



**Universidad
de Valparaíso**
CHILE

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



SEMINARIOS ASTROFISICOS

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

Auditorio 11-A, Facultad de Ciencias, Gran Bretaña 1111, Playa Ancha, Valparaíso.

Año 2009

Abril 3, 2009, 14.00 hrs.

Dr. Tomás Verdugo, Universidad de Valparaíso

"Laes a través de lentes gravitatorias"

En esta charla presentaré dos modelos de lentes gravitatorias fuertes para los cúmulos de galaxias MS2053 y MS0440, realizados con el código LENSTOOL. Seleccionando los mejores modelos de ambos cúmulos y aprovechando el efecto de amplificación de estos objetos, hemos construido una estadística para fuentes lenteadas. Para ello simulamos seiscientos mil fuentes entre $1 < z < 7$ distribuidas según las funciones de luminosidad para LAES y Ly α -blobs. Encontramos que la función de luminosidad se transmite a la probabilidad de encontrar emisores lenteados con una amplificación mayor a 10, preservándose incluso el corrimiento al rojo para el máximo de las dos funciones. De esta manera resulta posible en principio estudiar ambas poblaciones de objetos y mostrar si existe una asociación entre ambos fenómenos.

Abril 27, 2009, 14.00 hrs.

Dr. David Floyd, OGIW, Observatorio Las Campanas

"Examining Quasar Accretion Discs through Microlensing"

I present a novel method of constraining AGN emission region size and emission mechanism, using recent optical–NIR imaging from the Magellan telescopes of “anomalous” lensed quasars. Anomalous lensed quasars have an image pair in which one of the images is unusually (“anomalously”) dim. We rule out millilensing and partial obscuration as causes for the anomalous flux ratio in each of our quasars, leaving microlensing as the only plausible alternative. We generate magnification maps for each image using a range of smooth-to-clumpy matter fractions. We then randomly select source positions on the map and calculate the magnifications of a set of Gaussian sources of varying width. We are thus able to constrain statistically, both the proportion of smooth-to-clumpy lensing material, and the size of the emitting region of the lensed source. Using this technique we have probed down to unprecedented scale lengths in the central engine (< 7 light days in r' band) and have begun to explore the change with wavelength. We find clear evidence of a decrease in source size with wavelength, and can place meaningful constraints on possible emission mechanisms. The alpha-disk prescriptions (e.g. Shakura-Sunyaev 1973, Gaskell 2008) are strongly excluded.

Mayo 11, 2009, 14.00 hrs.

Dr. Nicolas Lodieu, Instituto de Astrofísica de Canarias, España

"Latest results from the UKIDSS Galactic Clusters Survey: the IMF of 4 young clusters and star-forming regions"

In this seminar, I will focus on the latest results obtained from the UKIRT Infrared Deep Sky Survey (UKIDSS) Galactic Clusters Surveys (GCS) in 4 regions: Pleiades (125 Myr; 130 pc), IC 4665 (27 Myr; 350 pc), Upper Sco (5 Myr; 145 pc), and sigma Orionis (3 Myr; 352 pc). I will briefly describe the UKIDSS survey and the GCS component. Then, I will detail the photometric and proper motion selections used in each region to identify very low-mass star ($M \leq 0.5 M_{\text{sun}}$) and brown dwarf member candidates. Finally, I will compare the mass functions in the 0.5-0.03 M_{sun} mass range with the field mass function derived by Kroupa (2002) and Chabrier (2003). I will discuss the similarities and differences.

Mayo 29, 2009, 14.00 hrs.

Dr. Mark Gieles, ESO

"The Universality of the Globular Cluster Mass Function - Can Dynamical Evolution Explain It?"

The young massive clusters (YMC) observed in the star-burst environments such as the "Antennae" galaxies are thought to be the progenitors of globular clusters (GCs) that are found in almost all galaxies. The respective mass functions (MF), however, are strikingly different: YMCs form with a power-law MF with an index of -2, while the GCs have a typical mass of $\sim 200,000 M_{\text{sun}}$. The most popular explanation is that the low mass GCs have been eroded by tidal disruption over the course of nearly a Hubble time. Dynamical models predict that indeed a power-law MF can be converted into a bell-shaped MF, but they also show that the turn-over mass depends on the strength of the tidal field. This is at odds with the empirical finding that the turn-over mass in the GC MF is independent of environment (galacto-centric distance and/or galaxy type). To overcome this problem, an analytical model was recently introduced in which the mass-loss rate scales with cluster density, that is, the internal relaxation dominates the evolution and sets the mass loss rate. I present result from a large set of N-body simulations with which we study this. The rather surprising result is that for a cluster of a given mass at a given orbit, the dissolution time is independent of its radius, and hence density. This is due to a balance between internal relaxation and the effect of the tidal field, which have an opposite effect, but of similar magnitude, on the mass loss rate of clusters with different radii. It implies that the cluster dissolution time depends only on cluster mass and angular velocity around the galaxy centre, which makes it hard, if not impossible, to explain the universality of the GCMF by dynamical evolution. Several alternatives, based on existing theories on the early evolution of clusters, will be discussed.

