



**Universidad
de Valparaíso**
CHILE

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



SEMINARIOS ASTROFÍSICOS

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 2010

Martes 4 de Mayo de 2010, 14.00 hrs.

Dr. Ronald Mennickent

"Restricciones observacionales para la evolución no conservativa de estrellas binarias de masa intermedia"

En esta charla se presentan las características observacionales de un centenar de estrellas binarias que muestran dos ciclos fotométricos ligados. El ciclo corto se interpreta como debido al movimiento orbital de un sistema semiseparado en proceso de intercambio de masa. El ciclo largo se interpreta como un ciclo de pérdida de masa al medio interestelar. Se analizan estos sistemas en el contexto de evolución no conservativa de binarias de masa intermedia y se postula una relación evolutiva con los sistemas tipo Algol y W Serpentids.

Martes 11 de Mayo de 2010, 14.00 hrs.

Dr. Markus Mugrauer, Astronomical Institute of the Jena University, Germany

"The University Observatory Jena, astronomical observations and research in the heart of Germany"

The University Observatory Jena is located about 20km west of the city of Jena, where we operate a 90cm reflector telescope, as well as a 25cm Cassegrain and a 20cm refractor auxiliary telescope. After its modernization phase, between 2006 and 2007, regular observations take place again at the observatory in each clear night of a year. Today, the observatory is equipped with a state of the art telescope control system, and modern instruments for imaging and spectroscopy are in use at all of its telescopes. Several observing projects were already started, whose first results were published in 12 refereed articles, filling the whole May 2009 issue of the astronomical journal "Astronomical Notes". In this talk I will present the observatory with its instrumentation, as well as the ongoing observing campaigns together with their results, which could be obtained, so far. Among them the spectro-photometric monitoring of young stars, lucky-imaging observations of close binaries, transit time and duration variation studies of transit planets, the photometric search for transit planets in young open clusters, as well as deep imaging observations to detect sub-stellar objects in these clusters

Miércoles 12 de Mayo de 2010, 14.00 hrs.

Dr. Emilio Falco, Director del Observatorio de Arizona

Harvard Smithsonian Whipple Observatory

"Lentes gravitatorias"

El Dr. Falco ofrece una clase donde habla sobre los recientes avances en la investigación sobre este tipo de fenómeno, telescopios naturales que permiten ver objetos muchos más lejanos que los conocidos hasta las últimas décadas.

Martes 25 de Mayo de 2010, 14.00 hrs.

Dr. Luis Vega, Universidad de Valparaíso

"Continuo azul en Seyfert 2s ¿Estrellas jóvenes o Continuo no-estelar?"

El profesor Vega analiza la importancia del Triplete del Calcio (CaT) en la cinemática y en el diagnóstico de las poblaciones estelares en una muestra de 78 galaxias, la mayoría con núcleo activo del tipo Seyfert 2. Se complementa el estudio observacional con modelos de síntesis evolutiva de poblaciones estelares simples y compuestas, para diferentes metalicidades.

Martes 15 de Junio de 2010, 14.00 hrs.

Dr. Thomas Eisenbeiss, Astronomical Institute of the Jena University, Germany

"Observations of isolated neutron stars"

With their almost thermal radiation and their small distance the seven ROSAT detected isolated neutron stars are great laboratories to study the equation of state of dense matter. Due to an (so far unexplained) optical excess these neutron stars are also detectable in optical wavelengths, giving the opportunity of precise astrometry and multi wavelength photometric measurements. In this talk the so far achieved results of optical observations of the "magnificent Seven" (as they are often called) are summarized. Two important additions, a new V magnitude and proper motion measurement of RX J0720.4-3125 as well as a new parallax of RX J1856.5-3754 are explained in more detail. Other methods of obtaining the distance as well as applications and conclusions are briefly discussed.

Martes 22 de Junio de 2010, 14.00 hrs.

