Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
09:00 - 10:00	session 1	session 9	session 12	session 5	session 7
10:00 - 11:00	break	break	break	break	break
11:00 - 12:00	session 2	session 10	session 13	session 6	session 8
12:00 - 13:00	break	break	break	break	break
14:00 - 15:00	session 3	session 11	posters 1	session 4	
15:00 - 16:00	break	break		break	

cosmology
gravitational lensing
extragalactic astronomy
astrophysical plasmas
star
solar systems
astroinformatics
instrumentation

session 1	Joaquín Sureda	Primordial black holes extended mass functions
Chair	Marcelo Rubio	Probing primordial black holes as source of magnetogenesis
Ariel Sanchez	Nelson Padilla	Halo clustering with primordial black holes as dark matter
	Ilia Musco	Primordial Black Holes: formation mechanism and cosmological impact

session 2	Carlos Mauricio Correa	Redshift-space effects in voids
Chair	Ignacio Araya	Einstein gravity from conformal gravity in 6D
Ariel Sanchez	Enrique Paillas	Redshift-space distortions with split densities
	Raúl Angulo	Numerical simulations for interpreting large scale structure data.

session 3	Karina Rojas	Strong lens finding using CNN
	Ezequiel Boero	Simulating a high fidelity image of M87* on horizon scales with simple accreting matter models and non conventional ray tracing techniques
Chair	Martin Makler	Towards improved constraints on modified gravity using Einstein rings
Damian Mast	**Maria da Silva Pereira**	Cluster Cosmology with the Dark Energy Survey Year 3 Data
session 4	Pedro Cataldi	Baryons Shaping Dark Matter Haloes
Chair	Elizabeth Gonzalez	Galaxy cluster shapes
Ale Benitez-Ll.	**Ismael Ferrero**	A Unified Scenario for the Origin of Spiral and EllipticGalaxy Structural Scaling Laws
session 5	Agustín Rodríguez Medrano	large-scale modulation of baryonic processes in expanding or contracting voids
Chair	Ignacio Germán Alfaro	How do galaxies populate haloes in extreme densities environments?
Ismael Ferrero	David Pérez-Millán	Star formation histories in cluster and field galaxies using WINGS/OmegaWINGS data
	Alejandro Benítez Llambay,	Starless dark matter halos and the onset of galaxy formation
session 6	Florencia Collacchioni	Studying radial metallicity profiles of galaxies in 2D
Chair	**Gian Luigi Granato,**	Dust evolution in cosmological simulations of galaxy formation
Cinthia Ragone	**Thiago S. Goncalves**	How fast do galaxies die? Probing quenching timescales in the green valley
session 7	Agustín Rost	The ThreeHundred: the structure and properties of cosmic filaments in the outskirts of galaxy clusters
chair:	Pablo López	Evolution of the halo spin-filament alignment in the context of TTT
	Omar Lopez-Cruz	
session 8	Jose Benavides	Splashback Ultra-Diffiuse Galaxies
chair:	**Laura V. Sales**	The Formation of Ultra-diffuse Galaxies in Clusters
Mariano Domíng	**Gary Mamon,**	A stellar graveyard in the core of a globular cluster
session 9	Mariana Cécere	Coronal loop oscillations
chair:	María Fernanda Montero	Plasmas of interest in Astronomy and Geophysics
Andrea Costa	**Hebe Cremades**	Evolution of coronal mass ejections in the inner heliosphere: observations and modeling
session 10	Abril Sahade	Flux rope interactions with coronal holes
chair:	**Alejandro Esquivel**	Huffing, and puffing, and blowing your house in: Strong stellar winds interaction with a super massive black hole
Andrea Costa		
session 11	Federico Zoppetti	Creep tide model for the 3BP - the rotational evolution of a circumbinary planet

Chair:	María Paula Ronco	Long live the disk: lifetimes of protoplanetary disks in hierarchical triple star systemsand a possible explanation for HD 98800 B
René Duffard	**Ricardo Gil-Hutton**	Polarimetry in the planetary sciences
session 12	**Marcelo M. Miller Bertolami,**	Central Stars of Planetary Nebulae
chair	**Mercedes Vazzano**	Molecular outflows in low-mass protostars
Gustavo Baume	Emmanuel Gianuzzi	Numerical study of protostellar clouds evolution:
session 13	**Bruno Dias**	The VISCACHA (VIsible Soar photometry of star Clusters in tApii and Coxi HuguA) Survey
Chair	**Miriam Peña**	Planetary Nebulae as clues for stellar nucleosynthesis and chemical evolution of galaxies
Andrea Ahumada		
posters 1	Paula Andrea Miquelarena Hollger	Lambda Boo stars as tracers of planet formation
	Jose Alacoria	KELT-17: a chemically peculiar Am star and a hot-Jupiter planet
	Octavio Miguel Guilera	Giant planet formation at the pressure maxima of protoplanetary disks
	Gustavo Baume	Studying stellar populations with machine learning
	Susana Beatriz Araujo Furlan	Development of a digital receiver for the detection and processing of Fast Radio Burst with the Dr. Carlos Varsavsky radio telescope
	Federico Iza	Gas accretion onto the disks of simulated Milky Way-mass galaxies
	Martin Chalela	GriSPy: A Python package for Fixed-Radius Nearest Neighbors Search
	German Alfaro	PISCIS, Platform for Interactive Search y CItizen Science

Invited Speakers

A Unified Scenario for the Origin of Spiral and EllipticGalaxy Structural Scaling Laws

- **Session:** 4
- **Speaker:** Ismael Ferrero
- **Abstract:** Elliptical (E) and spiral (S) galaxies follow tight, but different, scaling laws linking their stellar masses, radii, and characteristic velocities. Mass and velocity, for example, scale tightly in spirals with little dependence on galaxy radius (the "Tully-Fisher relation"; TFR). On the other hand, ellipticals appear to trace a 2D surface in size-massvelocity space (the "Fundamental Plane"; FP). Over the years, a number of studies have attempted to understand these empirical relations, usually in terms of variations of the virial theorem for E galaxies and in terms of the scaling relations of dark matter halos for spirals. We use Lambda Cold Dark Matter (LCDM) cosmological hydrodynamical simulations to show that the observed relations of both ellipticals and spirals arise as the result of (i) a tight galaxy mass-dark halo mass relation, and (ii) the selfsimilar mass profile of CDM halos. In this interpretation, E and S galaxies of given stellar mass inhabit halos of similar mass, and their different scaling laws result from the varying amounts of dark matter enclosed within their luminous radii. This scenario suggests a new galaxy distance indicator applicable to galaxies of all morphologies, and provides simple and intuitive explanations for long-standing puzzles, such as why the TFR is independent of surface brightness, or what causes the "tilt" in the FP. Our results provide strong support for the predictions of LCDM in the strongly non-linear regime, as well as guidance for further improvements to cosmological simulations of galaxy formation.

