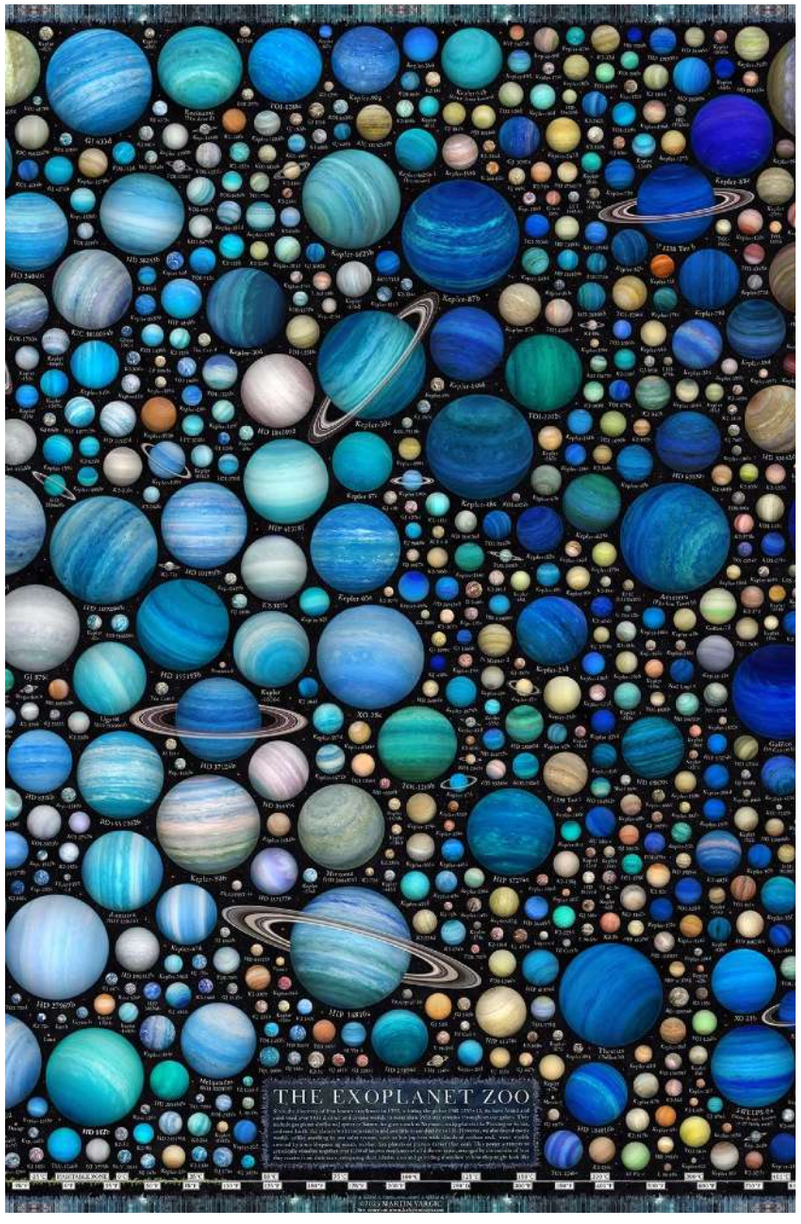
INSTITUTO DE ESTUDIOS ASTROFÍSICOS udp

FACULTAD DE INGENIERÍA Y CIENCIAS

Jamboree 2026A

Instituto de Estudios Astrofísicos

00 Research Areas

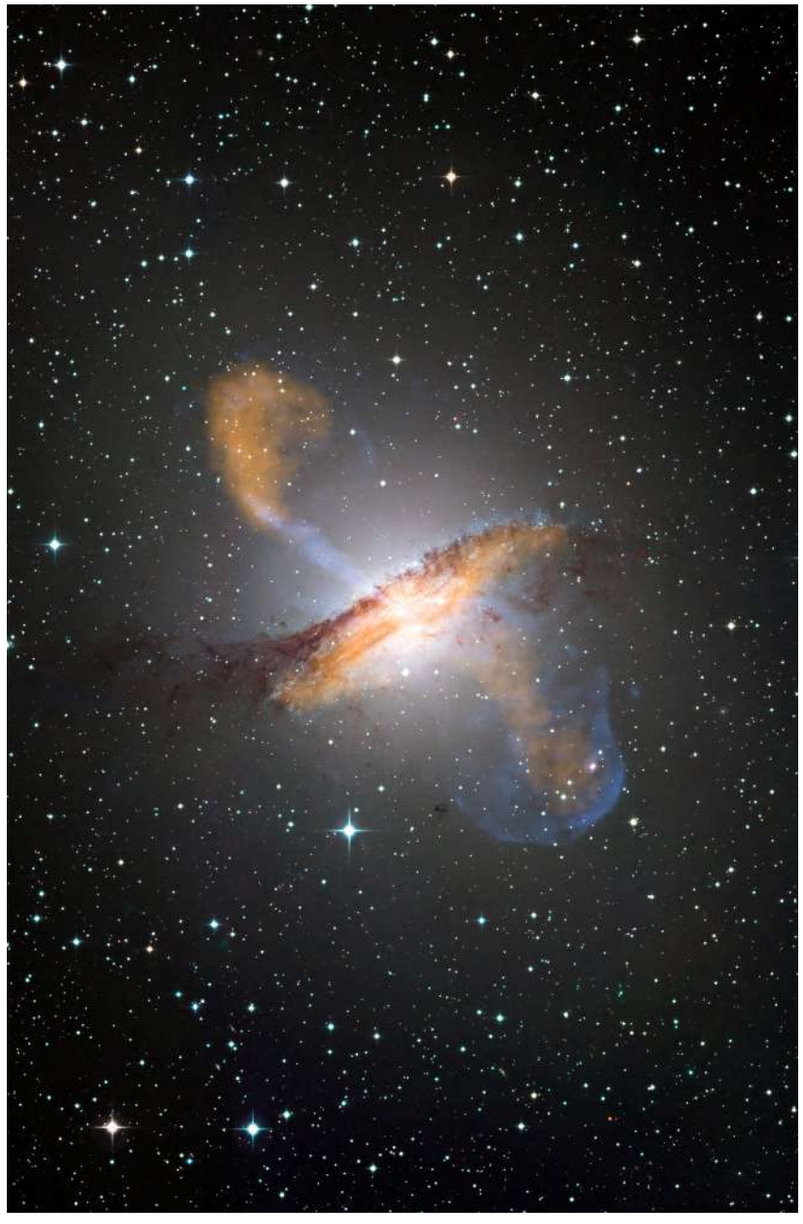


Planetary Systems

From the smallest terrestrial worlds to the largest gas giants, understanding the formation and evolution of planetary systems in the galaxy — including our own Solar System — are key to uncovering the origins of life in the Universe.

Stellar and Galactic Astronomy

Stars are the candles of the Universe, and as such the Stellar and Galactic Astronomy area is the window through which we study their structure and life cycle to answer an extensive variety of astrophysical phenomena.



Extragalactic Astronomy

As we reach beyond the stretch of our own Milky Way within Stellar and Galactic Astronomy, we enter the realm of Extragalactic Astronomy — a rich an active field of study in modern Astrophysics.