Junio 5, 2009, 14.00 hrs.

Dra. Paulina Lira, Universidad de Chile

"AGN Variability"

Variability is one of the most important and recognizable traits in Active Galactic Nuclei (AGN). Variations allow us to determine characteristic time scales and the system size. Some time scales can in fact be related to basic physical properties of the systems. In this talk I will review what can be learnt from studying flux variations in AGN and present a progress report on 2 projects: one that seeks to determine the Black Hole mass in high-z AGN and another which is trying to further understand the accretion process in Active Nuclei.

Junio 12, 2009, 14.00 hrs.

Dr. Saurabh Sharma, Universidad de Valparaíso

"Galactic open star clusters: star formation and IMF"

High-mass star forming regions have been known for many years as OB associations and HII regions and they have been observed quite extensively on various aspects. However, the census of low mass stars in such regions has not been possible until recently. Recent advancement in

detectors have permitted the detection of substantial population of low mass stars in OB associations. In this talk, I will discuss the comprehensive multi-wavelength study of young star forming regions containing the low mass pre-main sequence stars to understand the scenario of star formation in greater details. Deep optical and near-infrared imaging of star forming regions in broad (UBVRIJHK) & narrow bands (H α ; [S II], molecular hydrogen & Brakett gamma), spectroscopic observations along with mid- & far-infrared (MSX, Spitzer, IRAS-HIRES), X-ray (Chandra and xmm) and radio (VLA-NVSS) archival data set is used to study the star formation and age spread in young star forming regions, Effect of massive star(s) on star formation, Initial mass function at stellar/sub stellar mass range and K-band luminosity function.

Junio 17, 2009, 14.00 hrs.

Dra. Diah Y.A. Setia Gunawan,

"Cygnus OB2 association at 1400 and 350 MHz: In search of massive colliding-wind binaries"

A radio continuum survey at 1400 and 350 MHz using the Westerbork Synthesis Radio Telescope (WSRT) of a region of $2^\circ \times 2^\circ$ centered on the Cygnus OB2 association is presented. The resulting 5 σ flux-density limits of, respectively, ~ 2 mJy and ~ 10 -15 mJy are a significant improvement over previous surveys. More than 200 discrete sources with sizes less than $1.9 \times$ beam (beam size) were detected, 98 of which at both frequencies. We also detected 28 resolved sources (sizes $> 1.9 \times$ beam) still having well-defined peak intensities. The observed spectral index and source count strongly suggest an excess of sources of Galactic origin in the direction of Cyg OB2. Positional coincidences of the detected sources in our list were checked against other radio, infrared, and optical objects from various surveys by using the likelihood ratio (LR) method. Furthermore, we looked for objects that show characteristics of either optically thick stellar winds or non-thermal emission and/or variable spectral flux density. More than 100 identifications were found. Of the unidentified sources, $\sim 2/3$, show characteristics of sources of Galactic origin, ~ 10 of which may be stars. The remaining unidentified sources are probably of extragalactic origin.

Junio 26, 2009, 14.00 hrs.

Dra. Karen Kinemuchi, Universidad de Concepci n

"Probing the Outer Halo Galactic Formation: The new SDSS dSphgalaxies and their variable stars"

With the discovery of new dwarf spheroidal galaxies from the Sloan Digital Sky Survey, we have a larger pool of possible candidate objects that may have influenced the formation of our Galaxy. We studied six of these new galaxies for their variable star content, specifically for the RR Lyrae variables. RR Lyrae variable stars, which belong to an old stellar population, are effectively eyewitnesses to the formation of the Galaxy, as well as useful distance indicators. I will discuss our results from our studies for six of these dwarf galaxies.

Julio 10, 2009, 14.00 hrs.

