Universidad de Valparaíso CHILE

Instituto de Física y Astronomía
Facultad de Ciencias, U. de Valparaíso

INSTITUTO FISICA Y Astronomía

SEMINARIOS ASTROFISICOS

Lista de seminarios astrofísicos para Profesores, Postdocs, alumnos de Postgrado y Pregrado

Sala Juan Mouat, Facultad de Ciencias, Gran Bretaña 1111, Playa Ancha, Valparaíso.

Año 2016

Martes 12 de Enero, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Rodrigo Herrera, Max Planck Institute for Extraterrestrial Physics, Heidelberg
"Probing the multiphase interstellar medium in nearby galaxies trough far-IR spectroscopy"
Herschel and SOFIA observations of nearby galaxies provide an unprecedented opportunity to study the interaction between stars, dust and gas in the multi-phase interstellar medium (ISM). This knowledge is crucial for connecting the local, detailed Galactic observations with those of distant galaxies observable with ALMA, where far-IR cooling lines are one of the primary tracers of their ISM. Based on the largest sample to date of spatially-resolved, infrared observations of nearby galaxies drawn from the KINGFISH and "Beyond the Peak" surveys, in this talk I will discuss: (1) the properties of the low-excitation ionized gas as traced by the [NII] 122 and 205 um transitions, (2) the role of the [CII] 158 um fine-structure line as the major coolant for the neutral atomic gas, and the reliability of the [CII] and [NII] transitions as tracers of the star formation activity, and (3) the first large set of direct measurements of the cooling rate and thermal pressure of the diffuse, atomic-dominated gas (including the comparison to predictions from a two-phase ISM model in thermal equilibrium and self-regulated star formation).

Martes 19 de Enero, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Sylvestre Lacour, bservatorio de Paris, Francia
"GRAVITY: Latest results from commissioning"
The new GRAVITY instrument is a four telescope beam combiner installed at the VLT Interferometer. The main novelty of the instrument is the presence of a fringe tracker, the equivalent of an adaptice optics for the interferometer. It allows long integration times on a faint target, and therefore, high spectral resolution (~4000). The instrument is currently commissionned on the ATs at Paranal. It is scheduled to be offered for P98. I will present the latest results, and encourage you to ask questions if you are thinking of applying to the next ESO Call for Proposal.

Lunes 25 de Enero, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Víctor Sánchez Béjar, IAC Instituto de Astrofísica de Canarias, IAC
"Young Superjupiters"
Since the discovery of the first isolated planets in Orion and the planetary mass companion around 2M1207, a large sample of young low-mass brown dwarfs and superJupiters have been directly imaged both in the field and in young open clusters and associations. This seminar will review the main characteristics of these substellar objects and try to explain their evolution from recent discoveries of young superJupiters in the star formation regions of Orion, Upper Scorpius and Pleiades, as well as wide companions to young nearby stars. These objects are much easier to characterize than planets in close orbits and may shed light on the mechanism of planetary formation, as well as being key to understand the physical properties of extrasolar planets detected by other techniques.

Martes 22 de Marzo, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Stefan Dreizler, University of Goettingen, Alemania
" A spectroscopic census of galactic globular clusters with MUSE"
For a long time globular clusters have been recognized as simple objects - consisting of a single stellar population that was formed several billion years ago. However, over the last year high-resolution photometric and spectroscopic studies have shown that at least two stellar populations exist in almost all globular clusters. This discovery raised new questions - for example, if the different populations show distinct dynamical properties. Despite the short relaxation times of most clusters, there is evidence that the abundance of binary stars is lower in the second that in the primordial population. It is not only the question of multiple populations where binary stars play an important role for our understanding of globular clusters. Another example is their influence on the timescale at which the cluster undergoes core collapse. In addition, binaries allow one to investigate the spatial distribution of stellar remnants, such as neutron stars or black holes. Their distributions strongly affect the central kinematics of the clusters and hence are important to answer the question if globular clusters host intermediate-mass black holes. With masses in the range of 100 to 10,000 solar masses, these objects would fill the gap between stellar black holes and the supermassive ones that are found in the centre of galaxies. Answering the questions raised above is only possible by acquiring large spectroscopic samples of cluster stars. With the development of techniques that strongly enhance the efficiency of spectroscopic observations in globular clusters this now allows us to obtain and analyse samples of 10,000 stars per cluster in moderate observing times. Currently we are conducting a large programme (about 100 hours of observing time) with MUSE that targets 25 Galactic globular clusters with the aim of addressing these points.