Dr. Ricardo Salinas, Universidad de Concepción, Chile

"Heart of darkness: Dynamics of Abell 545 and its 'star pile' "

The universal shape of dark matter profiles predicted by cosmological simulations may be altered by the presence of baryons, in particular, by a cD galaxy. The massive cluster Abell 545 hosts in its center a large low surface brightness structure, known as the star pile, which contributes little to the baryonic budget, but at the same time can be used as a dynamical tracer for the innermost region of the cluster, where the halo density gradient is largest. The star pile has a marginally mildly rising velocity dispersion profile with $\sigma_{\text{LOS}} \sim 300 \text{ km s}^{-1}$ at $\sim 20 \text{ kpc}$ from its center, while the galaxy cluster has $\sigma_{\text{v}} \sim 1000 \text{ km s}^{-1}$ in the projected innermost 150 kpc. We discuss these results within the controversy between cuspy and cored dark matter halos. Additionally, I will present first results of our on-going projects on the dynamics of cD halos and isolated elliptical galaxies.

Martes 29 de Junio de 2010, 14.00 hrs.

Dr. Roberto González, Universidad Católica de Chile

"Filaments in the large-scale structure"

We present a new method to identify large-scale filaments, and apply it to a cosmological simulation. The method actually looks for filaments using DM haloes, but it is also applicable to a galaxy distribution. We show some novel statistical properties of filaments, and we study some halo properties in filaments which can influence the galaxy properties in such regions.

Viernes 02 de Julio de 2010, 14.00 hrs.

Margaret Hanson, Professor of Physics University of Cincinnati

"Improving Mass and Age Estimates of Unresolved Stellar Clusters"

Stellar clusters provide astronomers with powerful diagnostics to derive the history and evolution of the galaxies they reside in. Even with the Hubble Space Telescope, galaxies beyond our Local Group are too distant for the individual stars within these clusters to be resolved. The entire

stellar cluster must be studied as a single unresolved entity. Interpreting the integrated photometry of stellar clusters relies entirely on models to generate predicted colors of unresolved stellar systems. However, previous methods can lead to inaccurate estimates of cluster age because of the statistical fluctuations in the cluster's stellar mass function that leads to real and large ranges in integrated stellar cluster photometry. I will introduce a new stellar cluster-modeling program we have designed that populates and evolves a realistic sample of stars and derives integrated properties as a function of age and total cluster mass. We have used our model to generate a Monte Carlo database of 50 million stellar clusters to derive likelihood photometric properties as a function of cluster age and mass. This allows the user to work back, through statistical inference, to find the most probable age and mass of their stellar cluster based on integrated photometry alone.

Martes 13 de Julio de 2010, 14.00 hrs.

Dr. Alberto Rebassa, Universidad de Valparaíso
"El Origen de las Enanas Blancas de Baja Masa "

Low-mass white dwarfs ($M < 0.5M_{\text{sun}}$) are thought to have formed in binaries as a consequence of strong mass transfer interactions. However, recent radial velocity and infrared studies of apparently single low-mass white dwarfs reveal that a significant fraction of these do not have close companions. In this work we present the first white dwarf mass distributions directly obtained from observations of a large sample of post-common envelope binaries (PCEBs) and wide white dwarf-main sequence binaries (WDMS). The two distributions differ significantly. Whilst the PCEB sample is dominated by systems containing low-mass white dwarfs, the white dwarf mass distribution of the wide WDMS binaries is similar to that of single white dwarfs. Taking into account observational biases we find that the vast majority of low-mass white dwarfs must have formed in close binaries.

Martes 15 de Julio de 2010, 14.00 hrs.

Dr. Todor Popov, Bulgarian Academy of Sciences, Sofia, Bulgaria
"Creation-Annihilation Algebras and Young Tableaux "

We start by recalling the bosonic (fermionic) canonical (anti)commutation relations of creation-annihilation operators. Then we consider the field theoretical formalism introduced by H.S. Green as a generalization of the Bose-Fermi alternative. In the so called Green parastatistics the exchange symmetry of the operators is governed by cubic relations instead of the canonical (anti)commutation relations. The "Fock space" of the parastatistics creation-annihilation algebra carries a representation of the (particle-)permutation group. The irreducible representations thereof are labeled by Young diagrams and the states in the parastatistics "Fock space" are in one-to-one correspondence with Young tableaux (and their supersymmetric counterparts). We show how the permutation symmetry can be deformed into a braid group symmetry into the framework of deformed Green parastatistics. Finally we use the "Fock space" of the deformed parastatistics algebra in order to get algebraic structures on combinatorial objects such as Young Tableaux. We are aimed to keep the exposition as simple as possible: the prerequisites are only a basic notion of field theory, permutation and linear group, Young tableaux will be introduced, students are welcome.