Lic. Melina Bersten, Estudiante de doctorado Universidad de Chile

"Modelos hidrodinamicos de Supernovas de Tipo II Plateau"

I will present a study of the main physical parameters that influence the light curves of supernovae type II plateau (SNe II-P) using a newly developed hydrodynamical code. Two main reasons motivate our work. First, the few existing general studies of SN-II-P light curve modeling are based on simplified assumptions and are difficult to relate with observations. Second, the availability of a large database of highly precise and well-sampled observations of SN II-P from ongoing surveys such as the CSP affords a unique opportunity to characterize the properties of such objects.

Julio 15, 2009, 14.00 hrs.

Dr. Rainer Schödel, Instituto de Astrofísica de Andalucía, España
"The star cluster at the center of the Milky Way"

The Galactic center is a unique target for studying the properties of the nuclei of galaxies in general. The supermassive black hole, Sagittarius A*, that is located at the dynamical center of the Milky Way is surrounded by the densest and most massive star cluster of our Galaxy. In this talk I will focus on the most recent results of research on the structure and kinematics of the Milky Way's nuclear star cluster. Adaptive optics imaging is a necessary pre-requisite for this kind of work, which relies heavily on imaging data taken with NACO at the ESO VLT. In the past years enormous progress has been made in our understanding of the Galactic center. However, it is also surprising that several fundamental aspects of the nuclear star cluster have yet to be explored.

Agosto 7, 2009, 14.00 hrs.

Dra. Carol A. Grady, Eureka Scientific and Goddard Space Flight Center
"Recent Advances in the Study of Protoplanetary Disks"

As stars form, high angular momentum material cannot immediately accrete onto the protostars, and forms circumstellar disks. While molecular gas initially dominates the mass of circumstellar disks, by 8-12 million years, the remnant dust disks show signs of dynamical sculpting by Jovian-mass planets. While the overall timescale for the transformation of disk material is now clear, how circumstellar disks clear away the bulk of their material is still not well-understood. In this talk, I review our understanding of circumstellar disks, and in particular, how the combination of integrated-light photometry and spectroscopy coupled with high contrast imaging of the disk allows us to constrain disk properties. Multi-epoch imaging of a few systems has revealed unexpected changes in the visibility of the outer disk which are tentatively linked with changes in the amount and geometry of material within 1 AU of the star.

Agosto 21, 2009, 14.00 hrs.

Dr. Alberto Rebassa, Universidad de Valparaíso
"Actividad magnética en estrellas secundarias de baja masa"

In this talk I report on the analysis of magnetic activity in white dwarf-low-mass main sequence binaries. The seminar focuses on three different issues. The first is the comparison between the activity fractions at a given spectral type in both field M-dwarfs and M-dwarfs that form part of a binary system. In the second part I discuss whether the calculated secondary star distances can give insight on the magnetic properties of these companions. Finally I provide an empirical spectral type-radius relation for low-mass stars that is compared both to the theoretical expectations, and a compilation of directly measured low-mass radii.

Septiembre 4, 2009, 14.00 hrs.

Dr. Alessio Romeo, Universidad Andres Bello
"Evolution of the galaxy Red-Sequence in cosmological simulations of clusters and groups"

The Colour-Magnitude relation is a useful tool to study the evolution of elliptical galaxies, helping to estimate the relevance of passive over dynamical (mergers) evolution of their stellar populations. By means of cosmological and hydrodynamical simulations, we studied the building of the Red Sequence in clusters and groups, confirming that it is mostly driven by the specific star formation rate: galaxies move to the RS as they get aged and redder and eventually set upon a "dead sequence" once they have stopped their bulk star formation activity, perhaps as a result of mechanisms related to AGN feedback.

Septiembre 9, 2009, 14.00 hrs.

Dra. Nidia Morrell, Las Campanas Observatory
"Binarias Masivas"

Las estrellas masivas son objetos inusuales que se forman en menores cantidades y viven vidas mucho más cortas que las de las estrellas menos masivas. Además, se encuentran con frecuencia en regiones muy oscuras, difíciles de acceder a las observaciones Ópticas. Por estos motivos el conocimiento de sus parámetros fundamentales es impreciso. Entre esos parámetros, la masa juega un papel determinante sobre las características y la evolución de esas estrellas. El único método empírico de determinar masas estelares es el análisis simultáneo de curvas de luz y velocidad radial de binarias eclipsantes de espectro doble. Hasta el momento, las mayores masas "medidas" con este método rondan las 100 masas solares, siendo algo inferiores al límite superior estimado estadísticamente para las masas estelares. Un hecho curioso es que, para las estrellas más masivas, las masas predichas por los modelos evolutivos son frecuentemente más grandes (hasta un factor 2) que las derivadas del ajuste de modelos de atmósferas a los espectros observados de esas estrellas, un efecto conocido como la "discrepancia de masas". La multiplicidad no detectada es una de las grandes causas de incertezas en las determinaciones de masa, pues hace que objetos múltiples aparezcan como objetos simples de mayor luminosidad, y por lo tanto, de mayor masa evolutiva. En esta presentación se describirán brevemente algunos de estos problemas, avances realizados recientemente en el estudio de binarias con componentes masivas, y proyectos dedicados a estudiar la multiplicidad de objetos con espectros O y WN, la discrepancia de masas y la determinación empírica del límite superior de masas estelares.

