

## VI Meeting on Science with GTC. Valencia, Spain. 12 - 14 December 2018. List of INVITED TALKS.

Title	Authors	Abstract	Speaker	Speaker's institution
Birth and early years of the GTC	Francisco Sánchez		Francisco Sánchez	
Present and future of the GTC	Romano Corradi		Romano Corradi	GTC
At the edge of the knowledge of AGN tori with GTC	Omaira González	Dust in AGN is so important to understand them that it can even explain why they can be classified differently according to its spectroscopic properties. We have found that the infrared spectral energy distribution (SED) associated to the dust in nearby AGN is well explained as a few parsec torus-like structure. However, several authors have pointed toward an intrinsic evolution of this dusty structure for low and high luminous AGN. GTC has allowed for the first time to explore the dust properties of the low-luminosity end of AGN. We have found that indeed the torus evolves, even disappearing below a certain luminosity threshold (Gonzalez-Martin et al. 2015; 2017). These works are the seed for future investigations with JWST. In parallel with the large amount of infrared observations of AGN, several models have been proposed to explain them. These models account for a large variety of compositions (e.g. silicates or graphites with different dust sizes), morphologies (e.g. torus- or cone-like), dynamical behaviors (e.g. disk or wind), and distributions (e.g. clumpy or smooth). We explore the most famous five models to understand (1) what kind of data (current and future) are needed to constrain all these models (Gonzalez-Martin et al. 2018A) and (2) which model better represent the current data (Gonzalez-Martin et al. 2018B). We show how important is the superior spatial resolution obtained with mid-infrared GTC observations which, combined with JWST data, will give us final answers on the torus properties, specially for low-luminosity and/or high redshift AGN.	Omaira González	UNAM
Observations of Active Asteroids with GTC	Moreno, F, Licandro, J., Cabrera-Lavers, A., and Pozuelos, F.	This talk will be devoted to review the physical properties of a new population of objects discovered in the main asteroid belt, the so-called active asteroids. These objects, characterized for producing transient comet-like comae and tails, become active for a variety of reasons, including impact ejection, rotational disruption, and dust drag caused by ice sublimation. In 2010, we established a collaborative program, with Javier Licandro and colleagues at the IAC, of observations with the GTC, in order to shed light on the mechanisms triggering their activity, the dust production, and the duration of the activity of these objects, using Monte Carlo dust tail numerical codes. So far, we have characterized some ten of those objects. The main results of our observations and modeling will be reported.	Javier Licandro	IAC
Mapping the Galactic Center Magnetic Field with CanariCam	Charles Telesco (U. Florida, USA), Patrick Roche (U. Oxford, UK), Enrique López-Rodríguez (SOFIA, USA), Rainer Schoedel (IAA, CSIC, Spain), Christopher Packham (U. Texas-San Antonio, USA)	We present CanariCam 12.5 $\mu\text{m}$ imaging polarimetry of the central 0.8 pc of the Galaxy with 0.45" resolution, the highest mid-IR resolution thus far achieved for this region. The polarized light is emitted by non-spherical particles aligned by the B-field. While consistent with previous mid-IR polarimetry, these higher resolution observations reveal new details, including a greater degree of large-scale spatial coherence within some features. The B-field spatial coherence in the Northern Arm has large-scale structure tied to the compact mid-IR sources along the Arm, but the field closest to each of the sources appears undisturbed. Thus, the outflow energy of the individual sources may be small compared to the magnetic field energy. If the large-scale ionized "filaments" are ionization fronts at molecular cloud interfaces, our images may show magnetic-field compression at these interfaces, revealing a dynamic magnetic field configuration in this complex environment.	Charles Telesco	U. Florida
Low-metallicity stars and brown dwarfs	Nicolas Lodieu	In the first part of this talk, I will review our current knowledge on metal-poor low-mass and brown dwarfs. Ultracool subdwarfs, also referred to as metal-poor dwarfs with spectral types later than M7, usually belong to the thick disk and/or halo of the Galaxy and represent the low-metallicity counterparts of our Solar neighbours. I will explore the current census of ultracool subdwarfs, describe the current spectral classification, and present the main photometric and spectroscopic trends at optical and infrared wavelengths. In the second part of the presentation, I will describe our latest results on the search and characterisation of the coolest subdwarfs of M and L-types conducted with GTC OSIRIS over the past years. I will also present the current project that is looking for spectroscopic binaries to infer dynamical masses to confront evolutionary models that are basically untested at low-mass and low-metallicity.	Nicolas Lodieu	IAC
A CLOSE LOOK TO JET ACTIVITY IN V404 CYGNI	Yigit Dallilar, Stephen S. Eikenberry, Alan Garner, Richard D. Stelter, Amy Gottlieb, Poshak Gandhi, Piergiorgio Casella, Vik S. Dhillon, Tom R. Marsh, Stuart P. Littlefair, Liam Hardy, Rob Fender, Kunal Mooley, Dominic J. Walton, Felix Fuerst, Matteo Bachetti, Alberto Castro-Tirado	We obtained multiwavelength observations of V404 Cygni, a stellar mass black hole, during its outburst in 2015. The observations included fast photometry in Ks band with CIRCE, three band fast photometry in the optical with ULTRACAM, X-ray observations with NuSTAR and radio observations with AMI-LA. We found an enhanced optical/infrared activity starting with the rise of optically thick radio emission. In the end, we discovered a rapid decay from infrared to X-ray in which cooling profile is unique to synchrotron processes. Based on this event, we provided the first precise measurement of magnetic field in the corona of V404 Cygni, or in any black hole binary system. In addition, I will discuss the optical/infrared flaring activity with emphasis on the infrared flares. We found that fast infrared variability is more erratic than in the optical resulting very rapid change in the spectral distribution in very short time intervals. This evidence demonstrates the complex physical conditions in the jet base suggesting to revisit simplified theoretical models for jet formation in black hole binaries.	Stephen Eikenberry	U. Florida

Title	Authors	Abstract	Speaker	Speaker's institution
GTC Science Operations Status	A. Cabrera-Lavers	This contribution summarizes the current status of the night operation of the GTC and describes the GTC short- and medium- term instrumentation plan, that will make possible to provide access up to six different instruments to the users community in the period 2018-2019, largely enhancing the scientific return from the telescope.	A. Cabrera-Lavers	GTC
The GTC archive	E. Solano, J.M. Alacid	The Gran Telescopio Canarias archive ( <a href="http://gtc.sdc.cab.inta-csic.es">http://gtc.sdc.cab.inta-csic.es</a> ) is the result of a collaboration agreement between the Centro de Astrobiología (CAB, INTA-CSIC) and GRANTECAN S.A. The archive, in operation since November 2011, has been developed in the framework of the Spanish Virtual Observatory and is maintained at CAB. The archive contains both raw and reduced data and has been designed in compliance with the standards defined by the International Virtual Observatory Alliance (IVOA), which guarantees a high level of data accessibility and handling. In this presentation I will describe the main functionalities of the archive and how it can be used to do science using VO tools.	E. Solano	CAB (CSIC-INTA)
The GTC Adaptive Optics system and science with the Laser Guide Star System	Béjar, V. J. S., Reyes García-Talavera, M., Patrón, J., Hernández, E., López, R. L., Simoes, R., Marco de la Rosa, J., Montilla, I.; Núñez Cagigal, M., Puga Antolín, M., Rodríguez-Ramos, L. F.; Rosich, J., Sánchez-Capuchino, J., Tubío, O., Acosta-Pulido, J. A., Prieto, A., Watson, A. M., Zapatero Osorio, M. T.	The GTC Adaptive Optics (GTCAO) system is the general Adaptive Optics facility that will provide diffraction limited images in the near-infrared to the GTC telescope. At Day 1 it will consist of a single deformable mirror with 21x21 actuators, conjugated to the telescope pupil and a Shack-Hartmann wavefront sensor with 20x20 sub-apertures using a Natural Guide Star (NGS) as a reference source. The GTCAO system is expected to provide a strehl ratio of 0.65 in the K-band with a bright NGS, and it will be later upgraded to a Sodium Laser Guide Star (LGS) to significantly increase the sky coverage. In this talk, we will describe the GTCAO system, we will review the planned schedule for the GTCAO system first with the NGS and later with the LGS system, and we will summarize some of the scientific cases that can be carried out with the GTCAO LGS system and the FRIDA instrument.	Béjar, V. J. S.	IAC
FRIDA: diffraction-limited imaging and integral-field spectroscopy for the GTC	Alan M. Watson, José A. Acosta-Pulido, Martha Aguiar, Luis C. Álvarez-Núñez, Nicolás Cardiel, Salvador Cuevas, Oscar Chapa, José Javier Díaz García, Stephen S. Eikenberry, Carlos Espejo, Rubén A. Flores-Meza, Jorge Fuentes-Fernández, Jesús Gallego, José Leonardo Garcés Medina, Francisco Garzón López, Cesar A. Guzmán Alvarez, Peter Hammersley, Carolina Keiman, Gerardo Lara, José Alberto López, Pablo L. López, Heidy Moreno Arce, Sergio Pascual Ramirez, Jesús Patrón Recio, Almudena Prieto, Berenice Rodríguez, Beatriz Sánchez, J. Eleazar Sánchez, Víctor Sánchez Bejar, Jorge A. Uribe, and Francisco Váidez Berriozabal	FRIDA is a diffraction-limited imager and integral-field spectrometer that is being built for the adaptive-optics focus of the Gran Telescopio Canarias. In imaging mode FRIDA will provide scales of 0.010, 0.020 and 0.040 arcsec/pixel and in IFS mode spectral resolutions of 1500, 4000 and 30,000. In this contribution we present a summary of its design, fabrication, current status and potential scientific applications.	Alan M. Watson	UNAM

Title	Authors	Abstract	Speaker	Speaker's institution
MIRADAS for the GTC	Eikenberry, Stephen S.; Raines, Steven Nicholas; Steller, Richard Deno; Garner, Alan; Dailiar, Yigit; Ackley, Kendall; Almeida, Denisse; Bennett, John Greg; Carrera, Christian; Coll, Caridad; Fuentes, Gabriel; Murphey, Charles H.; Miller, Paola; Tooke, David; Williams, Luke; Chinn, Brian; Mullin, Scott A.; Schofield, Sidney L.; Warner, Craig D.; Varosi, Frank; Zhao, Bo; Eikenberry, Sophia A.; Vega, Claudia; Donoso, Hipatia V.; Sabater, Josép; Gómez, José María.; Torra, Jordi; Rosich Minguell, Josefina; Garzón López, Francisco; Lopez, Pablo; Russo, Anthony; Cardiel, Nicolás.; Gallego Maestro, Jesús; Marín-Franch, Antonio; Galipienzo, Julio; Carrera Astigarraga, Miguel Ángel; Fitzgerald, Greg J.; Prees, Ian; Stolberg, Todd M.; Kornik, Peter A.; Ramaprakash, Anamparambu N.; Burse, Mahesh P.; Punnadi, Sujit P.; Hammersley, P.	MIRADAS (Mid-resolution InFRared Astronomical Spectrograph) is the facility near-infrared multi-object echelle spectrograph for the Gran Telescopio Canarias (GTC) 10.4-meter telescope. MIRADAS operates at spectral resolution $R=20,000$ over the 1-2.5 $\mu$ m bandpass), and provides multiplexing (up to $N=12$ targets) and spectro-polarimetry. The MIRADAS consortium includes the University of Florida, Universidad de Barcelona, IAC, Institut d'Estudis Espacials de Catalunya, as well as partners at A-V-S (Spain), TVP (Spain), New England Optical Systems (USA), and IUCAA (India). In this paper, we review the current status and overall system design for the instrument, with scheduled delivery in 2019. We particularly emphasize key developments in cryogenic robotic probe arms for multiplexing, a macro-slicer mini-IFU, an advanced cryogenic spectrograph optical system, and a SIDECAR-based array control system for the 1x2 HAWAII-2RG detector mosaic.	Eikenberry, Stephen S.	University of Florida
An ultra-stable high resolution spectrograph for the GTC	KAI ZHANG, JIFENG LIU, JIANRONG SHI, YONGTIAN ZHU, GANG ZHAO	The NAOC and the GTC signed an agreement on 5 <sup>th</sup> of September, 2016, in order to strengthen scientific and technological collaboration between the two countries. The NAOC and the NIAOT are jointly developing an ultra-stable high-resolution spectrograph as the in-kind contribution for the GTC. It could lead to the NAOC becoming a full member of the international user community of the GTC, and access to certain observing time on the telescope. The spectrograph will provide the dedicated capability of high resolution spectral observation ( $R\geq 100K$ ) over wide wavelength coverage (380 - 780nm), with ultra-high instrument stability. This project is driven by the primary science cases on the Earth analogues orbiting around solar-type stars and the characterization of exoplanets and its atmosphere. Some cutting-edge science cases would get benefit from this excellent instrument as well. The presentation will introduce this international cooperation on three aspects, respectively the collaboration with the GTC, the science driver, and the progress on the instrument design.	KAI ZHANG	National Astronomical Observatories of China / Nanjing Institute of Astronomical Optics and Technology (NIAOT), CAS