Martes 10 de Agosto de 2010, 14.00 hrs.

Dr. Ingeniero Ricardo Marotti, Grupo de Física del Estado Sólido, Instituto de Física, Facultad de Ingeniería, Universidad de la República. Centro Interdisciplinario de Nanotecnología, Química y Física de Materiales, Universidad de la República. Montevideo, URUGUAY

"Propiedades Ópticas de Nanomateriales "

Los Nanomateriales, o materiales nanoestructurados, son materiales cuya estructura o composición cambia en longitudes del orden de entre 1 a 100 nm, en al menos una dimensión. Las propiedades físicas macroscópicas de algunos nanomateriales pueden cambiar drásticamente respecto a los materiales homogéneos de grandes dimensiones (micrométricos) correspondientes. Se ejemplificarán estos cambios estudiando las propiedades ópticas de semiconductores y metales nanoestructurados. En el caso de los semiconductores estas propiedades están gobernadas principalmente por confinamiento cuántico de portadores moviéndose en su interior. Un caso especialmente importante en que se observan estos cambios es el ZnO (Óxido de zinc). Se trata de un Óxido semiconductor transparente con muchas y diversas potenciales aplicaciones que ha despertado gran interés en la literatura científica en los últimos años. En el caso de los metales la posibilidad de preparación de estructuras metalodieléctricas a través del uso de moldes nanoporosos permite un camino para estudiar resonancias de plasmones superficiales, así como la posibilidad de preparar cristales fotónicos. Otros materiales en que la interferencia óptica gobierna sus propiedades pueden ser usados como superficies selectivas en colectores de conversión de energía solar en térmica.

Martes 17 de Agosto de 2010, 14.00 hrs.

Dr. Tobias Schmidt, Astrophysics Department Jena University, Germany

"(Sub-)stellar companions in the star forming regions of Chamaeleon "

We performed a direct imaging search for stellar and sub-stellar companions among 51 members of the ~ 2 Myr old Cha I region at approximately 165 pc distance as well as other slightly older parts of the Chamaeleon star forming regions using the Adaptive Optics instrument NACO at the Very Large Telescope (VLT) of the European Southern Observatory (ESO) in Chile. Here we present the results of this survey spanning in total 10 nights of imaging at the VLT, being expanded by follow-up spectroscopy of the most interesting objects using the AO-assisted integral field spectrograph SINFONI, as well mounted on Unit Telescope 4 (UT4) of ESO's VLT. In addition to 15 stellar companions that could be confirmed as members of double or multiple systems by common proper motion, partially showing first signs of orbital motion, a few new M stars could be found as companions of single up to a triple star, composing the first quadruple system within Cha I. Finally two sub-stellar companions could be identified, one of them, being close to the deuterium burning mass limit often used to distinguish between brown dwarfs and planetary mass objects, next to the classical T Tauri star CT Cha, very recently found to harbour a disk by 3 mm observations using the Australian Telescope Compact Array (ATCA).

Martes 28 de Septiembre de 2010, 14.00 hrs.

