentric radii, a region currently inaccessible to any other technique. Furthermore, the analysis of GC stellar populations will provide invaluable information on the process of early star formation in low-mass haloes. By accurately describing the relationship between the baryonic and total mass content of cluster satellites, this proposal will open new windows to the understanding of subhalo evolution.

Tiempo asignado: 18.9 horas

Propuesta: G/2012A/14

Investigador Principal: Timo Anguita Pontificia, Universidad Católica de Chile

Título: Velocity dispersions and stellar populations of RCS2 Galaxy Scale Lenses

Resumen: We have built a catalog of ~ 60 strong galaxy-galaxy lensing systems at intermediate redshift from fields of the RCS2. The Luminous Red Galaxy (LRG) lenses 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) and with extensive environmental information. The candidates are currently being followed-up with low resolution spectroscopy to confirm their nature and measure the redshifts of both sources and lenses. Here, we propose to obtain high resolution spectroscopy of 4 confirmed galaxy scale gravitational lensing systems with measured redshifts for both sources and lenses. This will allow us to measure the LRG velocity dispersion. Together with the total masses from lensing and the galaxy light profiles, these measurements will allow us to characterize the lens galaxy mass to light profiles. Moreover we will be able to characterize the stellar population of these massive galaxies, and study the baryonic versus observing time request summary dark-matter fraction of LRGs in an unprecedented way.

Tiempo asignado: 6 horas

Propuesta: G/2012A/04

Investigador Principal: Tom Richtler, Universidad de Concepción

Título: The ABC of BCDs: Antlia Cluster

Resumen: This is the continuation of our GS-2010A-Q-51 proposal which acquired pre-imaging successfully but uncomplete Band-3 spectroscopy due to bad weather, so the data could not serve our aims. We submit the same proposal again, asking for better conditions (although Band-3 still acceptable) to complete the proposed science via spectroscopy of 3 targets only (12h total, 9h acceptable). Physical studies in the NIR of dwarf irregular galaxies (dIs) and blue compact dwarfs (BCDs) have provided improved parameters for their old stellar populations. Chemical studies of dwarfs have shown that field dIs and observing time request summary Virgo BCDs exhibit the same relation between the oxygen abundance and the luminosity in K. The correlation between metallicity and gas fraction appears to be the same for BCDs as for dIs, suggesting that BCD evolution is similar to that of dIs. In this application we propose to scrutinize the evolution of BCDs in a new cluster environment by employing GMOS on Gemini South, to measure accurate oxygen abundances in 3 BCDs in Antlia. Using this data, we will be able to study the evolution of BCDs with respect to dIs in different environments (Virgo, Fornax, Hydra and Antlia) and to pinpoint the parameters controlling dwarf galaxy evolution.

Tiempo asignado: 3.0 horas

Propuesta: G/2012A/07

Investigador Principal: Alberto Rebassa-Mansergas Universidad de Valparaíso

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

Resumen: We aim for a 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 current evolution theories of all CDWDs and understand how they form.

Tiempo asignado: 7.5 horas.