## VI Meeting on Science with GTC. Valencia, Spain. 12 - 14 December 2018. List of ORAL CONTRIBUTIONS.

Title	Authors	Abstract	Speaker	Speaker's Institution
The Properties of the dusty inner regions of nearby QSOs	I. Aretxaga, M. Martínez-Paredes, A. Alonso-Herrero, O. González-Martín, C. Ramos-Almeida, N. Levenson, E. López-Rodríguez, A. Asensio Ramos, T. Díaz Santos, M. Elitzur, P. Esquej, A. Hernán-Caballero, K. Ichikawa, R. Nikutta, C. Packham, Pereira-Santaella and C. Telesco	We present MIR spectroscopy and photometry obtained with CanariCam on the 10.4-m Gran Telescopio CANARIAS for a sample of 20 nearby, MIR bright and X-ray luminous quasi-stellar objects (QSOs). We find that for the majority of QSOs the MIR emission is unresolved at angular scales-0.3 arcsec. We derive the properties of the dusty tori that surround the nucleus based on these observations and find significant differences in the parameters compared with a sample of Seyfert 1 and 2 nuclei. We also find evidence for polycyclic aromatic hydrocarbon (PAH) features in the spectra, indicative of star formation, more centrally peaked (on scales of a few hundred pc) than previously believed.	Itziar Aretxaga	INAOE
Searching for dust-reddened QSOs and metal-rich DLAs with GTC	Stefan Geier, Kasper Heintz, Johan Fynbo, Palle Møller, Lise Christensen, Jens-Kristian Krogager, Pasquier Noterdaeme, Pall Jakobsson	Damped Lyman-alpha Absorbers (DLAs) are galaxies intersecting the lines-of-sight to more distant QSO. DLAs play a crucial role in the study of the cosmic evolution of chemical enrichment and the gas and dust contents of galaxies as a function of redshift. However QSOs with dusty foreground DLAs appear reddened and fainter and hence there is a bias against finding such systems. We alleviate this problem by using a new innovative way of selecting QSOs by combining optical, near-infrared and mid-infrared color criteria. Here we describe how we with this method have discovered very metal-rich DLAs, missed by previous selections, and how GTC/OSIRIS spectroscopy has played a major role in this.	Stefan Geier	GTC
Protocluster of LAEs at z=6.5: GTC/OSIRIS' Photometry & Spectroscopy	K. Chanchaiworawit, R. Guzman, J.M. Rodríguez Espinosa, N. Castro Rodríguez, E. Salvador-Sole, R. Calvi, J. Gallego, A. Herrero, A. Manrique, A. Marin Franch, J.M. Mas-Hesse, I. Aretxaga, E. Carrasco, E. Terlevich, and R. Terlevich	We present the results of GTC observations of the protocluster of LAEs near the end of the Epoch of Reionization. By focusing on the two close, massive LAEs at $z=6.5$ in SXDS field, we have carried out a photometric observation with three red medium band filters from SHARDS program. The photometric survey covers $7 \times 8.5$ sq-arcmin (or 30,000 cubic-cMpc at $z=6.5$ ) and spans over 34 hours. We have identified 45 fainter LAE candidates. We have conducted a spectroscopic follow-up of 16 LAE candidates for their Ly-Alpha emission line. We have confirmed 10 LAEs with sufficient S/N. Their spectroscopic redshifts have led to our derived true survey volume of 9,000 cubic-cMpc and high overdensity level, parametrized by the density contrast of 3.18. Our statistical analysis confirmed the existence of this densely populated region of LAEs. Furthermore, we expect the final mass of this protocluster to be in the order of $\log(M/M_{sun}) = 15$ at $z=0$ , similar to that of the Coma cluster	Krittapas Chanchaiworawit	University of Florida
GTC observations of C/2018 F4: a comet with an extrasolar origin?	J. Licandro, J. de León, M. Serra-Ricart, C. de la Fuente Marcos, R. de la Fuente Marcos4 and A. Cabrera-Lavers	We study the dynamical and surface properties, and activity of C/2018 F4, an object with, as in the case of 1I/`Oumuamua, a possible origin outside the Solar System. We present numerical evidence that C/2018 F4 is a bound comet from the Oort cloud, although the evolution of about 40% of the studied orbits is compatible with an interstellar origin. We present also low resolution visible spectra and high SNR images obtained using the 10.4m GTC. C/2018 F4 has a primitive-like asteroid class spectrum (X-type) and no evidence of the hydration band observed in some primitive asteroids at 700nm. The spectral characteristics are compatible to that of comets. A faint compact coma is observed in the images. Analysis of these images show very low cometary-like activity ( $A_{frho} \sim 100$ [cm]), being slightly below the lower limit of activity observed in long period comets observed at similar distances. Results suggest that C/2018 F4 is a very low active comet scattered from the Oort cloud.	J. Licandro	IAC
Optical follow-up of Planck SZ sources and Msz-Mdyn relations	R. Barrena, J.A. Rubiño, A. Ferragamo, A. Aguado, A. Streblyanska	Planck collaboration catalogues of Sunyaev-Zeldovich (SZ) sources (Planck Collaboration XXIX 2013 and Planck Collaboration XXVII 2015) are the prove that the SZ effect signature on CMB is a very efficient method for detecting galaxy clusters. However, in order to use these catalogues for cosmological studies, SZ clusters need to be characterized in their physical properties. With this goal in mind we have developed 2 long-term observing programs (the ITP2013B-2015A and the LP2015B-2017A) to optically validate the SZ Planck sources. These programmes include photometric and spectroscopic studies, in which the 10.4m GTC has developed an important role confirming and characterizing galaxy clusters at $z>0.4$ through OSIRIS/MOS capabilities. We have been able to confirm more than 200 unknown clusters with redshifts up to $z=0.85$ , retrieving their spectroscopic redshifts, velocity dispersions and dynamical masses. Thanks to this optical survey, the scaling relation Msz-Mdyn has been determined in an unbiased way, allowing to estimate cosmological parameters (mainly $\sigma_8$ and $\Omega_m$ ) from SZ cluster abundance. The work here presented is crucial in order to clarify the (3-sigma) tension today existing between the results obtained for cosmological parameters through the SZ clusters abundance and CMB-Planck data.	Rafael Barrena	IAC
GTC based quest for the gas that feeds star formation in primitive galaxies	J. Sánchez Almeida and the ESTALLIDOS team	CONTEXT: Cosmological gas accretion has been predicted to be the driver of galaxy growth. The results below aim at testing this critical aspect of the theory of galaxy formation. RESULTS: Using OSIRIS-GTC and other supplemental data, we are trying to detect and characterize the gas that feeds star-formation (SF) in primitive local galaxies. I will report on the results achieved lately: (1) the identification of extremely metal poor (XMP) galaxies as objects going through a major gas accretion event (SA+15, ApJL, 810, 15), (2) the discovery of H $\alpha$ emission around such objects that may be tracing the inflow (Olmo-Garcia+18, in prep.), (2) the detection of massive outflows produced by SF, which in turn are driven by accretion (Olmo-Garcia+17, ApJ, 834, 181), (3) the presence of huge molecular gas reservoirs (Elmegreen+18, ApJL, 859, 22), and (5) the finding that XMPs and ultra-diffuse galaxies are essentially the same object in a different phases of a SF cycle (SA+18, ApJ, sub.).	Jorge Sánchez Almeida	IAC

Title	Authors	Abstract	Speaker	Speaker's Institution
Characterization of ionized outflows in optically obscured quasars (QSO2) at $z \sim 0.4$	Enrica Bellocchi, Montserrat Villar Martín, Antonio Cabrera Lavers	Ionized outflows are ubiquitous in non radio-loud obscured quasars (QSO2s) at different redshifts but their actual size is controversial. We investigate the properties and sizes of the ionized outflows in 6 SDSS QSO2 systems at $z \sim 0.3-0.4$ observed with Osiris/GTC with known extended radio sources, finding ionized outflows in 4 objects. Their extension goes from $\sim 1$ kpc up to 44 kpc for the most extreme case (SDSS0741+3020), possible triggered by the interaction of an extended radio source and the ambient gas. We enlarge our sample with 13 QSO2 systems observed with FORS2/VLT at similar redshift (Villar-Martín et al. 2011). For all these objects (19 systems) we find the systemic component shares similar kinematics than local elliptical galaxies and interacting/merger (U)LIRGs ('dispersion dominated' galaxies). The mean velocity of the broad component is blueshifted with respect to the narrow one for most of the sources (13/16), up to $\Delta v = -800$ km/s.	Enrica Bellocchi	CAB (CSIC-INTA)
SHARDS and SHARDS-FF: Understanding the formation of massive galaxies with GTC	Pérez-González and the SHARDS and SHARDS-FF teams	I will present the latest results from the SHARDS ESO/GTC Large Program and GTC Large Program SHARDS Frontier Fields in the context of the study of the formation of massive galaxies. In particular, I will talk about our findings presented in half a dozen of papers published in 2017 and 2018 talking about the oldest and most massive galaxies formed in the Universe (formed beyond at $z=4-6$ ), the Star Formation Histories and the attenuation law of star-forming and quiescent galaxies at $z=1-3$ , or the discovery of the highest redshift ( $z=5.7$ ) dwarf ( $M \sim 10^7 M_{\text{sun}}$ ).	Pablo Pérez González	CAB (CSIC-INTA)
On the distance and environment of BL Lac objects obtained with GTC and Gemini	Daniel Rosa González	In this contribution I will present the new distances towards extreme BL Lac objects obtained by our group. The new spectroscopic observations obtained with the Gran Telescopio Canarias (GTC) and Gemini North, allow us to directly obtain the redshift of some of the targeted objects. With the multi-object spectra capability of both GTC and Gemini we also studied the environment of the BL Lacs and in the cases where the spectroscopic redshift of the objects were not directly obtained we used an statistical method to assign a redshift to the elusive BL Lac.	Daniel Rosa González	INAOE
First science with MEGARA	Gil de Paz, A. & MEGARA team	On August 31st 2017, MEGARA completed its commissioning as the new intermediate-resolution ( $R=6k-20k$ ) optical IFU & MOS of GTC. As part of the tests carried out to verify the performance of the instrument in its two modes and 18 spectral VPH setups a number of astronomical objects were observed. These observations include MOS spectroscopy of RGB/AGB stars in Globular Clusters M71 & M15, including M15's PN K648, and IFU spectroscopy of diffuse objects in the MW (PNe M1-92 & NGC7027) and beyond. This latter category included narrow-lined star forming dwarfs in a wide range of redshifts, nuclear regions of nearby galaxies from which high-order stellar and neutral-gas (NaD) kinematics are derived, a high- $z$ QSOs with rich Ly- $\alpha$ forest (Q1422+2309), and a galaxy-galaxy lensed system (SDSSJ1630+4520). In this talk I will summarize the main results from these observations highlighting the unique capabilities of MEGARA@GTC within the instrument suites of present-day 8-10m facilities.	Gil de Paz, A.	UCM
MEGARA commissioning observations of UGC10205: Multiple neutral and ionized-gas kinematic components in the nuclear region of a nearby spiral	Catalán-Torrecilla, C., Gil de Paz, A., Castillo-Morales, A., MEGARA Consortium	Galactic winds are widely recognized as essential components in the evolution of galaxies. As part of an ongoing long-time effort to trace and characterize outflowing material associated to both neutral and ionized winds in nearby galaxies we observed the nearby galaxy UGC10205 during the MEGARA commissioning using its LR-V ( $R=6000$ in the NaD region) and HR-R ( $R=20000$ in H $\alpha$ +[NII]) spectral setups with the LCB/IFU mode. The two-dimensional mapping of the intensity and velocity of the multiple kinematical components identified in the NaD doublet and in H $\alpha$ are used to characterize the neutral and ionized gas phases, respectively. These results along with the study of UGC10205's stellar populations and emission-line ratios are key to determine the ultimate role of AGN activity and SF on powering galactic winds in this galaxy.	África Castillo Morales	UCM
NGC7469 as seen by MEGARA: results from commissioning	S.Cazzoli, J.Iglesias, I.Marquez and J.Masegosa	Using GTC/MEGARA integral-field unit observations of NGC7469 from the commissioning run, we map the ionized gas in this nearby ( $z \sim 0.016$ ) Seyfert-1 galaxy. We used the unprecedented resolving power of MEGARA of $R \sim 20000$ (the highest available) to measure the ionized gas kinematics with a spectral resolution of $\sim 5$ km/s, at physical scale of $\sim 20$ pc, in the inner $\sim 680$ pc $\times$ 750 pc. We model the H $\alpha$ -[NII] emission lines and interpret the multiple kinematic components. The most relevant results are reported in this talk (Cazzoli et al. 2018, in preparation).	S.Cazzoli	IAA-CSIC
An extremely molecular gas rich, lensed submillimeter galaxy at $z=2.04$	Dannerbauer, Diaz-Sánchez, Harrington, Iglesias-Groth, Rebolo	We report the discovery of cold molecular gas with the IRAM NOEMA interferometer of an ultra-bright lensed submillimeter galaxy (SMG) at $z=2.04$ . This source has a similar SED from optical-mid/IR to submm/radio, but significantly higher fluxes, than the well-known lensed SMG SMMJ 2135, the Cosmic Eyelash ( $z = 2.3$ ). It was identified as a result of our full-sky correlation of the Planck compact source catalogue with WISE. We obtained the spectroscopic redshift of $z=2.04$ with the GTC. The rest-frame UV-optical spectrum of this lensed galaxy shows typical absorption lines of a starburst galaxy (Diaz-Sánchez et al. 2017, ApJL, 843, 22). Subsequent NOEMA observations confirm unambiguously the SMG nature of this source, resulting in the brightest CO detection ever of an SMG. Its unseen brightness offers the opportunity to get new insights in the star-formation processes of high- $z$ galaxies. Finally, we discuss the potential of combining GTC and LMT observations to search for very bright SMGs.	Dannerbauer	IAC