00 Schedule

Table 1

Time	Speaker	Title
09:30	Anuroop Dasgupta	From Dust to Planets: A Multi-Scale, Multi-Wavelength Study of Protoplanetary Disk Structure and Evolution
09:45	Saimurali Kolupuri	An Overdensity of Lyman-α Emitters Around z≥5 Radio-Loud Quasars
10:00	Sethulakshmi V	Study of the Host Galaxies of Stripped-Envelope Supernovae Using VLT/MUSE
10:15	Kevin Hoy	Satellite(s) Detected Around a Star's Substellar Companion
10:30	Aurelie Torti	Tracing the cold gas reservoir in the extreme star-forming protocluster SPT2349-56, at z ~ 4.3 with ALMA Band 1
10:45	Kristina Kallova	Multi-wavelength view of local Super-Eddington AGN
11:00	Roberto Serafinelli	Catching a long-term obscuration event in the act: Optical and X-ray clues from NGC 1365
11:10	Yasna Ordenes-Briceño	Extending the BUDDI software to Globular Clusters: The case of the lenticular galaxy CCC122
11:20	Evelyn Johnston	AS5: After Sloan 5
11:30	**Coffee Break (FIC auditorium)**	
11:45		
12:00	Joanne Rojas	Hunting Long-Period Companions: HD222480 and New Candidates from the CHEPS Survey
12:15	Florence de Almeida	Planets Beyond the Milky Way: High Precision Spectroscopy of Accreted Stars
12:30	Aishwarya Sarath	Lyman Break Galaxies in the z = 6.9 Quasar Field VIK J2348–3054 and Spectroscopic Confirmation of Lyman alpha emitter
12:45	Tatevik Mkrtchyan	Searching for High-Redshift Quasars (z > 4.5) in the Southern Hemisphere with 4MOST
13:00	Daniela Barrios López	Stellar and accretion properties of the Upper Scorpius star-forming region
13:15	Bin Yang	OMA500
13:25	Paula Jofre	TBD
13:35	**Lunch (IEA foyer)**	

Abstracts

01 Anuroop Dasgupta

From Dust to Planets: A Multi-Scale, Multi-Wavelength Study of Protoplanetary Disk Structure and Evolution

Planet formation spans a vast range of physical scales and conditions, from sub-au inner disk regions to hundreds of au outer edges. In this talk I will present an overview of my PhD progress, with a focus on two ongoing projects. The first uses JWST/MIRI spectroscopy combined with ALMA and RADMC-3D radiative transfer modeling to quantify crystalline silicate production in the FUor object HBC 687, with a preliminary 3.6σ detection of forsterite at 23.5 μm already suggesting that episodic accretion outbursts drive significant dust crystallization. The second presents the first volume-complete near-infrared interferometric survey of Herbig Ae/Be stars within 1 kpc with VLTI/GRAVITY and CHARA, constraining inner rim sizes, temperatures, and the binary fraction across the full intermediate stellar mass range. I will also briefly summarize two published first-author papers on ALMA disk size distributions in Ophiuchus and a dust-embedded substellar companion candidate in V960 Mon.

02 Saimurali Kolupuri

An Overdensity of Lyman-α Emitters Around z≥5 Radio-Loud Quasars

Quasars at z>5 are predicted to reside in highly biased regions of the universe, surrounded by galaxy overdensities. While recent studies have revealed such enhanced environments, most studies have primarily focused on radio-quiet quasars (RQ-QSOs). On the other hand, radio-loud quasars (RL-QSOs) are found to reside in overdense regions at cosmic noon, where most RL-QSO observations are available. However, their environments at higher redshifts (z>5) and the influence of radio jets remain largely unexplored.

We present the first statistical investigation of RL-QSO environments at $5 \leq z \leq 6.44$, using MUSE observations of 10 fields to search for associated Lyman-α emitters (LAEs) over projected areas of ~4–6 $cMpc^2$. We identify 6 LAEs across four fields, with one exhibiting a particularly high local overdensity of three LAEs. We compare the observed LAE counts with expectations from blank fields and from RQ-QSO fields at comparable redshifts.

Despite significant field-to-field variance, we find that RL-QSOs reside in overdense environments relative to blank fields. On the other hand, their clustering strengths are consistent with those measured around RQ-QSOs at comparable redshifts, in contrast to the stronger environmental differences observed between RL- and RQ-AGN at later cosmic times. These findings place new constraints on the large-scale environments of RL-QSOs at Cosmic Dawn and their role in the assembly of early massive structures. Future wide-field, multiwavelength studies targeting complementary galaxy tracers will be crucial to assess the impact of radio activity on the evolution of companion galaxies in such extreme environments and determine whether the environmental dichotomy between RL- and RQ-AGN is already established at these early epochs.