Martes 05 de Abril, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Eric Feigelson, Penn State University, USA
“Astrostatistics: The Role of Statistics in Astronomical Research"
For centuries, astronomy and statistics were closely allied fields of study, but they diverged in the 20th century. The results was a weakening of methodology in astronomy, both in broad understanding of modern statistical concepts and detailed knowledge of the vast range of statistical procedures. A nascent field of astrostatistics is now emerging to synergize these capabilities with astronomical research challenges including the advent of Big Data from survey telescopes. Conferences, Summer Schools, textbooks, and the comprehensive R statistical software environment are now available to improve our community's knowledge and usage of modern statistics.

Martes 03 de Mayo, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Ronald Mennickent, Universidad de Concepcion
“Recent research on the interacting binaries Double Periodic Variables (DPVs) and W Serpentis"
A summary of observational data of close interacting binaries DPVs and W Serpentis stars is given, searching for a link between both classes of objects. To understand these systems, the concepts of Roche lobe overflow, stream tangential impact and stellar spin-up turn to be of fundamental importance. Recent results are presented, including the first Doppler tomography of Balmer emission lines at the high and low stage of the long cycle and the finding of new DPVs in our Galaxy.

Martes 10 de Mayo, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Pedro Escárate, Universidad Federico Santa María
“Astroingeniería"
Adaptive optics (AO) is a well-known technology that compensates image distortions induced by atmospheric turbulences and low frequency vibrations. Currently the vast majority of 8 meters class telescopes are now equipped with adaptive optics systems and will be an integral component in the next generation of telescopes and astronomical instruments. Despite the significant advances in astronomical instrumentation and adaptive optics, some problems still persist during the operations. In particular, achieving a satisfactory performance in front of mechanical vibrations progressively more important.

Martes 24 de Mayo, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Rodrigo Hinojosa, Instituto Astrofísica de Las Canarias, Tenerife, España
“Starburst galaxies in COSMOS"
Massive (>10^8 Msun) kpc-size clumps of star formation have been observed in the last years, principally for galaxies with z > 1 using the high spatial resolution images of the HST. In the local universe star formation proceeds on scales less massive, in the order of ~ 10^5 Msun for giant HII regions. These clumps of star formation observed at

high redshift have been studied as the stones of physical processes, and also as the building blocks of bulges, which is still unclear. In this talk I will show a sample of starburst galaxies at 0z.5 found in the COSMOS survey, some of them with two or ore star-forming clumps (~25%), trying to bridge the gap of the knowledge between local and high redshift star formation. I will focus this talk in two blocks:
1) The search of starburst galaxies in COSMOS and their principal features.
2) The analysis of the clumps of star formation in this sample.

Martes 31 de Mayo, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Daniel Faes, European Southern Observatory, ESO, Chile
"The rich Be star phenomenology and its modeling: unveiling the recent active phase of Achernar"
Be stars are main-sequence fast-rotating stars that display a circumstellar emission. This emission is regarded as originated from a disk, formed by episodic mass-loss episodes from the star. Here I report our observational campaign of the Be star Achernar in its current active phase, that started in 2013 after a period of 6 years in a disk-less quiescent phase. Our dataset includes spectroscopy, broad-band polarimetry and optical long baseline interferometry - a technique capable of resolving stars and their circumstellar environments at the milliarcsecond (mas) resolution level. Using VLTI AMBER and PIONIER data, we report the first spectro-interferometric follow-up of the evolution of a Be disk. These data are interpreted in the light of the VDD (Viscous Decretion Disk) model and radiative transfer simulations of the HDUST code. I will comment on this and other modeling efforts currently being in development at the BeACoN group at the IAG-USP (Brazil), such as the BeAtlas project, which aims at understanding the rich Be phenomenology and the physical processes driving it.