Octubre 2, 2009, 14.00 hrs.

Dr. Roberto Muñoz, Universidad de Valparaíso

"The growth of the red-sequence in clusters since $z \sim 1$ " ("El desarrollo de la secuencia roja en cúmulos de galaxias desde $z=1$ ")

Galaxy clusters are gravitationally bounded structures in the Universe, which are inhabited by several thousands of galaxies in a very small region in the sky and filled by a hot X-ray emitting gas. The central megaparsec of clusters is dominated by early type galaxies, which are observed to obey tight empirical scaling relations as the Fundamental plane and the Red-sequence. For many years the red-sequence in clusters has been thought to be in place since very early cosmic times, but recent works have found a deficit of faint red-sequence galaxies in clusters at $z > 0.4$. In this work, we present deep J_s and K_s-band imaging of 15 galaxy clusters at $z \sim 1$, which were discovered in the Red-Sequence Cluster Survey (RCS-1) and followed up using the VLT/ISAAC instrument. The K_s-band luminosity function (LF) for the composite cluster was derived down to $M^* + 2.5$ through the application of a statistical background subtraction method, and it can be described by a Schechter function with $K_s^* = 18.82$ and $\alpha = -0.42$. Furthermore, we built the color-magnitude diagram for the composite cluster at $z \sim 1$, and found that the ratio of luminous-to-faint red-sequence galaxies evolves as function of redshift. Our results suggest that bright cluster galaxies formed most of their stellar content at $z_f = 3$, that faint cluster galaxies are still forming stars at $z = 1$, and that the red-sequence is not yet fully in place at $z = 1$.

Octubre 6, 2009, 14.00 hrs.

Dr. Ralf-Juergen Dettmar, Director del Instituto de Astronomía de la Universidad Ruhr de Bochum, Alemania y presidente de la "Astronomische Gesellschaft" (Sociedad Alemana de Astronomía)

"Gaseous Halos of Spiral Galaxies and the Interstellar Disk-Halo Connection"

Multi-wavelength studies of edge-on disk galaxies show the presence of the various phases of the interstellar medium (ISM) in galactic halos. This includes the ionized gas, the hot medium, as well as the cosmic ray component coupled to the large scale magnetic field. The properties of these ISM components in halos are discussed in the framework of the disk-halo interaction, the large scale circulation of matter in a supernova driven ISM.

Octubre 16, 2009, 14.00 hrs.

Dr. Rodrigo Parra, Staff Astronomer Atacama Pathfinder Experiment (ALMA)

"Observing Starburst Activity at radio and mm Wavelengths"

I will show results obtained with two (very) different types of instruments. First, I will talk about recent radio interferometric observations of the prototypical ULIRG Arp220 and how we can use such data to infer what's really going on in the hidden nucleus of this remarkable object. Then I will show our new sub-mm spectroscopy data obtained from observations towards the southern starburst NGC253 and elaborate on how this information can be used to learn about the ionized gas inside its obscured nucleus.

Octubre 30, 2009, 14.00 hrs.

Dr. Nelson Zamorano, Universidad de Chile

"Una introducción a la teoría de branas y algunos resultados recientes"

Desde hace ya más de una década se han instalado unos objetos geométricos que describen un universo con más de 4-dimensiones y que han levantado nuevas posibilidades a las cuales recurrir en la descripción del cosmos. Para comunicar -sin recurrir a un exceso de tecnicismos-, las propiedades básicas de una nueva solución que hemos encontrado y que describe un tipo de branas, recurriremos a las herramientas geométricas. Simultáneamente describiremos un mecanismo que posibilita la generación de nuevas soluciones a partir de otras conocidas. Estos dos elementos nos permitirán resumir la descripción de esta nueva solución, utilizando el comportamiento de las geodésicas que se generan en esta geometría. Finalizaremos mencionando las preguntas que permanecen sin respuesta y los posibles caminos a seguir a partir de este resultado.

Noviembre 23, 2009, 14.00 hrs.