Title	Authors	Abstract	Speaker	Speaker's Institution
GTC discovers a dwarf galaxy at the epoch of reionization	A. Hernán-Caballero, P. G. Pérez-Gonzalez, J. M. Diego, D. Lagattuta, J. Richard, D. Schaerer, A. Alonso-Herrero, R. A. Marino, P. Sklias, B. Alcalde Pampiega, A. Cava, C. J. Conselice, H. Dannerbauer, H. Domínguez-Sánchez, C. Eliche-Moral, P. Esquej, M. Huertas-Company, R. Marques-Chaves, I. Pérez-Fournón, T. Rawle, J. M. Rodríguez Espinosa, D. Rosa González, W. Rujopakarn	I will present a lensed Ly $\alpha$ emitter at $z=5.75$ identified through medium band GTC imaging of the Abell 370 galaxy cluster by the SHARDS Frontier Fields survey. The source has a very faint continuum ( $m_{27.5}$ AB), but is much brighter in one of the SHARDS filters ( $m=25.5$ ) thanks to extreme Ly $\alpha$ equivalent width ( $EW=420\pm 150$ Å). Deep GTC and HST imaging, VLT/MUSE IFU spectroscopy, and strong magnification ( $\mu=16$ ) by the gravitational lens allow for an unprecedented detailed analysis for a galaxy in this luminosity range ( $M_{UV}=-16.5$ ) at $z=6$ . The galaxy has a blue restframe-UV spectral index ( $\beta=-2.4\pm 0.1$ ), which combined with the extreme Ly $\alpha$ EW requires a very young ( $t<10$ Myr) and metal poor ( $Z<0.004$ ) stellar population. Its low mass ( $M^*\sim 3\times 10^6$ Msun), small size ( $r<100$ pc), and high specific star formation rate ( $sSFR\sim 2.5\times 10^{-7}$ yr $^{-1}$ ) make it a good template for the dwarf star-forming galaxies responsible for Cosmic Reionization.	Antonio Hernán Caballero	UCM
Spectroscopic properties of young ultra-cool dwarfs	M. R. Zapatero Osorio, N. Lodieu, V. J. S. Béjar, E. Manjavacas	We will present the latest GTC observations on ultra-cool dwarfs of different stellar clusters: sigma Orionis, Upper Scorpius, and the Pleiades. All have masses in the interval 10-30 times the mass of Jupiter, i.e., giant free-floating planets and very low-mass brown dwarfs. With ages of 3-10 Ma and 120 Ma, we will discuss the dependence of various atomic and molecular absorption features as a function of surface gravity. Our targets have been classified with spectral types early-L through late-L (effective temperatures between $\sim 1000$ and $\sim 2400$ K), and can become benchmark to interpret the spectra of giant planets orbiting stars.	M. R. Zapatero Osorio	CAB (CSIC-INTA)
GTC's view on the colliding stellar wind binary WR147	P.Pessev, S. Zhekov, T. Tomov, B. Petrov	We report the results of GTC/Osiris observations of the colliding stellar winds (CSW) binary WR147. Our primary goal is to obtain accurate physical parameters of both stellar components. WR147 is the WR+OB system with the widest angular separation ( $\sim 0.64''$ ), that could be resolved from the ground and an unique laboratory for studying the CSW. The main complication is that the WR star dominates by a few magnitudes the emission and the parameters of the OB component, needed for detailed hydrodynamic modeling of CSW, remain unknown. We have obtained spectra with Osiris under excellent seeing conditions ( $\sim 0.6''$ ), which allow us to carefully deconvolve the spectra of both components, constrain the parameters of the stars (by modeling the observed spectra with modern stellar atmosphere code CMFGEN) and improve the model of the CSW. Presented results are an important step towards providing a consistent understanding of the massive stars binary systems and their CSW.	Peter Pessev	GTC, IAC, ULL
EMIR-MOS a alto z: primeros datos	Marc Balcells, Mercedes Prieto, Jesús Gallego, Francisco Garzón, Roser Pelló, Nicolás Cardiel, Nicolás Laporte, Lilian Domínguez, Cristina Cabello, Lee Patrick	EMIR y su modo MOS se postularon desde su principio para obtener el espectro visible en descanso para galaxias a desplazamientos al rojo cosmológicos. En la charla se comentarán las primeras pruebas en tres áreas principales de observación: galaxias con altos ritmos de formación estelar a $z=1-2$ , galaxias masivas a $z=0.5-2$ , y galaxias en la época de reionización	Marc Balcells	ING
Spectroscopic follow-up of transient X-ray binaries with the GTC	T. Muñoz-Darias, D. Mata-Sánchez, J. Casares, P. Charles, R. Fender and many others	Low-mass X-ray binaries are stellar systems formed by a black-hole (or a neutron star) that accretes material from a low mass companion. The subclass of transient X-ray binaries spend most part of their lives in a quiescent state, showing occasional outburst when their luminosity increases by several orders of magnitude, becoming the brightest X-ray sources of the night sky. I will review the main results obtained during the last 3 years with our ToO spectroscopic program aimed at observing X-ray binary transients with GTC+OSIRIS. This will include important findings on the nature of newly discovered transients. I will pay particular attention to the discovery of cold accretion disc winds in the system V404 Cyg (e.g. Muñoz-Darias et al. 2016, Nature). In addition, I will present recent studies, including new GTC data, of several X-ray binary transients. These reveal that cold optical winds are not unique to V404 Cyg, and instead seem to be a common feature in accreting black holes.	Teo Muñoz-Darias	IAC
The demographics of stellar black holes	M. A. P. Torres et al.	In this talk, I will focus on dynamical studies of black-hole X-ray binaries using OSIRIS. This work is part of on-going concerted GTC, ESO and Keck programs aiming to define the mass distribution for Galactic black holes. To contextualize our findings I will compare the results to those derived from the current dynamically proven stellar black holes, the black holes discovered through gravitational wave radiation and the massive black holes predicted in extra-galactic Ultraluminous X-ray sources.	Manuel Angel Perez Torres	IAC
Observations of PSR B0656+14 with the Gran Telescopio Canarias	S. Zharikov, A. Kirichenko, D. Zyuzin, Yu. Shibanov, 2 R. Mennickent, S. Geier, A. Cabrera Lavers	In this report, we present new optical narrow-band and near-IR broad-band photometric observations of PSR B0656+14 obtained with the Gran Telescopio Canarias (GTC). We have also revised the pulsar UV and optical data presented by Durant et al. (2011) and our optical spectroscopic observations (Zharikov et al. 2007). Analysis of the optical and X-rays data together allows us to estimate physical parameters (the radiuses and the temperatures the whole neutron star and the hot spot, the value of interstellar absorption to the pulsar, the contribution and the slope of non-thermal radiation in different spectral domains) of the neutron star of PSR B0656+14. That result is an important step to our understanding of equation of state of the matter in neutron stars.	Sergey Zharikov	IA UNAM
Optical studies of millisecond pulsar binary systems with the GTC	A. Kirichenko, S. Zharikov, D. Zyuzin, Yu. Shibanov, A. Karpova, S. Dai, A. Cabrera-Lavers, D. Beronya	We review optical photometric observations of several recently discovered millisecond pulsar binary systems obtained with the GTC/OSIRIS in 2017-2018. For each system, the observations allowed us to reveal for the first time the pulsar companion star, establish its nature and estimate the fundamental parameters both of the companion and the neutron star. We discuss the results together with their implications for the study of neutron stars and the future GTC observing campaigns aimed at these and other millisecond pulsar binary systems.	Aida Kirichenko	IA UNAM