03 Sethulakshmi V

Study of the Host Galaxies of Stripped-Envelope Supernovae Using VLT/MUSE

The Multi Unit Spectroscopic Explorer (MUSE) mounted on the Very Large Telescope provides spatially resolved spectroscopy that enables detailed characterization of supernova (SN) progenitor environments. In this work, we investigate the host galaxy environments of stripped-envelope supernovae (SESNe) using integral field spectroscopy. Our sample is drawn from the All-Sky Automated Survey for Supernovae, an untargeted and spectroscopically complete survey, ensuring minimal observational bias. Additional events from the ATLAS survey are included.

We analyze 37 newly obtained MUSE galaxy data cubes hosting stripped-envelope supernovae, including 13 Type IIb, 9 Type Ic, 1 Ic-BL, 4 Type Ib/c, and 10 Type Ib events identified by the ASAS-SN, along with an additional sample of 3 Type Ic, 3 Type Ib, and 1 Type Ib/c discovered by the ATLAS survey. Most observations are part of the AMUSING survey program. Using stellar population synthesis and spectral fitting techniques, we derive key physical parameters of H II regions across each galaxy, including star formation rate (SFR), Hα equivalent width (EW), oxygen abundance (metallicity), and dust extinction.

Statistically significant differences are primarily found in metallicity and Hα EW distributions between SESNe and SNe II. Within the SESN class, Type Ic events are associated with higher SFRs, Hα EWs, and metallicities than Type Ib, while Type IIb environments appear intermediate. Furthermore, we identify correlations between SN light-curve properties and local environmental parameters, including links between luminosity, decline rates, and host galaxy conditions.

04 Kevin Hoy

Satellite(s) Detected Around a Star’s Substellar Companion

Despite more than 6000 exoplanets being discovered to date, no satellite orbiting an exoplanet—an exomoon—has ever been confidently detected. While there are some candidates, they lack clear and convincing confirmation and remain controversial. Beyond the innate value of discovering new types of objects in the Universe, satellites can help give key insights into formation mechanisms and the dynamical evolution histories of their systems. In this work, we present evidence for the existence of a satellite orbiting the directly imaged brown dwarf companion CD-35 2722 B. We have applied radial velocity analysis, the same technique used to discover the first exoplanet around a Solar-type star, on spectra of this brown dwarf obtained with VLT/CRIRES+. We have found what appears to be the periodic signal induced by at least one orbiting satellite. This is the first time this technique has successfully produced evidence of satellites around a companion brown dwarf. Our best-fitting model includes a satellite candidate with a minimum mass of ~0.7 Jupiter masses and an orbital period of ~170 days. While it is uncertain if this satellite fulfills the presently undefined criteria to qualify as an exomoon, it is a significant step toward that first detection, as advancing technology will allow the same method to be applied to less massive targets.

05 Aurelie Torti

Tracing the cold gas reservoir in the extreme star-forming protocluster SPT2349-56, at z ~ 4.3 with ALMA Band 1