Chemical Anomalies in the Milky Way through the NIR eyes of the APOGEE-2 survey

- **Session:** 13
- **Speaker:** Jose Gregorio Fernandez Trincado
- **Abstract:** APOGEE-2 contains more than half a million new giant stars. This enabled us to collect an unprecedented and homogeneous sample of giant stars with light/heavy-element abundance variations similar to observed in "second-generation" globular cluster stars. If they are really former members of dissolved globular clusters, stars in these groups should show some of the basic GC-like chemical patterns known for stars currently belonging to the Milky Way globular clusters, such as depletion in C and O together with N and Al enrichment. I will present the results of an updated census of GC-like stars, which migrate to the disk, halo, and bulge as unbound stars, and become part of the general stellar population of the Milky Way.

Evolution of coronal mass ejections in the inner heliosphere: observations and modeling

- **Session:** 9
- **Speaker:** Hebe Cremades
- **Abstract:** The vast variety of past and current remote-sensing and in situ observations has enabled deepening our knowledge in numerous aspects of our Sun's activity and production. Moreover, the increasing demand of specialized space weather forecasts that address the needs of commercial and government systems has also proliferated. This is an overview of the most prominent and recent theoretical and empirical approaches of increasing complexity that have been developed to date, to understand the propagation and evolution of coronal mass ejections in the inner heliosphere. On the practical side, several of these models and methods are aimed at forecasting position, embedded flux rope magnetic field configuration, and time of arrival at 1 AU of the disturbances, with the ultimate goal of assessing their degree of geoeffectiveness. The addressed approaches involve a wealth of data sets from space- and ground-based instrumentation, ranging from remote-sensing observations of the solar atmosphere and inner heliosphere, to detections of radio waves and in situ measurements.

Dust evolution in cosmological simulations of galaxy formation

- **Session:** 6
- **Speaker:** Gian Luigi Granato
- **Abstract:** I will discuss recent advances in treating the dust content of ISM in models of galaxy formation. The focus will be on results attained by our group for zoom in cosmological simulations of galaxy clusters and disc galaxies.

Molecular outflows in low-mass protostars

- **Session:** 12
- **Speaker:** Mercedes Vazzano
- **Abstract:** Molecular outflows are energetic mass ejection phenomena associated with a very early stage of stellar evolution. The large kinetic energy involved in these phenomena indicates that outflows may play an essential role in the star formation process. In this contribution we present the study of a group of low-mass protostars with associated molecular outflows located in the Lupus regions that are among the nearest low-mass star-forming complexes, and host objects spanning evolutionary stages from pre-stellar to pre-MS. We studied the selected protostars based on ALMA observations. Our molecular line selection in Band 6 probe the dense cores (N_2H C^18O, continuum) and molecular outflows (CO, SiO). The quality of the ALMA molecular data allows us to reveal the nature of the molecular outflows in the sample by studying their morphology and kinematics, through interferometric mosaics covering their full extent.

Interferometric observations in the millimeter range allow us to observe molecular outflows with high angular resolution, but are not able to recover the entire emitted flux. By combining interferometric and single-disk data, we obtain images with high detail but without loss of emission.

Primordial Black Holes: formation mechanism and cosmological impact

- **Session:** 1
- **Speaker:** Ilia Musco
- **Abstract:** Primordial black holes (PBHs) formed in the radiation dominated Universe are possible candidates for the dark matter as well as for the seeds of supermassive black holes observed in the centre of galaxies. Numerical simulations of spherically symmetric collapse shows that a PBH is formed if a cosmological perturbation amplitude is larger than a threshold value depending on the specific shape of the perturbation. Recents studies have investigated how to link the initial conditions of numerical simulations with the power spectrum of cosmological perturbations: with simple analytic prescription it is possible to compute the threshold of PBHs from the shape of the peak of the power spectrum. This will allow to compute more precisely the cosmological impact (i.e. the abundance and the mass spectrum) of these objects.

Polarimetry in the planetary sciences

- **Session:** 11
- **Speaker:** Ricardo Gil-Hutton
- **Abstract:** The past few decades have been characterized by the rapid development of astronomical polarimetry that has resulted from new polarimetric instrumentation, new techniques and new theories. Such advances have aided the exploitation of polarimetry in areas ranging from solar system bodies to exoplanets and allowed the development of completely new fields of polarimetric exploration such as cometary nuclei, transneptunian objects, protoplanetary and debris disks, and applications in astrobiology. In this talk, some important processes that produce polarization will be explained and a quick overview of the recent advances in the area will be given.

How fast do galaxies die? Probing quenching timescales in the green valley

- **Session:** 6
- **Speaker:** Thiago S Goncalves
- **Abstract:** Galaxies show a clear dichotomy in their properties, with blue spirals being markedly different from red ellipticals. This means galaxies must undergo some physical transformation that prevent them from further forming new stars. In this talk I will discuss a series of results from

our group that aim to measure and understand star formation quenching, in particular measuring how fast this must occur. More recently, we have investigated the possible correlation between quenching timescales and other processes, in an attempt to further understand the main drivers of galaxy evolution and transformation between the two populations.