Title	Authors	Abstract	Speaker	Speaker's Institution
High Resolution 2D Spectroscopy: NEFER to open a new chapter for OSIRIS	John Beckman, Joan Font (IAC), Margarita Rosado (UNAM)	The power of 2D resolution, both spatial and spectral, over relatively wide fields, has been demonstrated with emission line mapping of a wide variety of sources: HII regions, supernova remnants, planetary nebulae, and external galaxies. The most powerful instrument of this kind, the GH[?]FaS Fabry-Perot interferometer, has been operational on the WHT, La Palma for a decade. Three case studies are presented: of superbubbles around OB stellar clusters, of the density wave patterns revealed and measured in spiral galaxies, and the characterization of star forming clouds, comparing HII regions from GH[?]FaS with molecular clouds observed with ALMA, to illustrate technique. The instrumental parameters of NEFER, a similar instrument now operational as a high resolution module within OSIRIS on the GTC, will be explained, with the aim of helping potential observers to understand its operation and what it has to offer to the community.	John Beckman	IAC
Explosive transients at the GTC	Christina Thöne, Antonio de Ugarte Postigo, Luca Izzo, Alexander Kann, Martin Blazek, Kasia Bensch	Gamma-ray bursts (GRBs) and supernovae (SNe) are the most luminous explosions in the Universe. Long GRBs also produce broad-line Ic SNe while short GRBs are associated to kilonovae and gravitational waves (GWs). In this talk, we review the highlights obtained by the HETH group with various GTC programs since 2012. Our observations lead to the discovery and follow-up of 14 GRB-SNe, 40 GRB redshifts and the study of several unusual objects, contributing 11% of all publications and 21% of all citations based on GTC data. Our study of GRB-SNe provided important insights on the diversity of this class. Absorption lines from high-redshift GRBs together with emission of the host provide an important tool to study the ISM of high-redshift galaxies in detail. We also present an update on the interesting SNe 2015bh and 2009ip followed up at GTC until very late times. Finally, we give an outlook to future observations of GW counterparts with GTC and resolved studies of GRB hosts with MEGARA.	Christina Thöne	IAA - CSIC
The OTELO survey	A. Bongiovanni, M. Ramon-Perez, A. M. Perez Garcia, J. Cepa, M. Cerviño, J. Nadołny, R. Perez-Martinez, E. Alfaro, H. Castañeda, J. A. de Diego, A. Ederoclite, M. Fernandez-Lorenzo, J. Gallego, J. J. Gonzalez, J. I. Gonzalez-Serrano, M. Lara-Lopez, I. Oteo Gomez, C. P. Padilla, I. Pintos-Castro, M. Povic, M. Sánchez-Portal, D. H. Jones, J. Bland-Hawthorn, A. Cabrera-Lavers	OTELO is a narrow band scan survey aimed to the search of emission- line sources with an unprecedented sensitivity in line flux and equivalent width. The OTELO data was gathered using the red Tunable Filter (TF) of the OSIRIS instrument at the 10.4 m telescope GTC, pointing to a selected region of the EGS field over 108 hours of GT awarded to the IDT. The TF scan was performed in a spectral window of 30 nm wide centred at 914 nm, and it was used to create a deep catalogue of blind detected sources and their corresponding low resolution spectra. Along with ancillary data from X-ray to FIR, this information was structured in a database that can be queried by using ad-hoc tools. The OTELO database contains 11237 entries and it is 50% complete at AB magnitude 26.38. Within them, 6600 sources have photometric redshifts with an uncertainty better than $(1+z)/5$ . The results and products of this GTC large program, which will be publicly available in 2019, are presented in this contribution.	A. Bongiovanni	IAC
The OTELO survey: AGN demography and the faint-end of the Halpha luminosity function at $z=0.4$	Marina Ramón Pérez, Angel Bongiovanni, Ana Maria Perez Garcia, Jordi Cepa and the OTELO team	Using the multiwavelength catalogue of objects in the field compiled by the OTELO survey, unique in terms of minimum flux and equivalent width, we present in this talk the selection and study of the AGN population in the field. In particular, we perform an analysis of the properties of these objects, including their demography, morphology and IR luminosity. Focusing on the population of Halpha emitters at $z=0.40$ , we also study the environments of AGN and non-AGN galaxies at that redshift. Finally, we present the Halpha Luminosity Function obtained. When compared to previous works, our luminosity functions extend the faint-end almost 1 dex, reaching observed Halpha luminosities below $\log_{10} L_{\text{IR}}=39$ erg/s, and therefore constricting the faint-end slope at such luminosity regime. Exploiting the AGN selection and analysis made for the OTELO survey, the AGN contribution to this LF is also estimated.	Ana Maria Perez Garcia	CAB (CSIC-INTA)
The PNLF bright cut-off: a ~40 years problem ready to be solved?	R. Galera-Rosillo, R.L.M. Corradi, A. Mampaso, B. Balick, K. Kwitner, J. García-Rojas	The most luminous planetary nebulae (PNe) populate the bright-end cutoff of the Planetary Nebulae Luminosity Function of a galaxy, an important standard candle for the extragalactic distance ladder. Distances are determined through the empirical, but not understood, evidence that the PN total luminosity in the [OIII]5007Å nebular emission line reaches a maximum value invariant with galaxy type. As part of a systematic effort to characterize the properties of the progenitors of the brightest PNe, we obtained the most detailed optical spectra up to date of a sample of PNe in the two key galaxies of the Local Group: 8 PNe in M31 ( $Z/Z_{\text{sun}} \sim 1$ ) using OSIRIS at 10.4mGTC and 4 PNe in LMC ( $Z/Z_{\text{sun}} \sim 0.5$ ) from FORS2, at ESO-VLT. We will discuss the nebular and stellar properties derived from these data, and how they shed light into understanding the universality of the PNLF. Our work goes hand in hand with a recent breakthrough from the theoretical side (Gesicki et al. 2018, letter to Nature).	R. Galera-Rosillo	IAC
Clouds, hazes, and alkali metals in exoplanet atmospheres from the view of GTC	Guo Chen, Enric Pallé, Felipe Murgas, Hannu Parviainen, Lisa Nortman	While a large collection of exoplanets have exhibited weakened water absorption signature at 1.4 micron, the determination of water abundances in exoplanet atmospheres is hindered by the potential presence of clouds and hazes owing to the degeneracy between pressure and abundance. Fortunately, clear atmospheres could exhibit two major characteristics to mitigate the degeneracy: Rayleigh scattering from molecular hydrogen and pressure-broadened absorption line wings of alkali metals. In this talk, we will present the latest results from our transit spectroscopy survey on more than 10 exoplanets with OSIRIS at GTC, which exhibits a variety of cloudy, hazy, and clear atmospheres. One of the highlights is the detection of Na, K, and Li in a super-Neptune and spectrally resolved pressure-broadened line wings of Na and K. We will also discuss our tests with EMIR and HiPERCAM, which along with OSIRIS, will play a crucial role to a more comprehensive understanding of exoplanet atmospheres.	Felipe Murgas	IAC

Title	Authors	Abstract	Speaker	Speaker's Institution
GTC OSIRIS and the peculiar physics of the born-again planetary nebula HuBi 1	Martin A. Guerrero (IAA-CSIC, Spain), Xuan Fang (University of Hong-Kong, Hong-Kong), Christophe Morisset (UNAM, Mexico)	The planetary nebula HuBi 1 is the brand new member of the exclusive club of born-again planetary nebulae. NOT ALFOSC spectra hinted at extreme physical conditions in this nebula caused by the peculiar stellar evolution of its central star and unusual nebular excitation processes. It has not been until the acquisition of deep GTC OSIRIS observations that a quantitative assessment of this physical conditions has been possible. OSIRIS makes the born-again planetary nebula HuBi 1 one of the most astonishing ionized nebula in the Universe.	Martin A. Guerrero	IACC (CSIC)
Looking for Earth-size planets around very-low-mass dwarfs using GTC light curves	Carlos del Burgo, Eduardo L. Martín	We present our results based on a high signal to noise light curve (LC) of the nearby (19.02±0.09 pc) ultracool M7.5 dwarf LP 44-162. We were granted 35 hours to perform observations of this dwarf with the medium band filter U823/17 of GTC/OSIRIS through the Spanish and Mexican filter Programs with IDs GTC78-14A and GTC78-14AMEX. It is part of a project to look for terrestrial and larger planets in the habitable zone (HZ) of very-low-mass dwarfs from GTC LCs, which can be obtained with a precision better than ~10 mmag. This is enough to find Earth-size planets and to yield the rotational period. The selected dwarf is fast-rotating ( $v_{\text{ini}} = 39 \pm 5$ km/s) and hence the transit method is the only one that can detect planets in the HZ around this dwarf. We discuss the potential of our strategy to look for terrestrial planets using as example the photometric monitoring of this dwarf, whose HZ has edges corresponding to orbital periods between 2 and 4 days.	Carlos del Burgo	INAOE
Long-term study of MAXI J1659-152: the black hole with the shortest orbital period	Jesús M Corral-Santana, Manuel AP Torres, Tariq Shahbaz, Elizabeth S Bartlett, David M Russell, Albert KH Kong, Jorge Casares, Daniel Mata Sánchez, Thomas Wevers, Pablo Rodríguez-Gil, Fraser Lewis, Laurien Schreuder	In this communication we show 5 yr of optical and infrared data of MAXI J1659-152: a black hole candidate in an X-ray binary system. Combining optical data taken during the outburst decay (with GTC, VLT, GS, WHT, INT, Mercator and FT), we obtain an orbital period of $2.414 \pm 0.005$ h, in perfect agreement with the value previously measured from X-ray dips, being the first optical evidence of this modulation and confirming that this is the black hole with the shortest orbital period ever reported. We also detect the quiescent optical counterpart at $r' = 24.20 \pm 0.08$ , $i = 23.32 \pm 0.02$ , and $H = 20.7 \pm 0.1$ . These magnitudes provide colour indices implying an M2–M5 donor star assuming 60 per cent contribution from a disc component in the $r'$ -band.	Jesús Corral-Santana	ESO
Pushing down the metallicity limit with GTC: discovery of the two most iron-poor dwarf stars known in the Galactic halo	Jonay I. González Hernández, David S. Aguado, Carlos Allende Prieto, Rafael Rebolo	The most metal-poor stars originated in the Early Universe from the mixture of primordial material from the Big Bang and the matter ejected from the first supernovae. Those stars are relics of the early epochs of the Milky Way, so their chemical compositions hold very relevant information on the mass of the first stars and the early chemical evolution of the Galaxy. During the last years we have been exploring the SDSS and LAMOST spectroscopic surveys to identify a few tens of such stars at $[\text{Fe}/\text{H}] < -3$ . Follow-up spectroscopic data with the WHT and GTC telescopes were obtained to confirm these candidates. We have recently discovered using GTC two very primitive dwarf stars, both with $T_{\text{eff}} \sim 6200$ K and metallicity $[\text{Fe}/\text{H}] < -6$ : the extremely carbon-enhanced star SDSS J0815+4729, and SDSS J0023+0307, without detected carbon. The existence of these two stars provides new constraints on the properties of first stars and supernovae, and the formation of low-mass stars in the Early Universe.	Jonay I. González Hernández	IAC
Detection of individual massive stars in M81 using GTC/OSIRIS spectroscopy	Divakara Mayya, Mauricio Gómez-González, Daniel Rosa-Gonzalez	Massive stars play an important role in shaping the interstellar medium, through the deposition of energy, momentum and metals during their evolution. Most of our current knowledge of evolution of massive stars comes through the study of massive stars and their evolutionary products in the Milky Way and the Magellanic Clouds. Combination of Hubble Space Telescope images and spectroscopy using 10-m class telescopes allows the study of massive stars in nearby galaxies. We here present the results from our study of massive stars in M81 using the GTC/OSIRIS longslit and MOS observations. These observations have enabled us to detect 21 individual Wolf-Rayet stars and around a similar number of O stars. In the talk, I will present the properties, including their spectral classification, and morphology of the ionized gas around these newly detected stars.	Divakara Mayya	INAOE
An ionised bubble at $z=6.5$	J M Rodríguez Espinosa, R. Calvi, K. Chancaiworawit, R. Guzman, E. Salvador-Solé, A. Manrique, M. Mas-Hesse, J Gallego, A. Herrero, A. Marin-Franch	We have performed a search for Lyman Alpha sources around two spectroscopically confirmed star forming sources in the Subaru Deep Field. I will show how these sources form a proto-cluster, and how they reside in an ionised bubble of at least $9000 \text{ Mpc}^3$ . It is the first time that an ionised bubble has been seen before the re-ionisation of the Universe. I will show that not only the bubble is ionised, but that there is still ionising photons escaping the bubble and contributing to the reionisation of the Universe.	José Miguel Rodríguez Espinosa	IAC
Neutron-capture element emission lines in planetary nebulae from EMIR spectra	Simone Madonna	The study of the s-process in AGB stars through nebular spectroscopy is a recent field of astrophysics, that in the last years has undergone a remarkable growth. In 2001 neutron-capture element abundances had been determined in just three planetary nebulae (PNe). That number now exceeds 100 for Galactic PNe and 10 for extragalactic PNe. Over the years, the discovery of new neutron-capture element emission lines in the optical and near-infrared (NIR) spectra of PNe has been crucial in the understanding of physical and nucleosynthetic processes in AGB stars, as well as in the development of atomic physics. The synergistic relation between observations, atomic data determinations and numerical modeling, allowed the development of new Ionization Correction Factors (ICFs) for Kr and Se, and new ICFs will be soon available for other neutron-capture elements. Furthermore, the new lines detected allowed to test the veracity of the new atomic data calculated for ions such as $\text{Se}^{2+}$ , $\text{Kr}^{5+}$ and $\text{Rb}^{3+}$ . Using the near-IR spectrograph EMIR at GTC, we report for the first time the detection of a $[\text{Br V}]$ line at $1.6429 \mu\text{m}$ in the PN NGC 7027 and of a $[\text{Te III}]$ line at $2.1020 \mu\text{m}$ in the PNe IC418 and NGC 7027. In this talk we present these discoveries and discuss the implications in the knowledge of AGB nucleosynthesis. Additionally, we discuss the study of s-process enrichments in several Galactic disc and halo PNe observed with EMIR.	Simone Madonna	IAC