Martes 21 de Junio, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Méderic Boquien, Universidad de Antofagasta, Chile
"Everything you always wanted to know about measuring star formation in galaxies but where afraid to ask"
Knowing when, where, and how stars form across cosmic times is key to fathom the formation and the evolution of galaxies. But are we so sure we measure star formation rates precisely and accurately? Shouldn't we actually worry about how we get star formation rates? In the first part of this talk, I will show that if many star formation rate estimators are now available across the electromagnetic spectrum, they each possess their own caveats and often provide us with an inconsistent view of star formation in galaxies. In particular, I will describe the sometimes startling effect of old stars on star formation rates estimates and the worrisome impact of some (surprisingly) strong assumptions behind some popular star formation rate estimators. In a second part I will present a new effort to build modern and resilient star formation rate estimators. I will focus on the so-called hybrid estimators that combine the ultraviolet emission from short-lived massive stars and the emission of the dust heated by these stars. Using the CIGALE multi-wavelength modeling tool, I will show that we can build adaptive star formation rate estimators that make them immune to some of the issues plaguing classical hybrid star formation rate estimators.

Martes 28 de Junio, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Yara Jaffe, European Southern Observatory
"How to kill a galaxy"
In a hierarchical Universe galaxy clusters grow via the accretion of galaxies from the field, groups and even other clusters. As this happens, galaxies lose their gas reservoirs via different mechanisms, eventually quenching their star-formation. One of the most effective mechanisms in clusters is ram-pressure stripping by the intra-cluster medium. I will present recent results from multi-wavelength observations of $z<0.2$ clusters that are helping to constrain the efficiency, time-scale, and consequences of stripping. In particular, I will present a phase-space analysis of HI-stripping and star formation in cluster galaxies, and show recent MUSE/VLT observations of the most extreme examples of stripping, the so-called "jellyfish galaxies".

Martes 12 de Julio, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. David Jones, Center for Astrophysics on La Palma (CALP), Instituto de Astrofísica de Canarias (IAC)
"Cosmic butterflies: the product of tempestuous stellar marriages"
Planetary nebulae are some of the most strikingly beautiful astrophysical phenomena known, gracing many a glossy-paged, coffee-table book and earning them the nickname "cosmic butterflies". It is now clear that a significant fraction of these objects originate from a binary evolutionary pathway, with some theories even going as far as to say that binarity may be a prerequisite for all but the most massive stars to form a planetary nebula. In this seminar, I will begin by outlining some fundamentals of close binary evolution and how they relate to the formation of planetary nebulae. I will then go on to discuss some of our most interesting results, what they can tell us about the common

envelope phase of close binary evolution, and the growing connections between these systems and other binary phenomena including novae and supernovae type Ia.

Martes 23 de Agosto, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Cristian Eduard Rusu
"H0LiCOW: H_0 Lenses in COSMOGRAIL's Wellspring"
Gravitationally lensed quasars with measured time delays between the multiple images are a powerful probe of cosmology. In particular, the time-delay distances from such systems are primarily sensitive to the Hubble constant H_0, and completely independent of the local distance ladder measurements. H0LiCOW is a program aimed at measuring H_0 from five such systems with high quality data such as: deep HST imaging as well as spectroscopy for the lens mass modeling, wide-field imaging and spectroscopy to characterize the lens environment, as well as time delays inferred from about a decade of monitoring. The analysis is currently complete for 3/5 systems, resulting in a 3.8% precision on H_0 in a flat Lambda-CDM cosmology. I will present the recent series of papers detailing the H0LiCOW technique, as well as its power to break degeneracies when compared to other cosmological probes, in more general cosmological models.