The VISCACHA (VIsible Soar photometry of star Clusters in tApii and Coxi HuguA) Survey

- **Session:** 13
- **Speaker:** Bruno Dias
- **Abstract:** The VISCACHA (VIsible Soar photometry of star Clusters in tApii and Coxi HuguA) Survey is an ongoing project based on deep and spatially resolved photometric observations of Magellanic Cloud star clusters, collected using the SOuthern Astrophysical Research (SOAR) telescope together with the SOAR Adaptive Module Imager, involving astronomers from five countries including Argentina. Since 2015 almost 500 hours of telescope time have been used to observe more than 180 stellar clusters, most of them with low mass (M < 10^4 Msun) and/or located in the outermost regions of the Large Magellanic Cloud and the Small Magellanic Cloud. With this high-quality data set, we homogeneously determine physical properties from a statistical analysis of color-magnitude diagrams, radial density profiles, luminosity functions, and mass functions. Ages, metallicities, reddening, distances, present-day masses, mass function slopes, and structural parameters for these clusters are derived and used as a proxy to investigate the interplay between the environment in the Magellanic Clouds and the evolution of such systems. In this talk, I will make a brief review of the field, present the VISCACHA Survey, and show the first results.

Cluster Cosmology with the Dark Energy Survey Year 3 Data

- **Session:** 3
- **Speaker:** Maria E. S. Pereira
- **Abstract:** In this talk, I will discuss the cosmological analysis of the Dark Energy Survey Year 3 (DES Y3) redMaPPer galaxy cluster' sample. The DES Y3 data is based on optical/near-infrared imaging covering ~5000 square degrees of the Southern sky taken by the Dark Energy Camera mounted on the 4-m Blanco telescope at Cerro Tololo Inter-American Observatory in Chile. The DES Y3 sample contains ~22,000 clusters having richness greater than 20 in the redshift range 0.2<z<0.7, and shear measurements for ~100M sources. For this analysis, we combine the cluster abundance and the tangential shear measurements around clusters (N+ T) to constrain cosmology and the observable-mass relation simultaneously. I also present the prospects for constraining cosmology with a combination of the cluster abundance with multiwavelength data (N+multi-) and

the recently developed method of combining the abundance with galaxy clustering, cluster tangential shear and cluster clustering (N+4x2pt). Due to the wide redshift range probed by the survey and these complementary methodologies, we can place competitive constraints on the amplitude of the matter fluctuations and the matter density of the large-scale structure.

As stellar graveyard in a nearby globular cluster

- **Session:** 8
- **Speaker:** Gary Mamon
- **Abstract:** Globular clusters are often thought to be possible hosts of intermediate-mass black holes (IMBHs), but the evidence for them is weak at best. Combining proper motions from HST and Gaia DR2 with line redshifts from VLT/MUSE, we performed mass-obit modeling with the Bayesian code MAMPOSSt-PM, which is a new extension of the public MAMPOSSt code that only handles redshifts. We cleaned the data by discarding stars with poor quality flags, offset proper motions, offsets from the color-magnitude diagram and large proper motion errors, and we limited our analysis to projected radii where the tidal effects from the Milky Way are small. We first found that the velocities are isotropic throughout the cluster. Using bayesian evidence, we found that an IMBH is very strongly preferred to no mass excess in the center. However, an extended inner mass distribution is very strongly preferred to the IMBH! This excess mass is a few percent of the cluster mass and its half-mass radius is a few percent of that of the cluster (constituting the first joint analysis of size and mass of an extra mass concentration in globular clusters). The small size of this (sub)-cluster of unseen objects (CUO) suggests that it is composed of compact objects that are more massive than the Main Sequence stars (white dwarfs, neutron stars and stellar-mass black holes), which fell into the core by dynamical friction. A simple integration over the initial mass function of stars suggests that most of the CUO mass is in the form of black holes. I will discuss the complex inner physics of star clusters to discuss whether black holes and neutron stars can survive in a small concentration within a globular cluster.

Talks

Baryons Shaping Dark Matter Haloes

- **Speaker:** Pedro Cataldi
- **Abstract:** In this work we aim at investigating the effects of baryons on the dark matter (DM) haloes structure, focusing on the correlation between the presence and importance of stellar discs and the halo shapes. We study the properties of a subsample of DM haloes from Fenix and EAGLE cosmological simulations. We inspect the central regions of haloes in the

mass range [10.9−992.3]×10^10 M at z=0 ,comparing the hydrodynamic runs and their dark matter only (DMo) counterparts. Our results indicate that baryons have a significant impact on the shape of the inner halo, mainly within 20 percent of the virial radius. We find haloes to be more spherical when hosting baryons. While the impact of baryons depends on the mass of the haloes, we also find a trend with morphology which suggests that the way baryons are assembled is also relevant in agreement with previous works. Our findings also indicate that disc galaxies preferentially form in haloes whose DMo counterparts were originally more sphericaland with stronger velocity anisotropy. The presence of baryons alter the orbital structure of the DM particles of the haloes, which show a decrease in their velocity anisotropy, towards more tangentially biased orbits. This relative decrease is weaker in the case of disc-dominated galaxies. Our results point out to a cosmological connection between the final morphology of galaxies and the intrinsic properties of their DM haloes, which gets reinforce by the growth of the discs.

Galaxy cluster shapes

- **Speaker:** Elizabeth Gonzalez
- **Abstract:** In this work we present the shape analysis of the dark matter distribution of galaxy clusters and their relation with the stellar and the galaxy member distribution. Using hydrodinamical simulations we study the variation of the shape parameters distribution with the distance to the cluster centre and how this is linked with the cluster relaxation state and mass. We also inspect how well is the dark matter particle distribution traced by the stars and the galaxy members. Finally we study the impact of using these observables to derive the dark matter halo shapes.

The ThreeHundred: the structure and properties of cosmic filaments in the outskirts of galaxy clusters

- **Speaker:** Agustín Rost
- **Abstract:** Galaxy cluster outskirts are described by complex velocity fields induced by diffuse material collapsing towards filaments, gas, and galaxies falling into clusters, and gas shock processes triggered by substructures. A simple scenario that describes the large-scale tidal fields of the cosmic web is not able to fully account for this variety, nor for the differences between gas and collisionless dark matter. We have studied the filamentary structure in zoom-in resimulations centred on 324 clusters from The ThreeHundred project, focusing on differences between dark and baryonic matter. This paper describes the properties of filaments around clusters out to five R200, based on the diffuse filament medium where haloes had been removed. For this, we stack the remaining particles of all simulated volumes to calculate the average profiles of dark matter and gas filaments. We find that filaments increase their thickness closer to nodes

and detect signatures of gas turbulence at a distance of 2 h−1Mpc from the cluster. These are absent in dark matter. Both gas and dark matter collapse towards filament spines at a rate of 200km s−1h−1 . We see that gas preferentially enters the cluster as part of filaments, and leaves the cluster centre outside filaments. We further see evidence for an accretion shock just outside the cluster. For dark matter, this preference is less obvious. We argue that this difference is related to the turbulent environment. This indicates that filaments act as highways to fuel the inner regions of clusters with gas and galaxies.