Title	Authors	Abstract	Speaker	Speaker's Institution
HIPERCAM on the GTC	Vik Dhillon and the HIPERCAM team	I will outline the design of HIPERCAM and its performance on the GTC. I will then review the science that has been performed to date with the instrument.	Vik Dhillon	Sheffield/IAC

## VI Meeting on Science with GTC. Valencia, Spain. 12 - 14 December 2018. SPLINTER SESSIONS.

Title	Organizers	Contact	Email	Abstract
Collaborative GTC and LMT projects	H. Dannerbauer	H. Dannerbauer (IAC)	helmut@iac.es	<p>Major aim of this proposed splinter is to motivate and encourage the community to present projects for future calls for collaborative proposals between Spanish and Mexican astronomers at the GTC and LMT. We start with the presentation of current and future instrumentations at the LMT. This is followed by a few selected science highlights with the LMT. We will conclude this 1.5hr splinter session with a guided discussion on synergies of both telescopes at several scientific topics. Contributions would be provided by experts. Program: *LMT - telescope and instrumentation (D. Hughes)</p> <p>*Protoplanetary Disks (J. Cernicharo)</p> <p>*Local Galaxies (U. Lisenfeld)</p> <p>*High-z Universe (Aretxaga)</p> <p>*Discussion (Dannerbauer)</p>
CanariCam Back on the GTC!	Charles Telesco	Charles Telesco (U. Florida)	telesco@astro.ufl.edu	This splinter session will be dedicated to describe the re-installation of CanariCam on the GTC.
EMIR + MEGARA data reduction process.	N. Cardiel, S. Pascual, F. Garzón, L. Patrick (for EMIR). Armando Gil de Paz & MEGARA team (for MEGARA)	Francisco Garzón (IAC) + Gil de Paz, A., Pascual Ramírez, S., Castillo-Morales, A., Cardiel, N. (UCM)	<a href="mailto:fgl@iac.es">fgl@iac.es</a> , <a href="mailto:agil@fis.ucm.es">agil@fis.ucm.es</a>	<p>This session is aimed at providing a deep insight of the current capabilities of the EMIR and MEGARA data reduction off-line pipeline. EMIR: There is a continuous effort in developing this tool, driving by the EMIR group at the UCM, and we have recently added new features to cope with MOS images. Those included on-line spectral calibration and spectral flat fielding. The session will be organised as a sort of hands-on workshop in which participants will walk throughout the several steps for a full data reduction in several EMIR observing modes. Test data will be provided to the assistant which will be encouraged to follow the reduction procedure on their own laptops. MEGARA: MEGARA is the new intermediate-resolution (R=6000- 20000) IFU &amp; MOS of GTC. It has been offered to the community as part of the 2018B "Call for Proposals" and it will start regular observations in both its modes on July 2018. This Splinter session will be devoted to carry out hands-on sessions on the processing of MEGARA observations that will be already available to the PIs at the time of the "VI meeting on Science with GTC". As the processing of MEGARA observations shares with the EMIR instrument a common environment (numina), python-based libraries and recipes and data reduction pipeline (DRP) concept, the EMIR (through its PI) and MEGARA teams have agreed to carry out this session in the same room as the EMIR DRP session requested by the EMIR PI (contact: <a href="mailto:fgl@iac.es">fgl@iac.es</a>). The first hour of the 3h-long session requested will be common to both instruments and the other 2h will be split among EMIR and MEGARA DRP specifics, 1h each.</p>

Title	Organizers	Contact	Email	Abstract
OTELO Survey	Bongiovanni, A. and OTELO collaboration	Jordi Cepa, A. Bongiovanni (IAC, ULL)	jcn@iac.es	<p>OTELO survey provides the deepest narrow band survey to date, in terms of minimum detectable flux, and emission line equivalent width. The data has been obtained using the red Tunable Filter of the OSIRIS instrument at the 10.4 m telescope GTC, pointing at the most deeply explored EGS region. This catalogue is complemented with ancillary data ranging from deep X-ray to FIR, including high resolution HST images, that allowed deriving precise photometric redshifts, and obtaining the morphological classification of the extragalactic objects detected.</p> <p>An oral contribution presenting a summary of the techniques, data quality, and the main survey demographics is already in the program of the meeting. In this splinter we aim to present more details about the catalogue, that will be publicly available by mid 2019, and the practical way to access it, including some hands-on tutorial.</p>

## VI Meeting on Science with GTC. Valencia, Spain. 12 - 14 December 2018. List of poster presentations.

Poster order	Title	Authors	Abstract	Poster presenter	Poster presenter's institution
1	Spectroscopic follow-up of submillimeter galaxies in the Extended Groth Strip	Itziar Aretxaga, Jorge Zavala, Daniel Rosa, Divakara Maya et al.	We present follow-up spectroscopy with OSIRIS in the 10.4m GTC of a sample of submillimeter galaxies found in the 15m JCMT S2CLS survey in the Extended Groth Strip, aimed at determining their redshift distribution and star formation properties derived from the rest-frame UV, and compare these properties with those derived from far-infrared measurements.	Itziar Aretxaga	INAOE
2	Testing a double reionization scenario by obtaining a deep image with a narrow-band filter with CIRCE at GTC	C. Cabello, J. Gallego, N. Cardiel, R. Guzmán, J. M. Rodríguez-Espinosa, A. Herrero, M. Mas-Hesse, E. Salvador, A. Manrique, A. Marín-Franch and S. Eikenberry	We have obtained an ultra-deep image (within the EGS field) taken with a narrow-band filter (FWHM=11nm and $\lambda_c=1.254 \mu\text{m}$ ) designed by ourselves for the CIRCE nIR camera at GTC. The main goal was to detect LAEs at $z=9.3$ by the flux excess due to the Ly $\alpha$ emission. The density of LAEs would help us to support or to reject the double reionization scenario predicted by the AMIGA model (Salvador-Solé 2015). After 19 hours on target we confirmed reaching only a limiting AB magnitude $-23$ in the ALBA-NB filter. With this depth we could not detect any LAE at high- $z$ . As a complementary result, we have performed a scientific analysis of the identified galaxies, gathering the available ancillary information from the 3D-HST and CANDELS surveys. This work will be complemented with a spectroscopic study of low-mass star-forming galaxies at different redshifts. We will exploit the guaranteed time and spectral resolution of both MEGARA and EMIR instruments for GTC	C. Cabello, J. Gallego and N. Cardiel	Universidad Complutense de Madrid
3	High redshift candidates around cluster MS 0440.5+0204: Preliminary results	Iliana I. Cortés-Pérez, Tomás Verdugo, J. A. de Diego	We present some preliminary results on the search of Lyman Alpha Emitters (LAEs) in the field of MS0440 using Multi Object Spectroscopy with OSIRIS-GTC. The candidates were previously selected using the OSIRIS-TF in a spectral range that matches the Ly $\alpha$ line redshifted between $6.5 < z < 6.6$ (a region which is important for the study of the LAE Luminosity Function and his effect in the reionization process). Our study allow us to separate between possible LAEs and interlopers (emission line galaxies at low redshift).	Iliana I. Cortés-Pérez	Facultad de Ciencias, IA-UNAM
4	Spectroscopic evolution of GRB150818A	I. Delgado Borrego (VIU & INAF/IAPS), R. Sánchez-Ramírez (INAF/IAPS & IAA-CSIC), A. de Ugarte Postigo (IAA-CSIC & DARK/NBI), L. Piro (INAF/IAPS)	Collapsar model establishes that formation of a black hole in the nucleus of massive, low metallicity stars, powers the formation of a Gamma-ray Burst (GRB). The observation of supernova (SN) signatures, that peak in the optical range around 2 weeks after the burst which are commonly broad-line type Ic, supports this scenario. This work presents the spectroscopic evolution of the afterglow and supernova (SN) associated to GRB150818A. A study of its host galaxy, that shows several emission lines at $z=0.282$ , will be reported as well. For this analysis, series of 11 spectra observed by GTC/OSIRIS were used. Since only a few GRB-SN events have such a high quality spectroscopic follow-up, the results of this data set represent an important step forward in the understanding of this phenomenon. We will discuss the impact of our observations on the current sample of GRB-SNe, BL type Ic SNe, and on our knowledge of the progenitors and their host galaxies.	I. Delgado Borrego	Valencian International University
5	Star-forming galaxies at different redshifts with the MOS mode of EMIR	J. Gallego, M. Balcells, M. Prieto, N. Cardiel, F. Garzón, R. Pelló, N. Laporte, C. Cabello, L. Domínguez, L. Patrick	Se presentan los objetivos y primeros resultados a partir de las primeras observaciones con el modo MOS del instrumento EMIR en el área de las galaxias con formación estelar a diferentes desplazamientos al rojo. Se discute los problemas encontrados, las técnicas aplicadas y los resultados esperables en futuras observaciones.	Jesús Gallego	Universidad Complutense Madrid
6	GTC/EMIR Observations of HII Galaxies at $z=1-2.5$ : A New Cosmic Distance Indicator to Measure the Expansion of the Universe at Very High Redshifts	Chanchaiworawit Krittapas, Rafael Gúzman, Jesús Gallego, Nicolás Cardiel, Roser Pelló, Mercedes Prieto	We present the preliminary results from GTC/EMIR observations of HII galaxies at $z=1-2.5$ , demonstrating their nature as standard candles using their L(HBeta)-sigma relation as a cosmic distance indicator. The measurements of their velocity dispersions and HBeta emission line fluxes were combined with other available data archives (MOSDEF & 3D-HST) to derive their luminosity distances at this critical redshift in the history of the universe. These results allowed us to: 1) establish HII galaxies as a reliable standard candle to probe the expansion of the universe over cosmological timescales (from $z=0$ to 4); 2) compare the newly derived cosmological parameters with those independently measured by SN-Ia probes at the highest redshift; and 3) test the best strategy for observing very high- $z$ HII galaxies as prime targets for observational cosmology projects within the GOYA survey.	Chanchaiworawit Krittapas	UF, UCM, IAC
7	The 2016 outburst of the neutron star transient Aquila X-1.	Guayente Panizo-Espinar, Teo Muñoz-Darias, Montserrat Armas Padilla, Felipe Jiménez-Ibarra	Aquila X-1 is a transient low-mass X-ray binary with a neutron star accretor. The system was discovered several decades ago during the dawn of X-ray astronomy. Since then, it has displayed several outburst, becoming a prototypical system. Among the recent accretion episodes, the 2016 outburst was the brightest and longest in time, allowing for detailed studies of the different physical processes at work. We will present an optical and X-ray study of this event using both GTC spectroscopy and Swift X-ray monitoring. In particular, we will report on the evolution of the main optical emission lines during the different stages of the outburst and how these are connected with the so-called "X-ray accretion states".	Guayente Panizo-Espinar	University of La Laguna
8	OSIRIS high SNR spectroscopy of Herschel galaxies: the unique hyper-luminous merger HLock01	Ismael Pérez-Fournón, Rui Marques-Chaves, Raphael Gavazzi, Paloma I. Martínez-Navajas, Dominik Riechers, Dimitra Rigopoulou, Antonio Cabrera-Lavers, David L. Clements, Asantha Cooray, Duncan Farrah, Rob J. Ivison, Camilo E. Jiménez-Ángel, Hooshang Nayyeri, Seb Oliver, Alain Omont, Douglas Scott, Yiping Shu, and Julie Wardlow	The submillimeter galaxy HERMES J105751.1+573027 at $z = 2.9574 \pm 0.0001$ is one of the brightest gravitationally lensed sources discovered in the Herschel Multi-tiered Extragalactic Survey (Conley et al. 2011, Gavazzi et al. 2011, Riechers et al. 2011 and Scott et al. 2011). It is also extremely bright in the rest-frame ultraviolet (UV), with a total apparent magnitude $m_{UV} = 19.7$ mag. We report here deep spectroscopic observations with GTC. Our results suggest that HLock01 is a merger system composed of the Herschel-selected SMG and an optically bright Lyman break-like galaxy (LBG), separated by only 3.3 kpc in projection. Deep, high signal-to-noise ratio, rest-frame UV spectroscopic observations with OSIRIS show complex kinematics of the gas, exhibiting both blueshifted and redshifted absorption components. We also find evidence of an extended gas reservoir at an impact parameter of 110 kpc. For more details, see Marques-Chaves et al. (2018), ApJ 854, 151	Ismael Pérez-Fournón	IAC

