

Resultados del Concurso 2016A para Observaciones en Gemini-Sur

Propuesta: G/2016A/005

Investigador Principal: Jorge Cuadra, Pontificia Universidad Católica de Chile

Título: Star formation and dynamics at < 2.5 pc from Sgr A*

Resumen: We propose to observe the Galactic Center's inner few parsecs using GSAOI. This field is characterized by the puzzling presence of young stars in the close vicinity of the massive black hole. The large field of view of GSAOI will allow us to dramatically increase the census of young stars, whose distribution and dynamics are crucial to understand their formation mechanism. Moreover, the comparison between this new data set and the VLT data will enable us to pin down systematic errors in the astrometry, which will translate into smaller uncertainties in determining the black hole mass and the distance to the Galactic Center. This proposal is the same that was approved as GS-2015A-Q-25, but not carried out due to weather and technical downtime.

Tiempo asignado: 6.8 horas.

Propuesta: G/2016A/024

Investigador Principal: Mariusz Gromadzki, Universidad de Valparaíso

Título: Trigonometric parallax of ancient T dwarf WISE0833+0052 (2016A)

Resumen: We propose to measure trigonometric parallaxes with GSAOI for fast moving late T dwarfs WISE 0833+0052 with kinematics of the thick-disk/halo. Such objects are very rare, only 5 are published until now. WISE 0833+0052 is the only one object in our sample with a suitable natural guiding star for GSAOI. Knowledge of accurate distance allow us constraints its kinematic, and shed more light on its status and origin. Parallax distance is crucial for this goal, and the colours of our target mean that the near-infrared is optimal for the required high precision astrometry. Additionally this observations allow us to test binary of WISE 0833+0052. This project is awarded 2.5h in Band 1 in semester 2015B. Proposed observations should allow complete this program.

Tiempo asignado: 2.5 horas.

Propuesta: G/2016A/010

Investigador Principal: Claus Tappert, Universidad de Valparaíso

Título: Recovery of old novae

Resumen: A nova eruption is a thermonuclear runaway on the surface of the white dwarf in a cataclysmic variable (CV). This is assumed to be a recurrent event, and CVs thus represent novae in-between eruptions. A few decades after the nova eruption, the characteristics of the underlying CV become dominant. Population studies of post-novae would therefore provide observational information on the importance of certain properties (magnetic field, mass-transfer rate, etc.) for the CV to undergo a nova eruption, as well as the impact of the eruption on those parameters. However, such research is severely limited by our incomplete knowledge of post-novae and their properties. The main reason is that still a large part of the Galactic novae lack identification of the post-nova system. We here propose to continue our program on unveiling the post-nova population by confirming selected candidates by the means of long-slit spectroscopy.

Tiempo asignado: 3.3 horas.

Propuesta: G/2016A/016

Investigador Principal: Francesco Mauro, Universidad de Concepción

Título: Searching for past multiple bursts of star formation in Terzan 5, a fossil relic of the Galactic bulge

Resumen: In the globular cluster (GC)-like system Terzan5 Ferraro et al. (2009) discovered two distinct stellar populations defining two separated Red Clumps (RCs) and showing both a significantly different iron content ($\Delta[\text{Fe}/\text{H}] \sim 0.5$ dex) and a striking chemical similarity with bulge stars. Recently, Origlia et al. (2013) and Massari et al. (2014) found a third metallicity population. This evidence strongly suggests that Terzan5 is the fossil of one of the pristine units that generated the Galactic bulge, the only such object known to date. In Ferraro et al. (2009) it is suggested that the two populations of the RCs have different ages, but existing data do not allow a definitive test. Here we propose to exploit the superior capabilities of GSAOI/GeMS to accurately measure the age of the various suspected Terzan5 populations from their main sequence turn-off luminosities. Precisely dating any bursts of star formation in Terzan5 is crucial for the correct reconstruction of its evolutionary history and its connection to the bulge. Indeed, the results of the proposed observations combined with existing HST optical photometry promise to have a dramatic impact on our understanding of the formation processes of the Milky Way bulge and of galactic spheroids in general.

Tiempo asignado: 7.3 horas.