Cluster Cosmology with the Dark Energy Survey Year 3 Data

- **Speaker:** Maria Elidaiana Da Silva Pereira
- **Abstract:** In this talk, I will discuss the cosmological analysis of the Dark Energy Survey Year 3 (DES Y3) redMaPPer galaxy cluster' sample. The DES Y3 data is based on optical/near-infrared imaging covering %5000 square degrees of the Southern sky taken by the Dark Energy Camera mounted on the 4-m Blanco telescope at Cerro Tololo Inter-American Observatory in Chile. The DES Y3 sample contains %22,000 clusters having richness greater than 20 in the redshift range 0.2

Studying radial metallicity profiles of galaxies in 2D

- **Speaker:** Florencia Collacchioni
- **Abstract:** Progresses of Integral field spectroscopy in the last decade have improved the way we understand the chemical evolution of galaxies, allowing astronomers to study galaxy's relations in a resolved way. We use the state-of-art hydrodynamical simulation EAGLE to extend our work on studying radial metallicity profiles of galaxies by analysing how the 2D metallicity profiles change when different physical processes are involved. In particular, we are interested in the effects of the gas accretion and the metal contribution on the resolved and global mass-metallicity relations. At the same time, we analyse how the history of galaxy mergers influences our results. In this sense, we aim to understand the connection between the development of global metallicity patterns and the evolution of local features in the abundance distributions. We define resolved regions of galaxies, referred as "spaxels", and find that spaxels with higher values of gas accretion display values of metallicity lower than expected. In addition, we discover that spaxels with higher fractions of accreted gas are preferentially located in the outer parts of the galaxies. Merger activity has the effect of increasing the amount of accreted gas that spaxels have.

Flux rope interactions with coronal holes

- **Speaker:** Abril Sahade
- **Abstract:** We simulate the interaction between flux ropes (FRs) and coronal holes (CHs), which are very usual structures in the solar corona.

The CHs are capable of deviate the FRs from their radial detachment. We analyze how this deviation depends on the relative polarity alignment between both structures and we compare a peculiar observational event with our simulations.

Primordial black holes extended mass functions

- **Speaker:** Joaquín Sureda
- **Abstract:** Although many candidates have already been postulated in order to alleviate our ignorance about Dark Matter (DM), it is still not clear the true nature of it. In this work, I consider Primordial Black Holes (PBHs) as a feasible candidate to solve this issue. By considering a modified Press-Schechter (PS) approach, I derive an extended mass function for PBHs, where their formation occurs in the very early Universe by the collapse of energy density fluctuations. I also present a novel method to translate observational constraints on the fraction f; computed on monochromatic mass distributions into constraints on f for extended mass distributions. This method is very general in the sense that one only needs to know the form of the function f(M_PBH), without going deeper into the full details of the physical process related to the particular observation. A set of %20 different observational constraints on f, for monochromatic distributions, are used, with the method developed in this work, to compute the allowed fraction f on the PS PBH mass functions. Combining them, we obtain the allowed fraction f such that there is no conflict with the observations. This result is presented as a function of the parameters of the PS mass function. When we only take into account well established constraints, an allowed region in the parameter space is found, such that all DM can be composed by PBHs. The most interesting region is the one that allows for PBHs of masses %10^2 Msun, as these are close to the ones detected by LIGO and are difficult to explain by stellar collapse.

large-scale modulation of baryonic processes in expanding or contracting voids

- **Speaker:** Agustín Rodríguez Medrano
- **Abstract:** Large sub-dense regions of the universe, called cosmic voids, are characterized for presenting properties different from the average of the Universe. In particular, we can differentiate the regions of voids in two populations due to their expansion or contraction dynamics. Under this dichotomy, the halos present inside and outside these regions, form and evolve in different ways. Using simulations of cosmological voids with astrophysical models, we characterize the voids and their environment through the study of baryons. Our results indicate a smoother accretion of matter to the halos present in voids and those halos present in the outer regions of the overdense voids, feel disturbances due to massive halos.

The galaxy size – halo mass scaling relations of central and satellite galaxies

- **Speaker:** Facundo Rodriguez
- **Abstract:** The distinct evolutionary processes undergone by central and satellite galaxies are expected to have an impact on their observed statistical properties. In this work, we combine size and stellar mass measurements from the Sloan Digital Sky Server (SDSS) with the group finder algorithm of Rodriguez & Merchán to determine the stellar and halo mass - size relations of central and satellite galaxies separately. We show that, while central and satellite galaxies display similar stellar mass - size relations, their halo mass - size relations differ significantly. As expected, more massive haloes tend to host larger central galaxies. However, the size of satellite galaxies depends only slightly on halo virial mass. We show that these results are compatible with a remarkably simple model in which the size of central and satellite galaxies scales as the cubic root of their host halo mass, with the normalization for satellites being %30% smaller than that for central galaxies, which can be attributed to tidal stripping. We further check that our measurements are in excellent agreement with predictions from the IllustrisTNG hydrodynamical simulation.

Numerical study of MHD modes in coronal loops

- **Speaker:** Mariana Cécere
- **Abstract:** In order to infer the properties of the coronal plasma, coronal seismology combines the measurement of temporal and spatial signals of oscillations and magnetohydrodynamic waves of different magnetic structures with their theoretical modeling. In the particular case of coronal loops, fast sausage modes and standing slow modes are the most studied oscillation modes, because their compressibility makes them susceptible to being observed. By performing magnetohydrodynamic numerical simulations, we analyze the capability of different types of disturbances, associated with typical solar corona energy fluctuations, to generate these types of modes. We found that confined energy deposition excites slow modes, while global perturbations, capable of instantly modifying the loop temperature, excite fast sausage modes.