Poster order	Title	Authors	Abstract	Poster presenter	Poster presenter's institution
9	Lensed Lyman alpha emitters in the BELLS GALLERY sample: detailed properties from GTC OSIRIS spectroscopy	Ismael Pérez-Fournón, Rui Marques-Chaves, Yiping Shu, Adam S. Bolton, Paloma I. Martínez-Navajas, Camilo E. Jiménez Angel, Stefan Geier, Christoph S. Kochanek, Masamune Oguri, Zheng Zheng, Shude Mao, Antonio D. Montero-Dorta, Joel R. Brownstein, and Brice Ménard	The BELLS GALLERY Survey is a Hubble Space Telescope program to image a sample of galaxy-scale strong gravitational lens candidate systems with high-redshift Ly $\alpha$ emitters (LAEs) as the background sources. One of the goal of this survey is to study the rest-frame far-UV emission in lensed LAEs. In this poster, we will describe in detail the SDSS spectroscopic strong-lens selection technique, and present results on GTC OSITRIS spectroscopic observations of a sample of BELLS GALLERY lenses. These systems consist of massive galaxies at redshifts of approximately 0.5 strongly lensing LAEs at redshifts from 2-3. The magnification effect from gravitational lensing reveals the structure of LAEs below 100 pc scales, providing a detailed look at the sites of the most concentrated unobscured star formation in the universe.	Ismael Pérez-Fournón	IAC
10	GTC/Osiris Spectral Analysis of the Dwarf Carbon Star LSR J2105+2514	P.Pessev, A.Antonova, V.Golev, D.Dimitrov	Dwarf carbon stars (dCs) make up the largest fraction of carbon stars in the Galaxy. Although there are more than a thousand candidates, the number of confirmed members of this group is more than an order of magnitude lower. To gain better understanding about their nature and formation (primordial carbon enhancement or mass transfer from an evolved companion), more information about the individual objects is crucial. In this contribution we present original high quality spectra of the dwarf carbon star LSR J2105+2514, obtained in queue mode with 10.4m GTC/Osiris in three epochs and flux-calibrated to ~3% via synthetic magnitudes. With these data we were able to confirm the classification of the star as a member of the dCs group. Furthermore, emission lines from the Balmer series H $\alpha$ and H $\beta$ were registered for the first time, which indicate that the star may be active.	Peter Pessev	GTC, IAC, ULL
11	MEGARA: Observations of an extremely obscured and luminous Galactic supergiant	S.R.Berlanas, A.Herrero, A. Gil de Paz and the MEGARA Commissioning team	J20395358+4222506 is a strongly reddened star in the outer field of the Cygnus OB2 association. A visual extinction of $A_V = 11.0$ mag is estimated and it has been recently classified as a B0 supergiant. In this contribution, we present the first results obtained during the instrument commissioning (using the LCB+HR-R grating) of this extremely obscured and luminous Galactic supergiant. This study shows the performance of MEGARA for observing very red objects in the Galaxy and the viability for future large surveys of Galactic massive stars using new instruments such as MEGARA at the GTC.	Sara Rodríguez Berlanas	IAC
12	The WIRCam Ultra Deep Survey (WUDS) : Selection of targets for EMIR/GTC GOYA Survey	R. Pelló, N. Laporte, M. Balcells, M. Prieto, N.Cardiell, J. Gallego, F. Garzón, P. Hudelot, Y. Mellier, H. J. McCracken, C. Cabello, L. Domínguez, L. Patrick	The WIRCam Ultra Deep Survey (WUDS) is a near-IR photometric survey carried out at the CFH Telescope in the field of the CFHTLS-D3 field (Groth Strip), providing a reference database in the near-IR for the selection of targets for detailed spectroscopic studies, in particular for the EMIR/GTC GOYA Survey. WUDS includes four nearIR bands (Y, J, H and K $_s$ ) over a field of view of ~400 arcmin $^2$ , and full coverage in ugriz by the CFHTLS Deep deep images. WUDS area and depth were specifically designed to set strong constraints on the cosmic Star Formation Rate and the Luminosity Function brighter or around L* in the z=6-10 domain, although these data are also useful for the selection of high-z targets in a variety of extragalactic projects. The results obtained on the selection of high-z candidates and the evolution of the UV Luminosity Functions between z=4.5 and 9 will be presented and discussed.	M. Prieto, on behalf of the GOYA team	IRAP - OMP
13	The X-ray transient MAXI J1813-095	Javier Sánchez Sierras, Teo Muñoz-Darias, Montserrat Armas Padilla, Felipe Jiménez-Ibarra	MAXI J1813-095 is a new X-ray transient discovered during an outburst in February 2018. We will present spectroscopic observations of its optical counterpart taken with the GTC and VLT telescopes. We will also include Liverpool Telescope photometry taken within February-August 2018. We will discuss the general properties of the source such as flux variability and the main spectral features present in the optical and infrared spectra. We will compare them with those typically observed in active X-ray binaries. Finally, we will report on Swift and XMM-Newton X-ray data taken during the outburst of the source.	Javier Sánchez Sierras	ULL
14	Probing the theories on disk-star interactions with CanariCam: the unique quintuplet YSO system LkHa 262/263	Velasco, S., Rebolo, R., Osoez and A., Labadie, L.	The multiple system LkHa $\alpha$ 262/263, located in the MBM12 cloud, is composed of five low-mass very young M-type stars and some discs, including an edge-on disc around the component LkHa 263C. Here, we describe the MIR observations of the system performed with CanariCam at the Gran Telescopio Canarias, (GTC). With the collected and archived data from several instruments we have performed energy distribution plots for the members of the close companions 262AB and 263AB, which have led us to understand the distribution of discs and their link with the multiplicity of the whole system.	Rebolo, R.	IAC
15	Extreme expansion velocities in the early spectra of GRB171205A/SN2017iuk	L. Izzo, A. de Ugarte Postigo, K. Maeda, C. C. Thone, D. A. Kann, M. Della Valle, A. Sagues Carracedo, M. J. Michałowski, P. Schady, S. Schmidl, J. Selsing, R. L. C. Starling, A. Suzuki, K. Bensch, J. Bolmer, S. Campana, Z. Cano, S. Covino, J. P. U. Fynbo, D. H. Hartmann, K. E. Heintz, J. Hjorth, J. Japelj, K. Kaminski, L. Kaper, C. Kouveliotou, M. Kruźynski, T. Kwiatkowski, G. Leloudas, A. J. Levan, D. B. Malesani, T. Michałowski, S. Piranomonte, G. Pugliese, A. Rossi, R. Sánchez-Ramírez, S. Schulze, D. Steeghs, N. R. Tanvir, K. Ulaczyk, S. D. Vergani, and K. Wiersema	In this talk I present the evolution of SN 2017iuk, associated with GRB 171205A which displays features at extremely high expansion velocities within the first day after the burst. The extraordinary dataset collected for this event, with GTC/OSIRIS and VLT/X-shooter, has provided us an incredible view of this SN, which represents one of the best ever studied SN connected with a GRB. I shall furthermore discuss the results obtained from the spectral modelling of SN 2017iuk and finally conclude with important considerations for future observations of GRB-SNe.	L. Izzo	IAA-CSIC

Poster order	Title	Authors	Abstract	Poster presenter	Poster presenter's institution
16	GTC spectroscopy of high energy active nuclei and neutrino candidates	S. Paiano, R. Falomo, R. Scarpa, M. Landoni and A. Treves	The majority of the extragalactic gamma-ray sources discovered by the Fermi satellite are AGNs belonging to blazar class. Many of them are classified as BL Lac objects and characterised by a quasi-featureless optical spectrum, which makes the determination of their redshift arduous, preventing a full understanding of their properties. To investigate the nature of these gamma sources, we are carrying out extensive optical spectroscopic campaigns at the GTC to secure high S/N spectra of their optical counterparts. From these observations we were able to: 1)classify several gamma sources as BL Lacs, NLSy1, etc; 2)determine new redshifts; 3)provide good candidates for TeV observations (by MAGIC); 4)secure unprecedented high quality optical spectra of neutrino candidates (including the redshift of the first extragalactic source, TXS0506+056, associated to a Icecube neutrino). We present in detail some examples of our results and underline the key role of the GTC observations.	Paiano	INAF - Osservatorio Astronomico di Padova
17	A simultaneous search for High-z LAEs and LBGs in the SHARDS survey	P. Arrabal Haro, J. M. Rodríguez Espinosa, C. Muñoz Tuñón et al.	We have undertaken a search for both LAEs and LBGs in the GTC/SHARDS Survey. It is the first time that both LAEs and LBGs are surveyed simultaneously in a systematic way in a large field. We draw a sample of 1558 sources; 528 of them are LAEs. Most of the sources (1434) show rest-frame UV continua. A minority of them (124) are pure LAEs with virtually no continuum detected in SHARDS. We study these sources from z~3.35 up to z~6.8. We derive redshifts, SFRs, EWs and LFs. Grouping within our sample is studied, finding 92 small groups of galaxies. In addition, we relate 55 UV-selected objects with a z=5.198 overdensity. We also show that surveys made with broad bands are prone to introduce many unwanted sources. A machine learning classification of the SEDs is also carried out using gaussian mixtures algorithms. The mean SED of each class found is fit using stellar population models to estimate the average masses, ages and metallicities involved in each one of the classes obtained.	Pablo Arrabal Haro	IAC (IAC)
18	The vertical structure of the accretion disc in LMXBs	F. Jiménez-Ibarra, T. Muñoz-Darias, L. Wang, J. Casares, D. Mata Sánchez, D. Steeghs, M. Armas Padilla and P. A. Charles	LMXBs are binary systems harbouring a neutron star or a black hole accreting mass from a companion star, which is typically lighter than the Sun. LMXBs are unique laboratories to study both accretion processes and the fundamental properties of compact objects. We will present multi-epoch GTC+OSIRIS spectroscopy of a classical LMXB, Aquila X-1. We observed emission lines arising from reprocessing on the donor star and determined its radial velocity (Kem). This velocity traces the motion of the irradiated, inner side of the companion, which is smaller than the true radial velocity of its centre of mass (K2). Combining Kem with K2 (previously obtained by our group) we determined the so-called K-correction, which can be expressed as a function of the accretion disc flaring angle. This allowed us to place, for first time, strong constraints to the accretion disc vertical size using direct measurements, and thus test geometrical models for accretion discs (Jiménez-Ibarra et al. 2018 MNRAS)	Felipe Jiménez Ibarra	IAC
19	A record-massive neutron star revealed by GTC	Manuel Linares (UPC), Tariq Shahbaz & Jorge Casares (IAC)	The maximum mass of a neutron star constrains the properties of ultradense matter and the possible outcomes of double neutron star mergers. Compact binary millisecond pulsars (with orbital periods shorter than about a day) are a rapidly-growing pulsar population, and provide a good opportunity to search for the most massive neutron stars. Because their main sequence companion stars are faint and irradiated, accurate mass measurements in these systems require large optical telescopes. We present observations and detailed modeling of an extremely irradiated companion to a millisecond pulsar, using GTC-OSIRIS observations. We apply a new method to measure the velocity of both sides of the companion star, and find that the binary hosts one of the most massive neutron stars known to date, with a mass of 2.27 [+0.17-0.15] Msun. A 2.3 Solar-mass neutron star would rule out most currently proposed equations of state, casting doubt on the existence of exotic forms of matter in the core.	Manuel Linares	UPC, GAA, Barcelona
20	Chemistry in the dIrr galaxy Leo A	Francisco Ruiz-Escobedo, Miriam Peña, Liliana Hernández-Martínez, Jorge García-Rojas	We present chemical abundance determinations of two H II regions in the dIrr galaxy Leo A, from GTC OSIRIS long-slit spectra. Both regions, which are the brightest in Leo A, are of low excitation. In one of the H II regions, we determined ionic abundances (O+, O+2, N+, & S+) and total abundances (O, N & S using ICFs for each element) using the direct method, by measuring the electron temperature from [O III] $\lambda\lambda 4363/5007$ line ratio. Abundances of O & N were also determined using strong-line methods, with similar results. For the other H II region, no electron temperature was determined. Emission lines of the only PN detected in Leo A were reanalysed. We computed photoionisation models for both H II regions & the PN, to determine their chemical composition. It is confirmed that Leo A is a very low metallicity galaxy, with $12+\log O/H=7.4$ , $\log N/O=-1.6$ , & $\log S/O=-1.1$ . This PN shows $12+\log O/H$ very similar to the ones of the H II regions.	Francisco Ruiz-Escobedo	Instituto de Astronomía, Universidad Nacional Autónoma de México
21	Performance results of GTC Adaptive Optics in the laboratory	M. Reyes García-Talavera, R. L. López, J. Marco, I. Montilla, M. Núñez, J. Patrón, M. Puga, L. F. Rodríguez, J. Rosich, R. Simoes, O. Tubio, A. Basden, V. J. S. Béjar	The Adaptive Optics system of GTC (GTCAO) is based on a CILAS deformable mirror with 21 x 21 actuators, conjugated to the telescope pupil, and a Shack-Hartmann wavefront sensor with 20 x 20 subapertures, that uses an OCAM2 camera. GTCAO will deliver to the science instrument FRIDA a corrected beam with a Strehl Ratio (SR) of 0.65 in K-band, when operating with bright natural guide stars. The integration of the different subsystems has been completed, including the electronics, the wavefront sensor and the calibration system. The Test Camera has been also integrated at the science focus to evaluate the system performance. The simulators of the star, the atmospheric turbulence and the GTC telescope, have been used to characterise the system, to adjust the control system, and to test the real time control software. This paper summarizes the final steps of the integration of the system in the IAC laboratory, and the results obtained in the tests carried out to evaluate its performance	Marcos Reyes García-Talavera	IAC