Propuesta: G/2016A/015

Investigador Principal: Roger Cohen, Universidad de Concepción

Título: Unveiling the Heart of the Milky Way: Ages and Structural Parameters of Inner Galactic Bulge Globular Clusters

Resumen: We propose to obtain GeMS+GSAOI imaging of 13 Galactic globular clusters (GGCs) located towards the Milky Way inner bulge. Our target clusters comprise all known GGCs in the inner bulge lacking deep high resolution imaging, and we will exploit the unique capabilities of GeMS+GSAOI@Gemini, together with imaging and expertise from our previous GeMS programs, to build a legacy on par with space-based optical GGC studies. By circumventing severe spatially variable extinction and resolving cluster members well down the main sequence, we will self-consistently measure the ages of the inner bulge globular clusters for the first time, finally completing the age-metallicity relation of the Milky Way GGC system, with vast implications for the formation history of our Galaxy and its bulge. Furthermore, the supreme spatial resolution of GSAOI, together with wide-field catalogs already in hand, will yield accurate structural parameters as a window into the dynamical history of the bulge and its clusters. Lastly, due to the exquisite image quality, the proposed observations will provide a key resource to the community for future proper motion-based investigations.

Tiempo asignado: 2.4 horas.

Propuesta: G/2016A/012

Investigador Principal: Lucas Cieza, Universidad Diego Portales

Título: The Planetary Systems of Young Massive Stars

Resumen: We propose to use the Gemini Planet Imager with nonredundant mask interferometry (NRM) to study planet formation around 38 massive stars in the Upper Scorpius region of the 5-20 Myr old Scorpius- Centaurus OB association. Sco-Cen is the nearest large population of young massive stars ($d=150$ pc), but analogs of our own gas giants (5-20 AU) have projected separations of only ~ 40 -150 mas and thus fall inside the inner working angle of the GPI coronagraph. The extremely young planets in this separation range should be quite bright (contrasts of $\sim 1000:1$ in K-band), but even so, traditional imaging cannot efficiently access this separation range. As our team has demonstrated with precursor science at Keck and the VLT, advanced techniques such as NRM are needed to achieve the necessary sensitivity at these small separations. Indeed, GPI-NRM will reach a contrast (>8 magnitudes, $>2000:1$ at 5-sigma) which is sufficient to detect massive gas giants in Sco-Cen down to the diffraction limit (~ 40 mas), and even slightly below. GPI-NRM provides the only means of probing the same region of orbital space for more massive stars as will be probed for closer, less massive stars with coronagraphic imaging. Through this unique approach, our survey will fill a major hole in our understanding of extrasolar planets by measuring the frequency of planetary companions around 2--5 M_{sun} stars, determining the primordial state of planetary systems and testing interior and evolution models of giant planets.

Tiempo asignado: 8 horas.

Propuesta: G/2016A/014

Investigador Principal: Paulina Lira, Universidad de Chile

Título: Reverberation Mapping of high-z QSOs: the final stages

Resumen: Reverberation mapping provides the only tool for obtaining the Black Holes (BH) mass in Active Galaxies. So far this method has been successfully applied only to low and intermediate luminosity systems ($<10^{46}$ ergs/s). We are extending these studies by two orders of magnitude, probing the BLR size (and BH-mass) of luminous AGN at redshift $\sim 2-3$, the peak of the Quasar era. Such large, slowly varying systems require a monitoring strategy that will maximise the likelihood of detecting significant variability. Since 2006 we have been monitoring a few dozen very luminous Quasars using broad band imaging with the SMARTS consortium. Targets with significant variations have been followed up with the du Pont telescope covering Ly α , SiIV, CIV and CIII. Now we have identified a handful of sources with significant structure in their continuum and line curves which are very promising to deliver BH mass determinations in the next few years of monitoring. With this Gemini/F2 campaign we want to add the crucial low-ionization MgII line observed at $\sim 10,000-10,600$ Å, and in some cases H β at ~ 17500 Å, to our monitoring campaign using the long slit capability of F2. Given the brightness of our sources, this would be a very economic proposal with a high scientific return.

Tiempo asignado: 1.5 horas.

Propuesta: G/2016A/01

Investigador Principal: Ronald Mennickent, Universidad de Concepción

Título: Infrared detection of circumbinary planets around NN Ser

Resumen: The alleged discovery of two circumbinary planets orbiting the close, low-mass pre-cataclysmic variable NN Ser via eclipse-timing variations has caused a vivid discussion in the community. Questions were raised about whether these variations could be explained with the Applegate mechanism, whether the proposed configuration was dynamically stable and, if so, whether the two planets could have survived the only recently ended common-envelope phase. So far the validation of the discovery with other methods remains elusive. Should these planets exist, they would provide a unique test-bed for evolutionary models due to their young age. A Spitzer observation of the system carried out in 2006 found an excess in the infrared emission, but, since all exposures were taken outside the primary eclipse and the infrared emission of the Red Dwarf is hard to model because of the large temperature gradient, it was inconclusive. We propose a Flamingos-2 observation during eclipse of the system in several channels in

Tiempo asignado: 3.0 horas.