Probing primordial black holes as source of magnetogenesis

- **Speaker:** Marcelo Rubio
- **Abstract:** We introduce a statistical framework for estimating the order of magnitude of magnetic field fluctuations produced by populations of primordial black holes (PBHs), which are characterized by extended Press-Schechter mass functions for different formation scenarios. The main idea is to assume that each PBH is capable of generating its own magnetic field by a given physical mechanism, in order to obtain a power spectrum of magnetic field fluctuations, with some statistical considerations. We

apply our analysis to the determination of whether or not classical mechanisms for magnetogenesis could have taken place in this context, such as the Biermann battery, and also to assess further possible mechanisms, in particular due to the accretion of magnetic monopoles at PBH formation.

How do galaxies populate haloes in extreme densities environments?

- **Speaker:** Ignacio Germán Alfaro
- **Abstract:** The diversity of astrophysical phenomena involved in galaxy formation makes it difficult to determinate unambiguously how galaxies populate the dark matter halos. A statistical analysis that can be to describe the connection between galaxies and their dark matter halo is to compute the Halo Occupation Distribution (HOD). It's usually assumed that the HOD doesn't vary between different large-scale environments. However, recent work has shown evidence to the contrary. In this presentation, we show the result of measure the HOD in large-scale structures with extremes densities of matter. In particular, we studied the inside of the cosmological voids and the future virialized structures. Also, we include a brief theoretical summary of the issues addressed during our research, present the results obtained and their conclusions.

Strong lens finding using CNN

- **Speaker:** Karina Rojas
- **Abstract:** The Gravitational lens effect is a powerful tool to study a broad variety of scientific questions like luminous/dark matter components of galaxies, the Hubble constant, the content, geometry and evolution of our Universe among others. Currently there are only hundreds of confirmed systems so we need to search for new lenses to statistically benefit several studies. Nowadays convolutional neural networks (CNN) is a popular method to search for these objects. Thus, we trained a CNN to search for new lens systems in ground base data from the Dark Energy Survey (DES), in preparation to perform such search on LSST and Euclid. Our CNN found hundreds of new lens candidates but also we dedicate time to characterize our false positives, creating a catalog with hundreds of rings galaxies.

Halo clustering with primordial black holes as dark matter

- **Speaker:** Nelson Padilla
- **Abstract:** If primordial black holes made up a sizeable fraction of the dark matter in the Universe, they would have an effect on the clustering on small scales due to their associated Poisson noise. We will show that this can be used to place constraints on the properties of the black holes that constitute the dark matter from the power spectrum of density fluctuations, the abundance of dark matter haloes of small and large masses,

and from the clustering of dark matter haloes and its dependence on halo mass.

Evolution of the halo spin-filament alignment in the context of TTT

- **Speaker:** Pablo López
- **Abstract:** According to the tidal torque theory (TTT), the direction of the angular momentum of dark matter haloes emerges during the linear regime of structure formation, as a result of the misalignment between the proto-haloes' inertia tensor and their surrounding tidal field. Within this frame, the halo spin-filament alignment is essentially fixed at the initial conditions of the proto-haloes' history. However, numerous studies with numerical simulations have shown that the present day angular momentum differs on average %30º from the measurements at such early times. In the present work we confirm this deviation, analyze its time dependence and determine its preferred directions with respect to the cosmic filaments. To explore possible causes, we take into account how the magnitude of the angular momentum grows relative to the TTT predictions. Among other results, we find that the evolution of the median alignment between the haloes' spin and the axes of their host filament can be decomposed in a general behaviour during the linear and quasi-linear times (towards perpendicularity with respect to the filament spine and its embedding wall) and a particular trend after z%2 that is strongly dependent on the haloes' angular momentum growth. These results indicate the alignment signals that a potential extension of the TTT should account for, and point towards systematic differences that might allow to model the haloes' non-linear evolution.

Creep tide model for the 3BP - the rotational evolution of a circumbinary planet

- **Speaker:** Federico Zoppetti
- **Abstract:** We present a tidal model for treating the rotational evolution in the general three-body problem with arbitrary viscosities, in which all the masses are considered to be extended and all the tidal interactions between pairs are taken into account. Based on the creep tide theory, we present the set of differential equations that describes the rotational evolution of each body, in a formalism that is easily extensible to the N tidally-interacting body problem. We apply our model to the case of a circumbinary planet and use a Kepler-38 like binary system as a working example. We found that, in this low planetary eccentricity case, the most likely final stationary rotation state is the 1:1 spin-orbit resonance, considering an arbitrary planetary viscosity inside the estimated range for the solar system planets. The timescales for reaching the equilibrium state is expected to be Myrs for stiff bodies, but can be longer than the age of the system for planets with a large gaseous component. We derive analytical

expressions for the mean rotational stationary state, based on high-order elliptical expansions of the semimajor axes ratio and low-order expansions of the eccentricities. These are found to reproduce very accurately the mean behaviour of the low-eccentric numerical integrations for arbitrary planetary relaxation factors, and up to 0.4. Our analytical model is used to predict the stationary rotation of the Kepler circumbinary planets and found that most of them are problably rotating in a sub-synchronous state, although the synchrony shift is much less important than the one estimated with another tidal model. We present a comparison of our results with those obtained with the Constant Time Lag and find that, unlike what we assumed in our previous works, the cross torques do not have a negligible net secular contribution, and must betaken into account when computing the tides over each body in an N-extended-body system from an arbitrary reference frame. These torques are naturally taken into account in the creep theory. In addition to this, the latter formalism considers a more realistic rheology that proved to reduce to the Constant Time Lag model in the gaseous limit and also allows to study several additional relevant physical phenomena.

Redshift-space effects in voids

- **Speaker:** Carlos Mauricio Correa
- **Abstract:** Voids are promising cosmological probes. Nevertheless, every cosmological test based on voids must necessarily employ methods to identify them in redshift space. Therefore, the redshift-space distortions and the Alcock-Paczynski effect have an impact on the void identification process itself generating additional distortion patterns in observations. Using a spherical void finder, we developed a statistical and theoretical framework to describe physically the connection between the identification in real and redshift space. We found that redshift-space voids above the shot noise level have a unique real-space counterpart spanning the same region of space, they are systematically bigger and their centres are preferentially shifted along the line of sight. The expansion effect is a by-product of RSD induced by tracer dynamics at scales around the void radius, whereas the off-centring effect constitutes a different class of RSD induced at larger scales by the global dynamics of the whole region containing the void. The volume of voids is also altered by the fiducial cosmology assumed to measure distances, this is the AP change of volume effect. We developed a theoretical framework to model these effects and tested it with the MXXL simulation. This description depends strongly on cosmology.