How the environment impacts galaxy evolution remains a fundamental question, especially at early cosmic times when the first massive structures were rapidly assembling. However, the role of cold molecular gas, the direct fuel for star formation, remains poorly constrained in the densest structures of the early Universe. In this talk, I present deep ALMA Band 1 observations of the CO(2–1) emission line in the protocluster SPT2349-56 at z = 4.3028. This system is the most extreme star-forming overdensity known, only ~1.4 Gyr after the Big Bang. It hosts nearly 30 spectroscopically confirmed, gas-rich galaxies within a compact core. While previous studies focused on high-excitation tracers, these data provide an unprecedented view of the cold molecular gas reservoir. We detect CO(2–1) emission in 14 out of 29 members and derive their CO luminosities, using both spectral and spatial modeling techniques. In parallel, we conduct a blind line search to identify additional low-excitation gas-rich emitters that may have been missed by high-excitation surveys. Through comparison with existing [CII], [CI], and high-J CO data, the CO(2-1) measurements allow us to determine molecular gas masses, gas fractions, and depletion timescales for individual galaxies, and explore the cold ISM physical conditions. This work provides key constraints on the regulation of gas supply mechanisms and star formation at early times, in star-forming galaxies in extreme environments. This dataset serves as a benchmark for future studies of molecular gas in overdense regions, and for interpreting low-excitation CO measurements in the era of upcoming large surveys targeting galaxy populations in dense environments.

07 Joanne Rojas

Hunting Long-Period Companions: HD222480 and New Candidates from the CHEPS Survey

Detecting long-period exoplanets requires both a long temporal baseline and multi-modal data integration. This study focuses on two fronts: the detailed characterization of known candidates and the systematic search for new ones. We first detail an upgraded analysis of HD222480, where RV Bayesian modeling is combined with astrometric data to further constrain the orbital parameters and true mass of its candidate companion. This analysis serves as a benchmark for current observational limits, illustrating the transition from "candidate" to "confirmed mass" while awaiting enhanced precision from future Gaia releases. Complementing this, we conducted a wide-scale exploratory analysis of archival data from the Chile-Hertfordshire ExoPlanet Survey (CHEPS). By filtering signals based on statistical significance and suitability for follow-up, we isolated several "high-interest" systems.

08 Florence de Almeida

Planets Beyond the Milky Way: High Precision Spectroscopy of Accreted Stars

Galactic haloes are postulated to harbour the remains of dwarf galaxies that have ultimately been incorporated into the Galaxy as a result of previous or ongoing merger events. This work aims to characterise Milky Way accreted stars to better understand their origins and explore planet formation in extragalactic environments. A selection of 92 accreted dwarfs was made based on the Gaia DR3 catalogue after a cut in stellar parameters such as metallicity, Teff, and surface gravity, along with kinematics indicating retrograde, high-eccentricity orbits. High-resolution spectra taken with HARPS, UVES and MIKE are available for at least two-thirds of the total sample. To ensure robust parameter determination across the wide metallicity range (-0.5 to -3.0 dex), the analysis pipeline is calibrated using five Gaia benchmark stars spanning this interval. I will present the derived stellar parameters for these benchmarks and compare them to literature values to assess the accuracy and reliability of the method. These calibrated pipeline configurations will then be applied to the full sample to derive robust stellar parameters and chemical abundances - focusing on iron-peak and α-elements - enabling a chemical validation of the accreted nature of the stars.

09 Aishwarya Sarath

Lyman Break Galaxies in the z = 6.9 Quasar Field VIK J2348–3054 and Spectroscopic Confirmation of Lyman alpha emitter

Recent observations of the z = 6.9 quasar VIK J2348–3054 reveal a striking overdensity of companion Lyman-α Emitters (LAEs), almost ten times higher than expected for an average field, confirming that the quasar lies within a massive protocluster environment. Interestingly, we also find a pronounced deficit of LAEs within a 5.15 Mpc radius of the quasar, suggesting that its intense radiation may be suppressing star formation in nearby low-mass galaxies. Using GMOS spectroscopic data collected this semester, we verified a subset of our candidates, confirming that they are indeed genuine LAEs and strengthening the results. To further investigate the quasar's impact on galaxy formation, we incorporate new DECam Y-band imaging to study the distribution of Lyman Break Galaxies (LBGs) in the same field. Since LBGs are more massive than LAEs, they are likely less affected by the quasar's radiation, making them ideal tracers of how galaxy growth proceeds in this extreme environment. We expect LBGs to appear in regions where LAEs are missing,and we have preliminary results of more than 40 LBG sources already which has passes the color cuts , potentially revealing how powerful quasars shape the evolution of galaxies over cosmic time.