Poster order	Title	Authors	Abstract	Poster presenter	Poster presenter's institution
22	First results of the GALEP project, the EMIR survey of the Galactic plane	Alina Streblyanska & GALEP team	In this talk we will review the current status of the GALEP survey and its first results. The GALEP project is carried out at the GTC using EMIR (Espectrografo Multiobjeto Infra-Rojo) camera. Using the Multi-Object Spectroscopy, we are planning to obtain NIR spectra of a few thousands Galaxy sources, mainly located in the inner regions. These sources are selected from their particular position on IR colour-magnitude (CM) diagrams and correspond to disc, bar bulge and ring stars. Our principal aim is to accurately classify these stars to provide a better understanding of the redder parts of an infrared CM diagram and to contribute to enlarge our knowledge of the galactic stellar distribution.	Alina Streblyanska	IAC
23	Stellar populations and galaxy dynamics with MEGARA	Chamorro-Cazorla, M., Castillo-Morales, A., Gil de Paz, A., Gallejo, J., Carrasco, E., Iglesias-Páramo, J., Dullo, B. T., Catalán-Torrecilla, C., Pascual, S., García-Vargas, M. L. and MEGARA Commissioning team	In this talk we present the capabilities of MEGARA@GTC in IFU mode for studying stellar populations and dynamics in nearby galaxies. The analysis carried out so far in this regard is based on data taken with MEGARA during the commissioning period between June and August 2017. Our objective is to target a well-defined sample of 150 nearby disks from the S4G survey to measure their (1) stellar velocity ellipsoids, (2) stellar population ages and (3) abundances along the galaxies' major and minor axes using MEGARA spectroscopy in the CaT region at R=20k and in multiple R=6k setups. We have already been awarded with Q1 observing time for 2018B semester. These results are helping to reveal the role of dynamical processes in the formation and evolution of galaxies, thanks to the unprecedented capabilities of MEGARA@GTC, mainly its combination of spaxel size (0.62 arcsec), FoV (12.5 arcsec x 11.3 arcsec), efficiency and spectral resolution (R=6k-20k).	Mario Chamorro Cazorla	Universidad Complutense de Madrid
24	Self-consistent spatially-resolved star formation histories of high-z galaxies with SHARDS(-FF)/CANDELS/HFF	Ángela García Argumánez, Armando Gil de Paz, Pablo G. Pérez González	In order to shed new light on how Milky Way like galaxies are formed, we analyze the spatial distribution of the stellar populations in $z>1$ massive galaxies ( $M_* > 10^{10} M_\odot$ ) in the fields surveyed by the SHARDS and SHARDS-FF GTC Large Programs, also covered by the deepest HST observations (CANDELS and HFF). We present an innovative hierarchical Monte Carlo Markov Chain approach that has been developed to combine data with different spatial resolutions. The method has been tested on Illustris simulated galaxies and then applied to high-z massive galaxies divided according to its activity (star-forming vs quiescent) and compactness (compact vs extended). We discuss the differences in SFH and mass distribution for each subsample and propose an evolutionary connection among them.	Ángela García Argumánez	Universidad Complutense de Madrid
25	The puzzling broadband evolution of AT 2018cow	D. A. Kann, A. de Ugarte Postigo, S. Schulze, C. C. Thoenen, L. Izzo, A. Jerkstrand, R. Lekschmi, et al.	AT 2018cow is a mysterious, highly luminous transient discovered in June 2018. It is composed of multiple emission components, dominated by a highly luminous, rapidly rising hot blackbody. Bright X-ray and mm/sub-mm emission is indicative of synchrotron emission stemming from a relativistic jet. The optical regime is dominated by rapidly changing absorption and emission components that have similarities with broad-lined Type Ic SNe, but also novae. I will present our follow-up observations, which are centered on a fast-cadence sequence of GTC OSIRIS long-slit spectra, in addition to photometry from GTC and several other facilities, and mm/sub-mm observations. I will also present host-galaxy results based on coverage with OSIRIS, and models to explain the data.	David Alexander Kann	IAA-CSIC, Granada
26	LOCKMAN SpreSO.	Padilla-Torres C. P.; Bongiovanni A., Pérez-García A. M.; Cepa J.	The Lockman Hole is the best reference among the most prominent extragalactic fields regarding low Galactic hydrogen column density (Dickey & Lockman 1990). The central part has been targeted by ROSAT, XMM-Newton and GALEX missions, PACS-Herschel Key Project, e.g. over an area of $\sim 24 \times 24$ arcmin <sup>2</sup> . These data have been already gathered, reduced, and the first catalogues extracted by the PEP Team. Data from Herchel-PEP provides a good estimate of bolometric luminosity for targets, and with a good enough spatial resolution to establish a reliable cross-correlation with optical sources. A surprising lack of deep optical spectroscopy is an unresolved issue despite the wealth of ancillary data (Fotopoulou et al. 2012): We have confirmed that from 786 optical counterparts, only 40 have known spectroscopic redshift. Some very red AGN and SMG, are being targeted in the framework of the Lockman-SpreSO by the proponents using OSIRIS MOS guaranteed time.	Padilla-Torres C. P.; Bongiovanni A., Pérez-García A. M.	IAC-FGG-INAF
27	Red Supergiants as Chemical abundance Probes: EMIR abundances	L. R. Patrick, F. Garzón, C. J. Evans, B. Davies, R-P. Kudritzki	Red Supergiant stars (RSGs) are important probes of stellar and chemical evolution in star-forming environments and have been recently used to examine the metal-content and -distribution of Local Group galaxies. They represent the brightest near-IR stellar components of external galaxies and probe the most recent stellar population providing robust, independent abundance estimates. Multi-object near-IR spectrographs on 10m telescopes (e.g. GTC-EMIR) are vital to realising the potential of RSGs in the context of extragalactic abundances, ahead of the next generation of ground- and space-based observatories - specialised for observing in the near-IR. To this end I present preliminary results from a pilot study with EMIR, that focuses on stellar parameters (including metallicities) of RSGs in the Galactic cluster, RSGC01. To highlight the potential of this technique, I present the Mass-Metallicity relation of Galaxies as estimated by red- and blue-supergiant stars in the Local Universe.	Lee Patrick	IAC
28	Exploring exoplanet observation capabilities on GTC/FRIDA with high-contrast imaging and integral-field spectroscopy	M. N'Diaye, S. Cuevas, B. Sánchez, A. Carlotti, A. Vigan, K. Dohlen, M. Bonnefoy, J.-L. Beuzit	Over the past few years, several large ground-based facilities have enhanced their exoplanet direct imaging capabilities to observe planetary companions and debris disks around nearby stars. The Gran Telescopio Canarias (GTC) will soon have its first high-contrast capabilities with FRIDA. This near-infrared imager and integral field spectrograph will operate with GTC AO, the adaptive optics system of the telescope that will feed the instrument with a corrected beam achieving a 60% Strehl ratio in K-band. While covering a broad range of astrophysical topics, FRIDA will enable the study of circumstellar environments with its high-resolution spectroscopy capabilities and coronagraph modes. In this communication, we discuss possible combinations of high-dispersion spectroscopy and high-contrast imaging for advanced exoplanet observations with this instrument.	M. N'Diaye	Observatoire de la Côte d'Azur