Simulating a high fidelity image of M87* on horizon scales with simple accreting matter models and non conventional ray tracing techniques

- **Speaker:** Ezequiel Boero
- **Abstract:** It is somewhat intriguing that new results could arise in the

study of gravitational lensing effects of black holes where geodesic motion has been fairly well studied and understood in the past. In this talk we will report new exact expressions for the curvature scalar Psi_0 sourcing the null emph{geodesic deviation equation} in Kerr spacetime for valid arbitrary central null geodesic in a bundle of photons. Such expression allows for an efficient numerical calculation of the combined system of geodesic and geodesic deviation equations. We will also present a numerically simulated images implementing the whole system of equations for a very simple model of accretion disk having simple characteristics compatible with the usual low luminosity AGN's and magnetically arrested dominated general relativity magnetohydrodynamical models. We show that high fidelity reproduction of the reported images by the EHT collaboration on April 11th can be achieved in this way. Our approach then, exhibits that the present features observed in the constructed images from the observational data can be also customized with a simple setting besides of sophisticated and very detailed modeling. The EHT collaboration has pointed out that the main features imprinted on the images are signs of the so called photon ring region in Kerr; our study suggests that such features could also to be ascribed to settings non previously considered.

Estudio de la evolución de diferentes nubes protoestelares en simulaciones

- **Speaker:** Emmanuel Gianuzzi
- **Abstract:** In order to provide information about the star formation process, we studied protostellar clouds by means of numerical simulations. Nine protostellar clouds were created and evolved varying the initial index of velocities power spectrum, the initial magnitude of the initial kinetic energy, and the model of equation of state. All clouds possess same initial radius, mass particle number, radial density profile and temperature; and manage to form sink particles. We made comparisons between simulations on different properties, such as the evolution of their power spectrum, energy, and multiplicity of formed systems.

Einstein gravity from conformal gravity in 6D

- **Speaker:** Ignacio Araya
- **Abstract:** We extend Maldacena's argument, namely, obtaining Einstein gravity from Conformal Gravity, to six dimensional manifolds. The proof relies on a particular combination of conformal (and topological) invariants, which makes manifest the fact that 6D Conformal Gravity admits an Einstein sector. Then, by taking generalized Neumann boundary conditions, the Conformal Gravity action reduces to the renormalized Einstein-AdS action. These restrictions are implied by the vanishing of the traceless Ricci tensor, which is the defining property of any Einstein spacetime.

Splashback Ultra-Diffiuse Galaxies

- **Speaker:** Jose Benavides
- **Abstract:** Ultra-diffuse galaxies (UDGs) are extreme objects. With sizes comparable to large galaxies but dwarf-like stellar masses, they occupy the tail of low surface galaxies. Typically, they are red and quiescent when found in high-density environments, like groups and clusters, but blue and star-forming in low-density regions, like the field. This result hints at environmental effects playing a key role to produce these two separated populations. However, the recent detection of red and quiescent UDGs in the field represents a puzzle for this environmental naif scenario. Using the TNG50 cosmological hydrodynamical simulations. We show that these enigmatic objects were indeed a splashback satellite galaxy of a much more massive dark matter halo that ejected them up to a few Mpc away.

Plasmas of interest in Astronomy and Geophysics

- **Speaker:** María Fernanda Montero
- **Abstract:** At different scales in nature, we find the interaction of plasmas with both magnetic and electric fields, either external or produced by the proper movement of such plasmas. These interactions produce a myriad of phenomena that can be found in the Earth's magnetosphere, in the Sun, in accretion disks as well as in laboratory plasmas. The main goal of our interdisciplinary project is the study of plasmas in different contexts. We address the study of the role of magnetic fields in the modeling and analysis of accretion disks in binaries systems. We analyze their local instabilities, regarding the disks as globally stable. Furthermore, we are particularly interested in the analytical study of different terms of Ohm's generalized law on the stability of magnetic flux tubes and the modification of wave propagation. Finally, in the context of space plasmas, we focus on the study of the magnetic-kinetic energy exchange phenomena that plasma experiences on its way. We study the problem from the magnetohydrodynamic approach (MHD) in concomitance with the treatment used in Hamiltonian Systems. All these lines of research are addressed in an analytical and numerical fashion, comparing the results with the available observational data. Keywords: 1) astrophysical plasmas 2) space plasmas 3) magnetohydrodynamics Proyecto de Incentivos 11 G165 Project Director: Patricia Sallago Members: O. Benvenuto, H. Berezin, A. De Vito, C. Giordano, and M. F. Montero Contact: fmontero@fcaglp.unlp.edu.ar, mfer_13@yahoo.com

Redshift-space distortions with split densities

- **Speaker:** Enrique Paillas
- **Abstract:** Accurate modelling of redshift-space distortions (RSD) is challenging in the non-linear regime for two-point statistics, such as the power spectrum or the two-point correlation function (2PCF). The density split

(DS) method for RSD, presented in Paillas et al. (2021) consists in splitting the galaxy density field in different quantiles according to the local galaxy density, and cross-correlating those densities with the entire galaxy field. The distribution of peculiar velocities in each density quantile is close to Gaussian, allowing an accurate modelling of RSD down to small scales. DS also captures the non-Gaussianity of the density PDF at small scales, leading to improved cosmological constraints on the growth rate of cosmic structure and Alcock-Paczynski (AP) parameters over the 2PCF.