Dr. Félix Mirabel, Comisión de Energía Atómica, Francia & CONICET, Argentina

"Agujeros Negros en el Universo"

En esta conferencia se presentarán las evidencias que se han obtenido en los últimos años sobre la existencia de agujeros negros en el universo a través de sus tres manifestaciones como cuasares, microcuasares y fuentes de destellos gamma. Luego se describirán los fenómenos observados en las inmediaciones de estos objetos, algunos de los cuales pueden ser utilizados para contrastar por esas observaciones las teorías físicas en el límite de los campos gravitacionales más intensos. Finalmente se describirá el rol que han tenido los agujeros negros en la evolución de las estructuras cósmicas.

Diciembre 2, 2009, 14.00 hrs.

MSc. Liliana Hernández-Cervantes, Instituto de Astronomía, UNAM.

"Nuevas Tecnologías de la Información vs Observatorios Virtuales Astrofísicos"

Uno de los principales retos que tiene actualmente la investigación en astrofísica es el manejar y analizar el crecimiento exponencial y complejidad de datos observacionales, junto con el enorme volumen de resultados computacionales que se han generando en todo el mundo en las últimas décadas. El concepto de Observatorio Virtual (OV) es la mejor respuesta a este problema, ya

que permite el acceso transparente y distribuido de las bases de datos a través del Internet, además de proporcionar poderosas herramientas para analizarlos y visualizarlos. En esta charla hablaremos de la importancia que tienen las nuevas tecnologías de la Información en el desarrollo de los Observatorios Virtuales Astrofísicos.

Diciembre 3, 2009, 14.00 hrs.

Dr. Alfredo J. Santillán, Centro de Cómputo-DGSC, UNAM

"Turbulencia en las partes externas de galaxias espirales"

Es sabido que muchos procesos físicos pueden estar asociados a la turbulencia que se produce en los discos galácticos. El hidrógeno neutro que se observa en discos de galaxias espirales puede proporcionar información valiosa sobre la eficiencia y dominio de los diversos procesos físicos a diferentes radios galácticos. Varios de estos mecanismos físicos pueden producir turbulencia aun cuando no exista formación de estrellas, por ejemplo, inestabilidades hidrodinámicas, interacción de pequeñas nubes satélites con las galaxias, etc. En esta plática presentaremos simulaciones numéricas magnetohidrodinámicas para estudiar la interacción de nubes de alta velocidad con las partes externas de discos galácticos. Con nuestras simulaciones demostraremos que una lluvia de pequeñas nubes de alta velocidad, además de estar alimentado al disco de material, es un excelente mecanismo para producir movimientos aleatorios en las partes externas de discos galácticos.

Diciembre 4, 2009, 14.00 hrs.

Dr. José Gallardo, Universidad de Chile

"Estudios de evolución temprana de estrellas de baja masa"

Uno de los escenarios más aceptados durante la formación de objetos estelares y sub/estelares corresponde a que material circumestelar es acretado por un periodo de alrededor de 1 millón de años. En la charla se discutirán fenomenológicamente este proceso y resultados teóricos del efecto de la acreción en la evolución de estrellas, particularmente de baja masa y en objetos sub-estelares en edades tempranas. Adicionalmente analizaremos los ritmos de acreción obtenidos recientemente para algunos miembros del cúmulo joven NGC 6523 de la nebulosa M8 usando espectros visuales de baja resolución de Gemini-Sur+GMOS.

Martes 11 de Diciembre de 2009, 14.00 hrs.

Dr. Gastón Follatelli, Universidad de Chile

"Low-Redshift Type Ia Supernovae by the Carnegie Supernova Project"

I will present the analysis of the first set of 35 low-redshift ($z < 0.08$) Type Ia supernovae (SNe Ia) studied by the Carnegie Supernova Project. The data consist of densely-sampled, high-precision light curves obtained with a uniform, well-characterized photometric system comprising the u'g'r'i'BVYJHKs bands. I will show how we used these data to derive light-curve parameters and to build template light curves that are applicable for fitting other SNe-Ia data. Also, I will present our calibration of intrinsic colors at maximum light and color excesses which allowed us to study the properties of the reddening law in the host galaxies, with the advantage of combining optical and NIR bands. The main goal of the analysis was to produce a calibration of absolute peak magnitudes in all bands versus decline rates and color (or reddening). The results of these multi-band fits suggest that SNe Ia provide distances with a precision *as good as 3%--4%*. I will further discuss the validity of Type-Ia supernovae as true *standard candles* (i.e. requiring no correction for decline rate) in the NIR.