Propuesta: G/2016A/028

Investigador Principal: Paolo Cassata, Universidad de Valparaíso

Título: Compactness-dependent quenching in $z \sim 2$ galaxies?

Resumen: Passive and massive ($M/M_{\text{sun}} > 10^{10}$) early-type galaxies at $z > 1.5$ are nearly all much more compact than their local counterparts of similar mass, suggesting that the quenching mechanisms at these early epochs must be related to compactness. Recent evidence suggests that compact star-forming galaxies, their likely progenitors, at $z \sim 3$ experience more extreme feedback than normal-sized galaxies of similar mass (Williams+14,15), but this link between stellar density and quenching has yet to be fully investigated. We propose near-infrared spectroscopy with FLAMINGOS-2 to study the kinematics, ionization state and metallicity of the gas in a sample of compact, spheroidal star-forming galaxies at redshift $z \sim 2.2$, and a control sample of normal-sized star-forming galaxies at the same z . These galaxies have been selected from the CANDELS dataset and already have existing rest-frame UV spectroscopy to complement the proposed observations. With the proposed dataset, we will discover if the compact galaxies are more evolutionarily advanced, if they truly experience stronger feedback than more extended galaxies, and study if they energize their ISM sufficiently to prevent future SF.

Tiempo asignado: 10 horas.

Propuesta: G/2016A/023

Investigador Principal: David Principe, Universidad Diego Portales

Título: Searching for Evidence of Planet Formation in a Nearby Solar Nebula Analog

Resumen: MP Mus is a rare example of a nearby ($D \sim 100$ pc) young star hosting an "old" (age ~ 7 Myr), molecular-rich circumstellar disk from which it is actively accreting. This system provides an excellent opportunity to directly observe an environment analogous to the early solar nebula during or just after the epoch of giant planet formation. HST observations of MP Mus have detected the disk in scattered light, and reveal surface brightness variability that may be due to shadowing of the outer disk by inner disk material. The proposed Gemini/GPI observations will provide a unique means to search for evidence of young giant planets orbiting within the MP Mus disk, and will further our understanding of how the giant planet formation process affects the structure of young circumstellar disks. Moreover, polarimetric imaging of the disk with Gemini/GPI will probe the disk to within 10 AU of the central star -- well within the ~ 35 AU radial limit in the HST imaging -- and hence may reveal the inner disk structure that is associated with the enigmatic disk surface brightness variability seen by HST.

Tiempo asignado: 4.1 horas.

Propuesta: G/2016A/029

Investigador Principal: Ezequiel Treister, Universidad de Concepción

Título: Resolving the peak of the Cosmic X-ray Background: Optical Follow-up for the NuSTAR Serendipitous Survey

Resumen: A key goal of high-energy astrophysics is to determine the detailed composition of the Cosmic X-ray Background (CXB) at $\sim 20\text{--}30$ keV in order to understand the evolution of AGNs. NuSTAR, the first focusing X-ray observatory with good sensitivity between 3-79 keV, provides a major breakthrough in studying the CXB through targeted extragalactic deep-field and serendipitous surveys. To obtain a full census of these sources, however, requires optical redshifts and classifications. Here we propose for 15 GMOS observations in 2016A to obtain modest resolution spectra for southern targets from the serendipitous component of the NuSTAR serendipitous survey. Redshifts and spectral classifications are needed to characterize this complete sample of hard X-ray selected AGN and model the hard CXB population in detail.

Tiempo asignado: 10.2 horas.

Propuesta: G/2016A/006

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

Título: Understanding the origin of a peculiar star-forming region in NGC 6845A

Resumen: Interacting galaxies provide us with an ideal laboratory to study bursts of star-formation triggered by gravitational encounters. In some cases these burst are found in intergalactic HI clouds, while in other cases, these regions are located on the main body of interacting galaxies. The origin and fate of these systems, in both cases, is not clear given that these regions can become independent entities or they can be dissolved into the intergalactic medium. In order to understand the origin and fate of these burst, we propose to obtain spatially resolved IFU spectroscopy of one spectacular star-forming region located in the interacting galaxy NGC 6845A. Previous Gemini/GMOS multislit data allowed us to determine some physical properties for this region. Including multiwavelength information, we speculated that this object was formed by neutral gas belonging to NGC 6845B, which compressed the disk of NGC 6845A, triggering the star formation. However, detailed kinematic and chemical analysis are necessary to confirm or exclude this scenario. For these reasons, we propose to obtain GMOS/IFU observations of this region, in order to derive 2D velocity field and oxygen abundances maps, which will be useful to understand the origin of this source. In addition, the kinematic analysis will be useful to determine if this object displays some rotation, which can convert it in a tidal dwarf galaxy candidate. Understanding the origin and fate of these systems is extremely important in the context of satellite galaxies, intergalactic HII regions and enrichment of the intergalactic medium.