Sr. Felipe Garrido Goicovi, Alumno Licenciatura en Física, Pontificia Universidad Católica Con Dr. Nelson Padilla, Dr. Roberto Muñoz, Dra. Verónica Motta, Dr. Tom's Verdugo, Dr. Marceau Limousin

"Calibración de masas de Grupos de Galaxias mediante simulaciones de Materia Oscura"

El objetivo de este trabajo es encontrar la precisión en la estimación de la masa de 6 grupos de galaxias a redshift medio ($z \sim 0.5$) que presentan arcos de lentes gravitacionales desde CFHTLS Strong Lensing Legacy Survey. A partir de una simulación numérica basada en un modelo semi-analítico de formación de galaxias se obtiene una representación del universo en el cual se puede reproducir la búsqueda observacional de grupos de galaxias. Las características observacionales a reproducir son: magnitud absoluta máxima detectable (-18 en la banda roja de Sloan), galaxias mayormente en la secuencia roja del CMD y la utilización de sólo una fracción ($f \sim 0.3$) de los miembros para calcular la masa. El criterio de membresía de galaxias corresponde al formalismo de Wilman et al. (2005), filtrando luego los miembros observacionales usando los criterios ya mencionados; el radio y la dispersión de velocidad de cada grupo se realiza mediante el método de gapper, que posteriormente entrega el valor de la masa usando el

teorema del virial. Los resultados obtenidos muestran que el cálculo de la masa con este método observacional es una buena aproximación a la masa real del grupo de galaxias.

Martes 2 de Noviembre de 2010, 14.00 hrs.

Sr. Chris Evans, UK Astronomy Technology Centre, Edinburgh

"Massive Stars: From the VLT to the E-ELT"

Massive stars are an important ingredient in the evolution of their host galaxies. I will summarise some of the key results from our ongoing surveys of massive stars in the Magellanic Clouds and the Galaxy with FLAMES, the multi-object spectrograph on the VLT - in particular the role that environment (metallicity) has on their evolution. For the future, this year there was great news for Chile, with the selection of Cerro Armazones as the site for the future 42m European Extremely Large Telescope (E-ELT). This will be a fantastic facility to study the stellar populations of galaxies beyond the Local Group. I will use VLT observations with adaptive optics and new simulations of near-infrared spectroscopy as examples of the exciting prospects that lie ahead in the 2020s.

Martes 9 de Noviembre de 2010, 14.00 hrs.

Dr. Andrés Meza, U. Andrés Bello

"Formación y evolución de supercúmulos de galaxias en un universo en expansión acelerada"

Observaciones recientes sugieren que el universo está entrando en una era de expansión acelerada, posiblemente gobernada por una constante cosmológica, en la cual las estructuras ligadas gravitacionalmente se vuelven cada vez más aisladas. En este escenario, las estructuras ligadas más grandes están aún en proceso de formación y corresponden a los llamados supercúmulos de galaxias. En esta charla, mostraré algunos de los inconvenientes que tienen los métodos usuales de identificación de supercúmulos de galaxias. A continuación, discutiré un criterio analítico alternativo para definir supercúmulos motivado por el modelo de colapso esférico, el cual ha sido comparado con los resultados de simulaciones cosmológicas. Finalmente, mostraré la aplicación de este criterio a la identificación de supercúmulos a alto redshift.

Martes 7 de Diciembre de 2010, 14.00 hrs.

Dr. Hugo Beltrami, Environmental Sciences Research Centre St. Francis Xavier University Antigonish Nova Scotia, Canada, B2G 2W5

"Borehole Climatology and GCM simulations: First steps towards an integrated assessment"

Understanding climate variability of the last millennium relies on paleoclimatic reconstruction and modeling efforts. Exercises blending both approaches could potentially provide insights relevant to the specific characteristics of proxies and methodologies used in climate reconstructions, and on the realism and limitations of model simulations. Borehole temperature data are now routinely used to reconstruct the long-term trends of past climate change. Here we discuss some results from our collective research efforts related to paleoclimate modeling and borehole climatology that have contributed with a unique perspective, to our knowledge of the low-frequency climate evolution in the recent past. We will show some preliminary results from the comparison of model simulations of the climate for the last millennium and subsurface temperatures for the northern hemisphere, in order to illustrate the use of models as a validation tool for borehole climate reconstruction methodologies, and also to compare geothermal information and model simulations as a means of assessing model performance or for understanding past climatic behaviour.

Martes 14 de Diciembre de 2010, 14.00 hrs.

Dr. Linda Schmidtobreick, ESO

"SW Sextantis Stars and the Evolution of Cataclysmic Variables"