Searching for High-Redshift Quasars (z > 4.5) in the Southern Hemisphere with 4MOST

The identification of high-redshift quasars (z > 4.5) is critical for studying the early Universe, supermassive black hole growth, and cosmic reionization. Most known high-redshift quasars are located in the northern hemisphere, leaving the southern sky largely unexplored.

As part of the 4MOST Chilean AGN/Galaxy Evolution Survey (ChANGES), we constructed a multi-band photometric catalog combining optical data from DELVE DR2 and DECaLS DR10, infrared data from VHS DR5 and AllWISE, and astrometry from Gaia DR3, covering ~420 million southern hemisphere sources. After applying morphological and color-based cuts, we perform custom SED fitting using quasar and brown dwarf templates, ranking candidates via χ^2, BIC, and F-test criteria. Our final catalog contains 6,104 high-redshift quasar candidates at $4.5 < z < 7$. Initial spectroscopic validation with NTT/EFOSC2 and Palomar/NGPS confirmed 3 quasars at $z > 5$ out of 6 observed candidates.

This catalog will serve as the primary input for spectroscopic follow-up with 4MOST, significantly expanding the number of high-redshift quasars in the southern sky.

11 Daniela Barrios López

Stellar and accretion properties of the Upper Scorpius star-forming region

The study of the accretion mechanism has enriched our understanding of how the young stellar mass is set and what are the initial conditions on planet formation. In the scenario described by the magnetospheric accretion model, disk material travels along stellar magnetic field lines and is channelled onto the star. Although this process has been tested in pre-main-sequence stars observations, its study has been limited, for the moment, to relatively bright young stars. Thanks to the Gaia mission, its very high sensitivity, and its unprecedented astrometric precision, I have investigated the possible young nature of many stellar sources, aiming at analysing their accretion properties. In this talk, I present recent progress in my research on the stellar and accretion properties of sources in the nearby (< 500 pc) Galaxy, based on spectroscopic and photometric analysis.

This work explores the magnetospheric accretion mechanism in the Upper Scorpius star-forming region, where I analyzed a sample of 598 sources. For these stars, I derived fundamental stellar parameters such as mass, radius, surface gravity, effective temperature, and luminosity. Using high-resolution spectroscopic data, I identified 97 sources as young accreting objects studying the Lithium abundance, providing information on the stellar age, and hydrogen line emission, tracing the accretion process of young stars.

12* Javiera Espinoza

Monitoring the activity of the Oort Cloud comet C/2017 K2

Comet C/2017 K2 is an exceptional long period comet that exhibited sustained activity at unprecedented heliocentric distances, up to 35 au, where activity is no longer driven by the sublimation of water ice, but rather supervolatiles species such as CO. This made K2 a unique laboratory for studying the evolution of cometary activity from near interstellar conditions and as it approaches the Sun. Traditionally, intensive studies of comets are made when they are within 2-3 au from the Sun, as comets appear too faint to be characterized in detail when far away. Even within this range, the relative abundances of ices largely vary and the behavior of comets across different perihelion distances remain poorly constrained. With long term monitoring over a wide range of heliocentric distances, we are able to constrain intrinsic abundances from temporal effects.

We present preliminary results from APEX observations of the CO(2-1) and HCN(3-2) rotational transitions obtained both before and after perihelion. We probe heliocentric distances spanning the inbound and outbound legs of the orbit, allowing us to investigate temporal variations in gas production rates and line profiles. Our first analyses reveal changes in HCN and CO emission strength relative to earlier measurements.

These observations offer new insights into the drivers of distant comet activity and the role of subsurface volatile reservoirs in shaping post perihelion evolution. Out results place K2 in context with the few other well-studied comets such as Hale-bopp, contributing to the broader understanding of the physical and chemical evolution of Oort Cloud comets.

*Date TBC

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Thank you for sharing your work

At the IEA, the people are the real stars