Tiempo asignado: 3.2 horas.

Propuesta: G/2016A/007

Investigador Principal: Steven Parsons, Universidad de Valparaíso

Título: Accurate component masses and radii of three white dwarf-M dwarf binaries observed by Kepler

Resumen: Close white dwarf-main sequence (WDMS) binaries are excellent systems to constrain several important open problems in modern astrophysics, such as the mass-radius (MR) relation of both low-mass main sequence stars and white dwarfs. This has been only possible thanks to our efforts in identifying close WDMS and in measuring accurate values of their component masses and radii. However, despite our success, the theoretical MR relations remain severely unconstrained and more model-independent mass and radius measurements are needed. We here apply for 35.4 hours of Gemini service mode observations to accurately derive the masses and radii of three close WDMS observed by the Kepler space mission.

Tiempo asignado: 16 horas.

Propuesta: G/2016A/018

Investigador Principal: Osmar Rodriguez, Universidad Andres Bello

Título: Testing Type II supernova as cosmological probes at nearinfrared wavelength

Resumen: We propose to use GMOS-S to take one spectroscopic observation of a sample of Type II supernovae (SNe II) during the plateau phase. From the resulting spectrum we will measure the expansion velocity of the photosphere which, combined with a photometric near-infrared follow-up, can be used to calibrate the SN II absolute brightness at such wavelength. Our targets will be secured by surveys which discoveries we have access. They are brighter than 19th mag and therefore can be observed with Gemini+GMOSS under the worst sky conditions. The requested observations will contribute to assemble a statistically significant data set which will allow us to test once and for all the internal precision of SN II as distance indicator in the near-infrared and to compute an accurate value of the Hubble constant. We believe this project represents a very effective way to obtain relevant astrophysical results using 8m-class telescope under non-optimal observing conditions.

Tiempo asignado: 6.5 horas.

Propuesta: G/2016A/027

Investigador Principal: Fernanda Urrutia-Viscarra, Universidad de La Serena

Título: On the 2D structure and kinematics of the tidal dwarf candidate in the gas-rich interacting galaxy pair NGC 3166/9

Resumen: Interacting galaxies are ideal laboratories to study the formation of new stellar systems, which span from small HII regions to Tidal Dwarf Galaxies (TDG). We propose to study the 2-D kinematics of the ionized gas in the prominent TDG candidate in the interacting gas-rich galaxy pair NGC3166/9, detected in HI and UV. This information will allow us to study the velocity field of the whole system and, at the same time, we will be able to search for gas flows within the object. We will analyse its internal kinematics to determine if it is gravitationally bound and measure its dynamical mass to constrain its dark matter content. These measurements will allow us to verify the nature of the TDG candidate and confirm or falsify its tidal origin. We note that this proposal was granted observing time in band 2 in semester 2014A, between the chilean and brazilian TACs. However, the target was not observed during that semester.

Tiempo asignado: 8 horas.

Propuesta: G/2016A/011

Investigador Principal: Patricia Bessiere, Universidad de Concepción

Título: Are all high luminosity AGN triggered at the peaks of major, gasrich mergers?

Resumen: It has been suggested that a dichotomy exists in the triggering mechanism for low and high luminosity AGN. Whereas major gas-rich mergers may be required to trigger high-luminosity AGN, secular processes are deemed sufficient at lower luminosities. If this is the case, we would expect to see a strong evolution in the morphological evidence of mergers in AGN host galaxies with increasing AGN luminosity. We will test this idea by imaging a complete sample of high luminosity type II quasars. Along with data already obtained, we will characterise any luminosity dependence in the degree of morphological disturbance of the host galaxies of AGN across a wide range of luminosities. We will also obtain wide spectral coverage, deep, long-slit spectra of the same sample of high-luminosity AGN in order to model their stellar populations, thereby helping us to understand the sequence of events in a merger driven scenario.

Tiempo asignado: 30 horas.