Star formation histories in cluster and field galaxies using WINGS/OmegaWINGS data

- **Speaker:** David Pérez-Millán
- **Abstract:** Star formation histories in cluster and field galaxies using WINGS/OmegaWINGS data One of the main challenges that modern extragalactic astrophysics faces is understanding the different mechanisms driving the changes in galactic properties. While isolated galaxies follow evolutionary paths and timescales that are mostly driven by the typical processes of stellar evolution, galaxies in clusters are subject to a whole range of different processes and interactions that dramatically change that picture. To shed light on these issues, we use the most homogeneous and complete cluster galaxy survey up to date: WINGS and its extension OmegaWINGS (Fasano et al. 2006; Gullieuszik et al. 2005; Moretti et al. 2017). This dataset covers a full mass range of 72 clusters in the local Universe ($0.04 < z < 0.07$), with imaging, and a subsample in spectroscopy, for thousands of galaxies up to twice the virial radius and beyond. Previous works have measured/calculated properties such as photometry, redshifts and memberships, morphologies, and local density. In this work, we take advantage of all these known properties and use the stellar population synthesis code SINOPSIS (Fritz et al. 2007, 2011) to obtain stellar properties, e.g., stellar mass, stellar ages, star formation rates (SFR), and star formation histories (SFH). We analyze and compare our galaxy sample in clusters and the field (no cluster members), especially for spiral galaxies, SFHs as a function of morphology, stellar mass, local density; and for cluster members: clustercentric projected distance, and cluster mass. We include other results as SFR-mass relation, color-magnitude and color-mass relation, and the fraction of morphological types with cluster mass. We put all of these results together to see what is the most important factor to affect galaxy's destiny: stellar mass, global or local environment, among others.

Long live the disk: lifetimes of protoplanetary disks in hierarchical triple star systemsand a possible explanation for HD 98800 B

- **Speaker:** María Paula Ronco
- **Abstract:** The gas dissipation from a protoplanetary disk is one of the

key processes affecting planet formation, and it is widely accepted that it happens on timescales of a few million years for disks around single stars. Over the last years, several protoplanetary disks have been discovered in multiple star systems, and despite the complex environment in which they find themselves, some of them seem to be quite old, a situation that may favor planet formation. A clear example of this is the disk around one of the binaries in the hierarchical quadruple stellar system HD 98800, which at a 10 Myr age seems to still beholding significant amounts of gas. Here we present a 1D+1D model to compute the vertical structure and gas evolution of circumbinary disks in hierarchical triple star systems considering different stellar and disk parameters.We show that tidal torques due to the inner binary together with the truncation of the disk due to the external companion strongly reduce the viscous accretion and expansion of the disk. Even allowing viscous accretion by tidal streams disks in these kind of environments can survive for several Myr, with photoevaporation being the main gas dissipation mechanism. We particularly apply our model to the circumbinary disk around the system B in the system HD 98800 and confirm that its longevity, along with the current non-existence of a disk around the binary system A, can be explained with our model and by this mechanism.

Towards improved constraints on modified gravity using Einstein rings

- **Speaker:** Martin Makler
- **Abstract:** Galaxy-scale strong lensing systems (aka Einstein rings) are key for testing modifications of general relativity at the few kpc scales. In particular, combining the kinematics of the central galaxy with the lens modeling, allows one to set constraints on the so-called slip parameter eta (which is the ratio of the two scalar potentials for general metric theories). The current constraints on eta are either based on a single system at low redshift or on a heterogeneous sample of lenses, which have only a coarse measurement of the velocity dispersion and are subject to strong modeling assumptions. We propose to improve the statistical measurements of eta with Einstein rings in a number of ways by: i) providing a new sample of systems, with a more homogeneous selection and analysis; ii) performing a more self-consistent analysis, using the mass and luminosity profiles derived from the data for each system; iii) addressing some of the systematics of the previous analyses, including improved models for the velocity anisotropy; iv) gathering higher quality data for selected systems, in particular, spatially resolved spectroscopy. This last point will enable a qualitative improvement over the current state-of-the art, allowing us to a) provide a modeling of the lens velocity dispersion, in particular its radial dependence, b) obtain a spectrum of the lensed galaxies (sources at z%0.9), thanks to the flux enhanced by the lensing magnification and the subtraction of the lens spectrum, c) give a hint on the kinematics

of the source, thanks to the lensing stretching and the precise measurement of the emission lines in each spaxel. We expect with these data to finally decrease the systematic errors to below the statistical ones. The resolved spectroscopy will also provide a rich dataset to study the physical properties of both the lens and the sources.

Posters

GriSPy: A Python package for Fixed-Radius Nearest Neighbors Search

- **Author:** Martin Chalela
- **Abstract:** We present a new near neighbors searching algorithm at fixed radius, developed in Python. This module indexes a set of k-dimensional points on a regular grid, with optional periodic conditions, providing a quick approach to close neighbor queries. In this first version, we implement three types of queries: bubble, shell and nearest nth; as well as three different metrics of astronomic interest: the Euclidean and two distance functions in spherical coordinates of variable precision, Haversine and Vincenty; and also, the ability to provide a custom distance function. This package is particularly useful for large data sets where a brute force search becomes impractical.

Lambda Boo stars as tracers of planet formation

- **Author:** Paula Andrea Miquelarena Hollger
- **Abstract:** We study the possible chemical signature of planet formation in early-type stars with planets. In particular, we analyze a likely relation between the Lambda Boo chemical pattern and the presence of giant planets by using spectral synthesis. Our first sample includes 13 stars with planets and 24 stars without detected planets. We have detected four Lambda Boo stars in our sample, two of which present planets and circumstellar disks (HR 8799 and HD 169142) and one without detected planets (HD 110058). We also identified the first Lambda Boo star which is orbited by a brown dwarf (Zeta Del). Our results support a scenario in which giant planets orbiting pre-main-sequence stars block the dust of the disk and result in a Lambda Boo pattern. On the other hand, we do not support a proposed scenario in which the winds form hot-Jupiter planets could produce a Lambda Boo pattern on early-type stars.

Studying stellar populations with machine learning

- **Author:** Gustavo Baume
- **Abstract:** Stellar populations in NGC 1313 galaxy were studied using multi-band photometric data obtained with the Hubble Space Telescope.

Machine learning techniques were applied to recognize both the stellar populations and the groups of stars in the youngest population. We could then to characterize their spatial distribution.

PISCIS, Platform for Interactive Search y CItizen Science

- **Author:** Ingrid Vanessa Daza Perilla & Ignacio Germán Alfaro
- **Abstract:** Many topics in modern astronomy are characterized by the identification of features on images. While this is an easy task for a trained eye, it is difficult to carry out through models or numerical methods. Here we present a tool that eases the process of generating value added catalogs from data comprising a set of images. This is made through a citizen science web platform (PISCIS, Platform for Interactive Search and CItizen Science). We present a report on the experience and early results of PISCIS implemented on an observational catalogue of galaxy pairs, aimed at classifying the type of interactions. With this dataset, we analyze several stability and reproducibility metrics of the platform and discuss its potential application to problems strongly based on image classification tasks.