Poster order	Title	Authors	Abstract	Poster presenter	Poster presenter's institution
29	Prospecting high redshift WISE+VISTA+SDSS Galaxy Clusters (GCs) at $z>1$	Anastasio Díaz Sánchez, Rafael Barrena, Antonio Ferragamo, Alina Streblyanska	We search the most massive GCs at $z>1$ in the ALLWISE, VISTA and SDSS Stripe 82 photometric catalogs. Our method use the fact that $W1-W2$ color is a linear function of redshift between $0.7 < z < 1.5$ . A GC has been observed with multiobject spectroscopy using GTC/OSIRIS in the 2016B period. From the 46 slits in the mask we only had 20 good spectra due to the short integration time we did (93 minutes) with a peak of 5 galaxies in the redshift distribution at $z \sim 1.1$ . Others 10 rich GC candidates have been observed with GTC/EMIR in the broad band imaging mode in 2017B period in order to improve the photometric redshift accuracy. So, we have reached deeper in the J and Ks bands for these candidates. With these data we have obtained the photometric confirmation and chosen the galaxies to followup spectroscopically. This observational program is conceived to study the capabilities of GTC/OSIRIS in GCs validation and characterization at $z>1$ , in view of upcoming EUCLID data.	Anastasio Díaz Sánchez	Universidad Politécnica de Cartagena
30	Is There a Third Supermassive Black Hole (SMBH) Associated with the cD Galaxy Holm 15A?	Emmanuel Ríos-López, Omar López-Cruz, Christopher Añorve, Divakara Maya, Héctor Ibarra	Holm 15A, the BCG of Abell 85, has the largest core known so far ( $r=4.57\text{kpc}$ ) and scaling laws suggest that it could host a SMBH of mass $M_{\text{BH}}=10^9-10^{11} M_{\odot}$ . Furthermore, is possible that the compact X-ray source associated with J004150 is a third SMBH associated with Holm 15A. This target, lying at $13.74''$ from the center of Holm 15A, is a quasar candidate with $z_{\text{phot}}=0.9$ . For this Holm 15A represents an ideal opportunity for testing the SMBH "scouring" scenario for the creation of BCG cores. Hence we are making a follow-up study for Holm 15A in order to prove whether J004150 is a background source or a bound black hole, which could be tested by optical spectroscopy of J004150. So that we have acquired new spectroscopical data from GTC using OSIRIS-MOS mode for H15A to study in detail its nuclear region. Besides, we want to extend the spectroscopic luminosity function of A85 more than one magnitude deeper than previous studies by obtaining spectra of the satellite galaxies of H15A.	Emmanuel Ríos-López	INAOE
31	Emission Line Galaxies as tracers of evolution drivers in clusters of galaxies	Ricardo Pérez-Martínez, Ana María Pérez-García and the GLACE collaboration	The mapping of emission line galaxies in clusters provides an outstanding tracer of galaxy evolution and its relation with overdense environments. However, obtaining deep spectroscopic observations for areas of typically several square minutes is expensive in terms of exposure times. It also imposes a preselection of candidates that may bias the results. We have used OSIRIS tunable filters as a proxy for integral field spectroscopy to solve both issues with outstanding results. We have identified up to 110 emitters in ZwCL0024+1652, a massive rich galaxy cluster at $z=0.4$ . By extending our catalogue to other wavelengths (from X-ray to Far-infrared) using state of the art cross matching techniques, we have been able to identify the area where the bulk of the galaxy characteristics (SFR, morphology, AGN ratio etc) transforms from those of standard field objects to those of typical cluster members. The future use of MEGARA will allow us to extend the study of specific areas of interest.	Ricardo Pérez-Martínez	ISDEFE for the European Space Agency
32	Studying warm and cold phases of galactic winds in nearby galaxies with MEGARA	Castillo-Morales, A., Gil de Paz, A., Chamorro-Cazorla, M., Catalán-Torrecilla, C. and MEGARA Consortium	Galactic winds are known to be an ubiquitous phenomenon in galaxies with active star formation and/or active nuclei being a key ingredient to understand the life cycle of galaxies. Resolved 2D information is essential to understand many relevant details of this complex multiphase kinematical phenomenon. Most surveys of galactic winds are biased towards strong starbursts or active galaxies, but very little is known about winds in normal, quiescent galaxies. Our aim is to study the existence, frequency and strength of winds in this kind of galaxies, and how they compare to active galaxies. We have already been awarded with Q2 (first proposal) observing time for 2018B semester to carry out a pilot study of 3 SF galaxies, and 1 LINER. Using MEGARA (LCB/IFU mode) in its LR-V ( $R=6000$ in the NaD region) and MR-R ( $R=12000$ in H $\alpha$ +[NII]) spectral setups will allow us to simultaneously study multiple phases of the outflows across the innermost regions of nearby galaxies at subkpc scales.	Castillo-Morales, A.	Universidad Complutense de Madrid
34	FADO analysis of intermediate redshift with GTC-OSIRIS data: Stellar Populations in galaxies between $z=0.4$ and $z=0.5$	Macarena García del Valle (UCM), Mercedes Mollá (CIEMAT), Manuel E. Moreno-Raya (IAA), Lluís Galbany (U.Pittsburgh)	We have spectra obtained with OSIRIS in GTC for six galaxies at redshift $z \sim 0.4-0.5$ . The aim of this project is using them to obtain the star formation history and the metallicity evolution of six galaxies observed with GTC from the study of their spectra by applying the FADO code (Gomes & Papaderos, 2017). We will present the reduction of data steps, the basic technique of FADO applied to this particular case and our results about the star formation history and the evolution of the metallicity in each galaxy.	Mercedes Mollá	CIEMAT
35	MEGARA-GTC spectral library	Mollá Lorente, Mercedes; García Vargas, María Luisa; Carrasco Licea, Esperanza; Gil de Paz, Armando; Gallego Maestro, Jesús, Iglesias Páramo, Jorge and MEGARA Commissioning Team	MEGARA opens GTC to a higher and up to now new dimension in terms of spectral resolution and efficiency in 8-10m telescopes. The interpretation of the observations of extra-galactic targets by modeling their stellar populations demands of the availability of stellar spectra taken with the same instrument set-up. We have prepared an observational stellar library with MEGARA and the GTC to feed the PopStar new generation evolutionary synthesis models. Both library and models are summarized in this talk. We present the first on-sky observations of the library taken during commissioning (40 field stars in Low Resolution (LR) gratings, 23 field stars in HR-I, plus 88 stars in M15 cluster in all VPHs). We also present the web database developed for carrying out the project and retrieving the data. We have been awarded 50h of GTC in 2018B for a "filler" program focused on HR-I (first priority) and HR-R (second priority) at $R=20,000$ . We will update the results on this on-going program.	Mercedes Mollá	CIEMAT

Poster order	Title	Authors	Abstract	Poster presenter	Poster presenter's institution
36	BATMAN@GTC: a new spectro-imager for GTC	Frédéric Zamkotsian, Francisco Prada, Eric Jullo, Carlo Schmid, Olivier Ilbert, Sylvain de la Torre, Samuel Boissier, Jean-Claude Bouret, Justo Sánchez, Enrique Pérez	<p>We are proposing a new generation spectro-imager called BATMAN for GTC. This novel instrument is based on MOEMS (Micro-Opto-Electro-Mechanical Systems) programmable slit masks for multi-object spectroscopy (MOS). MOS is used extensively to acquire the light from thousands of astronomical targets simultaneously, to perform massive spectroscopic surveys, which are fundamental in astrophysics and cosmology, as they can address new fundamental knowledge in many different science topics. BATMAN optimises the Signal-to-Noise Ratio (SNR): high precision spectra are obtained and the problem of spectral confusion and background level occurring in slit-less spectroscopy is cancelled, as well as it provides higher throughput as compared to classical MOS using multi-slits. Fainter limiting fluxes are reached and the scientific return is maximized both in cosmology, in galaxies formation and evolution, in stellar physics and in solar system small bodies characterization. A very relevant feature of BATMAN is that provides simultaneously imaging of the same MOS field. There is a very wide range of Science Cases that can be addressed with an instrument such BATMAN at GTC, that will make this facility unique.</p> <ul style="list-style-type: none"> <li>• <i>High-redshift studies:</i> Strong lensing science Ly-alpha extended emission (cosmic web) at <math>z=6-7</math> Study of galaxy clusters at <math>z&gt;1</math> Spectroscopic Deep Field Survey</li> <li>• <i>Nearby galaxies:</i> Low surface brightness galaxies Extragalactic Planetary Nebula Deep survey of young stellar clusters in nearby galaxies Star formation regions study using an adaptable slit</li> <li>• <i>Stellar Physics:</i> Characterization of the stellar content in open clusters The EHB (Extreme Horizontal Branch) stars study in globular clusters</li> <li>• <i>Near Earth Objects:</i> Detection and characterization</li> </ul> <p>We are proposing to develop a micro-mirror array based instrument: a two-arm system providing in parallel imaging and spectroscopic capabilities. The micro-mirror array (MMA) will provide a real-time reconfigurable reflective slit-mask at the entrance of the spectrograph. This MMA could be either a Digital-Micromirror-Device-based (DMD) from Texas instruments composed of 2048x1080 micro-mirrors (13.68<math>\mu</math>m pitch) or a European-based micro-mirror array called MIRA (French-Swiss LAM-CSEM project) where the number as well as size of the micro-mirrors could be adapted to the dedicated BATMAN@GTC. The former MMA will lead to a limited FOV of 2.3x1.2 arcmin<sup>2</sup>. The later will allow a much larger FOV of 6x6 arcmin<sup>2</sup>, or even more. The wavelength range goes from the UV/visible to the near-infrared, from 365 nm to 1000 nm. The spectral resolution would range from <math>R=500</math> to 4000 for 1" – 0.2" slits.</p> <p>Thanks to its compact design, a high throughput is expected for BATMAN at GTC. The Imaging arm will use multi-band filters and the Spectroscopic MOS multiplexing performance could reach several hundred objects simultaneously and a sequential IFU may have any FOV from 1" up to the whole F.O.V. The two arms are mounted on a common bench, and an upper bench supports the detectors thanks to two independent hexapods. The stiffness of the instrument is guaranteed thanks to a box architecture linking both benches. The volume of BATMAN is 1.4x1.2x0.75 m<sup>3</sup>, with a total mass of 400kg in the DMD-based option; for the MIRA-option, a redesign has to be done.</p> <p>A similar instrument concept will be placed initially on the 3.6m Telescopio Nazionale Galileo (TNG) in La Palma by 2019. Mounting of all sub-systems has been done and integration of the individual arms is under way at LAM. The commissioning of BATMAN at TNG is of prime importance for characterizing the actual performance of this new family of MOS instruments, as well as investigating the new operational procedures on astronomical objects (combining MOS and IFU modes, different spatial and spectral resolutions in the same FOV, absolute (spectro) photometry by combining imaging and spectroscopy in the same instrument, automatic detection of transients ...). The plan is to move this optimized instrument to Gemini in 2022 to benefit from a larger telescope diameter as well as unique abilities of its Adaptive Optics System. Here, <b>we are proposing to revisit in parallel our spectro-imager concept in order to develop a BATMAN for GTC, to be ready by 2025.</b></p>	Frédéric Zamkotsian	LAM (Laboratoire d'Astrophysique de Marseille), Aix Marseille Univ., CNRS, Marseille, France
37	GATOS: A fast multi-channel imager and spectrograph for GTC	Antonio de Ugarte Postigo, et al.	<p>GATOS (GTC Astrophysical Transient Octuple-channel imaging Spectrograph) is a multi-channel imager and spectrograph capable of simultaneously obtaining images of the same field in 8 optical and near-infrared bands or alternatively performing spectroscopy covering the range between 3700 and 23500 Å in a single shot at a resolving power of <math>R \sim 4000</math>. State-of-the-art detectors envisioned for this instrument will have negligible readout time and be able to perform high-time-resolution observations. An integral-field mode covering the same range simultaneously will be available as well. In its current design the integral-field unit covers a field of 9.7"x6.8" with 0.4" slitlets. Finally, we aim to include a unique spectropolarimetry unit that will give GTC the first broad-band spectropolarimeter on a 10 m class telescope.</p>	Antonio de Ugarte Postigo	IAA-CSIC

Poster order	Title	Authors	Abstract	Poster presenter	Poster presenter's institution
38	A high-resolution red/near-infrared spectrograph for exoplanet science and general astrophysics	E. Pallé, G. Anglada-Escudé, I. Ribas	High-resolution red and infrared spectrometers, covering the wavelength range from 700nm (optical red) to 1.5 microns (and beyond), are relatively new and rare instruments. For exoplanet characterization, they enable the detection of atomic and molecular species in transmission and reflected light spectroscopy (H <sub>2</sub> O, CH <sub>4</sub> , He, Fe, K, and others). Moreover, Doppler measurements to detect and determine masses of terrestrial planets around very late-type stars (best for high contrast star planet characterization) are also advantageous at these wavelengths. In the near future, the coupling of high-resolution spectrometers and high-contrast imaging systems will enable the detection and characterization of terrestrial planets in the Habitable zone of nearby stars (Snellen et al. 2015, Lovis et al 2017). Testing such technologies at 10-m class telescopes are essential for later enabling similar techniques to the more powerful Extremely Large Telescopes.	Enric Pallé	IAC
39	Exploitation of the GTC/Osiris Public Archive using the Virtual Observatory	M. Cortés-Contreras, F. Jiménez-Esteban, E. Solano	We use the GTC Public Archive, hosted at the CAB Scientific Data Centre, to build a photometric source catalogue from the GTC Osiris broad-band images taken in the Sloan g, r, i and z filters. At the moment, it includes observations from April 2009 to January 2014, and contains more than 6 10e6 photometric points of over 600 000 sources. In the era of large-area surveys, we aim to exploit this catalogue with the help of the Virtual Observatory. In particular we plan to discover and characterize ultra-cool objects. Due to their low masses, lifetimes of these objects are comparable to the age of the Milky Way. Hence, their discovery and characterization could help tracing the Galactic chemical history. We present here the first results obtained in this study	Enrique Solano	CAB (INTA-CSIC)
40	Update of GTC/Osiris system to MCAO	V. J. S. Béjar, et al.	There are a large number of scientific cases that benefit from the development of an AO system capable of providing near diffraction correction over a large field of view. The concept proposal for the implementation of GTC/Osiris is presented here.	Victor J. S. Béjar	IAC