Martes 30 de Agosto, 2016
Sala Juan Mouat de la Facultad de Ciencias.
Dr. Enrico Schiappacasse, Institute of Cosmology-Tufts University
"Oscillating scale factor in an expanding universe: graviton creation and cosmological implications"
We treat quantum creation of gravitons by small scale factor oscillations around the average of an expanding universe. Such oscillations are predicted both by modified gravity theories with a term proportional to the square of the Ricci scalar in the gravitational action, and by semiclassical gravity in which a renormalized expectation value of a quantum matter stress tensor is the source of gravity. A perturbative method due to Birrell and Davies involving an expansion in a conformal coupling parameter is used. We obtain expressions for both the number and energy density creation rates on an average background of flat spacetime. We extend our analysis to an expanding universe, including two effects: damping on the metric oscillations and density dilution and redshifting of the created gravitons. We use the equivalence between f(R) theories and the scalar tensor gravity to analyze the behavior of the scale factor in an expanding background spacetime. We find that the oscillation frequency in comoving time is unchanged, but the amplitude of the oscillations decays. Cosmological constraints on the present graviton energy density are discussed, which indicate an upper bound of the order of 4% of the total mass-energy density of the universe. This constraint leads to an upper bound on the dimensionless amplitude of the oscillations. We also discuss decoherence of quantum systems produced by the spacetime geometry fluctuations due to such a graviton bath, and find a lower bound on the decoherence time resulting from this process.

Martes 06 de Septiembre, 2016
Sala Juan Mouat de la Facultad de Ciencias
Dr. David Valenzuela Díaz, Pontificia Universidad Católica de Chile
"Algunas aplicaciones de QED_2+1 y SUSY a la física del Grafeno"
En esta charla abordaremos la física cuántica relativista aplicada a la física del Grafeno como medio corroborativo, pues cerca de sus puntos de Dirac se recrea un escenario relativista en donde los electrones se mueven a velocidad máxima constante $v_F \cong 10^6\, m/s$. En este sentido trataremos dos grandes temáticas: Electrodinámica cuántica en el plano y colapso atómico.
En el primer tema hablaremos del fenómeno de la absorción de luz que se produce cuando una onda electromagnética incide perpendicularmente en una lámina, de Grafeno, sometida a un campo magnético débil perpendicular a ella. Para ello calcularemos el tensor de polarización del vacío usando el propagador de Schwinger restringido a 3 dimensiones y expandido para campo magnético débil. De esta forma calcularemos la intensidad trasmitida de esa onda al traspasar la lámina. También veremos algunos efectos asociados a la absorción de luz, como son el efecto Hall y la rotación de Faraday.
En el segundo nos centramos en el colapso atómico vía impurezas eléctricas visto desde mecánica cuántica super simétrica. Éstas corresponden a cargas eléctricas regulables, donde se busca inducir el colapso por medio de esta carga. Una vez colapsado el átomo descubriremos que la unitaridad del sistema se pierde, lo que quiere decir que la probabilidad no se conserva.

Martes 27 de Septiembre, 2016
Sala Juan Mouat de la Facultad de Ciencias
Dr. Johan Oloffson, Instituto de Física y Astronomía, Universidad de Valparaíso.
"From dust to planets: debris disks evolution"
Circumstellar disks are the birthplaces of giant and terrestrial planets, and their respective evolution are intimately connected. With thousands of exoplanets discovered, it seems clear that planetary formation is an efficient process. And yet, from an observational point of view, we barely scratched the surface of how planets form. A promising strategy to address such a challenging question is to study the disks at key stages of their evolution, when planet formation is thought to happen. The motivation of my research is to constrain how circumstellar disks evolve within the first 100 Myr, and thus better understand the conditions in which planets can form. In this talk, I will present the research project that I will lead as the Max Planck Tandem Group Leader in Valparaiso. This project aims at connecting disk and planet studies, with a clear emphasis on addressing the outcomes of giant planetary formation and possibly on-going terrestrial planet formation in young (10-100Myr) debris disks.