KELT-17: a chemically peculiar Am star and a hot-Jupiter planet

- **Author:** Jose Alacoria
- **Abstract:** There is very little information to be found in the literature regarding the detection of planets orbiting chemically peculiar stars. We carried out a detailed abundance determination in the planet host star KELT-17 via spectral synthesis. Also, we estimated the stellar radius using two methods: a) comparing the synthetic spectral energy distribution with the available photometric data and the Gaia parallax, and b) using a Bayesian estimation of stellar parameters using stellar isochrones. We found over-abundances of Ti, Cr, Mn, Fe, Ni, Zn, Sr, Y, Zr, and Ba, together with subsolar values of Ca and Sc. Notably, the chemical pattern agrees with those recently published for Am stars, making KELT-17 the first exoplanet host whose complete chemical pattern is unambiguously identified with this class. The stellar radius derived by two different methods agrees to each other and with those previously obtained in the literature.

The origin of star-gas misalignments in cosmological hydrodynamical simulations

- **Author:** Catalina Casanueva
- **Abstract:** We use the EAGLE cosmological hydrodynamical simulation to study the kinematic misalignment between star-forming gas and stars across cosmic time. Our aim is to determine statistically the origin of misalignments and what processes lead to this. We explore dependence on redshift, morphology, assembly history and other galaxy properties.

These results will be used to make comparisons between simulations and integral field spectroscopic observations and to help their interpretation.

Gas accretion onto the disks of simulated Milky Way-mass galaxies

- **Author:** Federico Iza
- **Abstract:** In the standard paradigm of galaxy formation and evolution, the baryonic component of galaxies forms from the collapse and condensation of gas within dark matter haloes, and later grows from continuous accretion of gaseous mass, both in diffuse form and in mergers with other systems. In the disc region, the cosmological accretion of gas combines with the outflows resulting from supernovae, affecting the hydrodynamical and structural properties of the disc and producing gas flows in the vertical and radial directions. In this work, we use a set of simulated galaxies from the Auriga Project, a suite of magneto-hydrodynamical, zoom-in cosmological simulations of Milky Way-like galaxies, to study the temporal dependency of gas accretion onto the disc. We investigate net accretion patterns as a function of cosmic time and, for a subset of these galaxies, total inflow and outflow rates. We find that accretion patterns can be roughly separated into two different phases: a first period, at early times, characterized by a violent increase in accretion rates, followed by a late-time exponential decrease epoch. For most of the analysed galaxies, net accretion rates at present times are of approximately $1 - 10$. However, the behaviour of each galaxy is subject to its formation history, and particularly to mergers with smaller satellites.

Studying stellar populations with machine learning

- **Author:** Gustavo Baume
- **Abstract:** Stellar populations in NGC 1313 galaxy were studied using multi-band photometric data obtained with the Hubble Space Telescope. Machine learning techniques were applied to recognize both the stellar populations and the groups of stars in the youngest population. In both cases, different clustering algorithms were used and their efficiency were evaluated. Additionally, we characterized the spatial distribution of each population. It was possible to identify the youngest populations with a hierarchical structure and the most evolved ones with a homogeneous distribution, except for very large scale fluctuations.

Giant planet formation at the pressure maxima of protoplanetary disks

- **Author:** Octavio Miguel Guilera
- **Abstract:** Recent high-resolution observations of protoplanetary disks have revealed ring-like structures that can be associated to pressure maxima. Pressure maxima are known to be dust collectors and planet migration traps. The great majority of planet formation works are based either

on the pebble accretion model or on the planetesimal accretion model. However, recent studies proposed the possible formation of Jupiter by the hybrid accretion of pebbles and planetesimals. We aim to study the full process of planet formation consisting of dust evolution, planetesimal formation and planet growth at a pressure maximum in a protoplanetary disk. We compute, through numerical simulations, the gas and dust evolution in a protoplanetary disk, including dust growth, fragmentation, radial drift and particle accumulation at a pressure maximum. The pressure maximum appears due to an assumed viscosity transition at the water ice-line. We also consider the formation of planetesimals by streaming instability and the formation of a moon-size embryo that grows into a giant planet by the hybrid accretion of pebbles and planetesimals, all within the pressure maximum. We find that the pressure maximum is an efficient collector of dust drifting inwards. The condition of planetesimal formation by streaming instability is fulfilled due to the large amount of dust accumulated at the pressure bump. Then, a massive core is quickly formed (in %10 yr) by the accretion of pebbles. After the pebble isolation mass is reached, the growth of the core slowly continues by the accretion of planetesimals. The energy released by planetesimal accretion delays the onset of runaway gas accretion, allowing a gas giant to form after %1 Myr of disk evolution. The pressure maximum also acts as a migration trap. Pressure maxima generated by a viscosity transition at the water ice-line are preferential locations for dust traps, planetesimal formation by streaming instability and planet migration traps. All these conditions allow the fast formation of a giant planet by the hybrid accretion of pebbles and planetesimals.

Spectra os SDSS quasars

- **Author:** Octavio Garcia
- **Abstract:** We study the optical and UV properties of SDSS quasars to derive their stellar and non-stellar properties

Development of a digital receiver for the detection and processing of Fast Radio Burst with the Dr. Carlos Varsavsky radio telescope

- **Author:** Susana Beatriz Araujo Furlan
- **Abstract:** Thanks to the new generation of digital receivers available at the IAR, developed by the CASPER collaboration (Collaboration for Astronomy Signal Processing and Electronics Research), it is possible to elaborate and implement new techniques for digital signal processing, increasing the observational capabilities and flexibility of the radio telescopes of the IAR. The present work describes a proposal for the creation of a new high-bandwidth receiver, based on the ROACH (Reconfigurable Open Architecture Computing Hardware) board for the detection and study of the radio transients known as Fast Radio Bursts (FRB). These are extremely rapid (1ms) flares that occur at cm- wavelengths of unknown origin.

FRBs can be identified because they shift in frequency due to the refractive effects of the interstellar medium. Here we describe the hardware that will be used, the software tool-flow already provided by CASPER, as well as the tools developed for the acquisition and processing of the signals.

V.2021-04-28T12:03:24.618202