Jueves 29 de Septiembre, 2016
Sala Juan Mouat de la Facultad de Ciencias
Maria José Guzmán, Instituto de Astronomía y Física del Espacio, CONICET-UBA
"Modified teleparallel gravity and cosmology"
Modified teleparallel gravity, also called f(T) gravity, is a modification of the teleparallel equivalent of general relativity, which describes gravitational phenomena in terms of the tetrad field instead of the metric tensor. T is the torsion scalar made up of the Weitzenböck connection, which is curvatureless and represents a spacetime with absolute parallelism. f(T) gravity was born from the same motivations than f(R): by writing the most general action for general relativity, but now starting from an alternative teleparallel framework to describe gravitation. Modified teleparallel gravity has novel features as second-order equations of motion (unlike other modified gravities) and more extra degrees of freedom with respect to general relativity. It also has interesting cosmological solutions, which provide alternative interpretations for the accelerating phases of the universe. We will introduce the main features of teleparallel gravity and its modifications, paying particular attention to the issue of degrees of freedom.

Martes 18 de Octubre, 2016
Sala Juan Mouat de la Facultad de Ciencias
Nelson Braga, Universidade Federal do Río de Janeiro
"Discussing the relation between Strong Interactions and String Theory"
We know from experimental observations that there is a very large number of particles that are subject to the strong interaction. These particles are called hadrons. They are actually not elementary articles, in the sense that they have an internal structure with more fundamental constituents, the quarks and gluons. The interactions of quarks and gluons is governed by a Quantum Field Theory called QCD. This theory makes it possible to understand some important aspects of the strong interactions but up to this moment we do not know how to describe the confinement of quarks and gluons and the formation of bound states. In order to study this aspects one can use String Theory. In this seminar we will discuss the relation between String Theory and QCD. We will talk about the so called AdS/CFT correspondence and some applications like the calculation of the hadronic spectra.

Martes 15 de Noviembre, 2016.
Dr. Cristian Saez Korea Astronomy and Space Science Institute (Republica de Corea)
""Two studies of gravitational lensing addressing totally different phenomena"
In this talk I plan to describe our two latest gravitational lensing studies. In the first study (Misawa, Saez et al 2016), we try to constrain the physical size of the region were quasar winds are located using the multi-imaged lensed quasar SDSSJ1029+2623. This is accomplished through the use of multi-sightline spectroscopy which consist on performing spectral follow-up of two images of SDSSJ1029+2623 with Subaru HDS and VIMOS UVES.
In the second study (Saez et al 2016), we try to constrain better the dark matter profile that describes galaxy clusters. For this purpose, we use a novel statistical approach based on the analysis of a large
sample of galaxy clusters.

Martes 6 de diciembre, 2016
Sala Juan Mouat de la Facultad de Ciencias
Margherita Talia Universitá Degli Studi Di Bologna (Italia)

"An introduction to the VANDELS survey and a science case: study of galactic-scale outflows in high-z AGN"

To Reproduce the properties of galaxies in the local universe, as well as the scaling relations between host galaxies and black holes properties, many galaxy formation models invoke the presence of fast and energetic winds extending over galaxy scales. Blue- shifted inter- stellar medium (ISM) absorption lines in the uv regime have been observed in the galaxies at all redshifts and are usually interpreted as evidence of material moving towards our line of sight. Massive gas outflows can be powered either by star-formation (SF) or agn activity, tougth the relative dominance of efficiency of the diferent mechanisms is not yet fully understood. In order to shed more light over this issue we z>1.7 from optical spectroscopic surveys (Zcosmos, vuds, eso public surveys), complemented with HST imaging and X-RAY (CHANDRA) collected a large sample of AGN and SFGS at data. Through spectroscopic stacking tecniques we measured velocity off sets of -150 km/s for the AGN is boosting the outflow up to velocities thar could not be reached only with the contribution by activity.