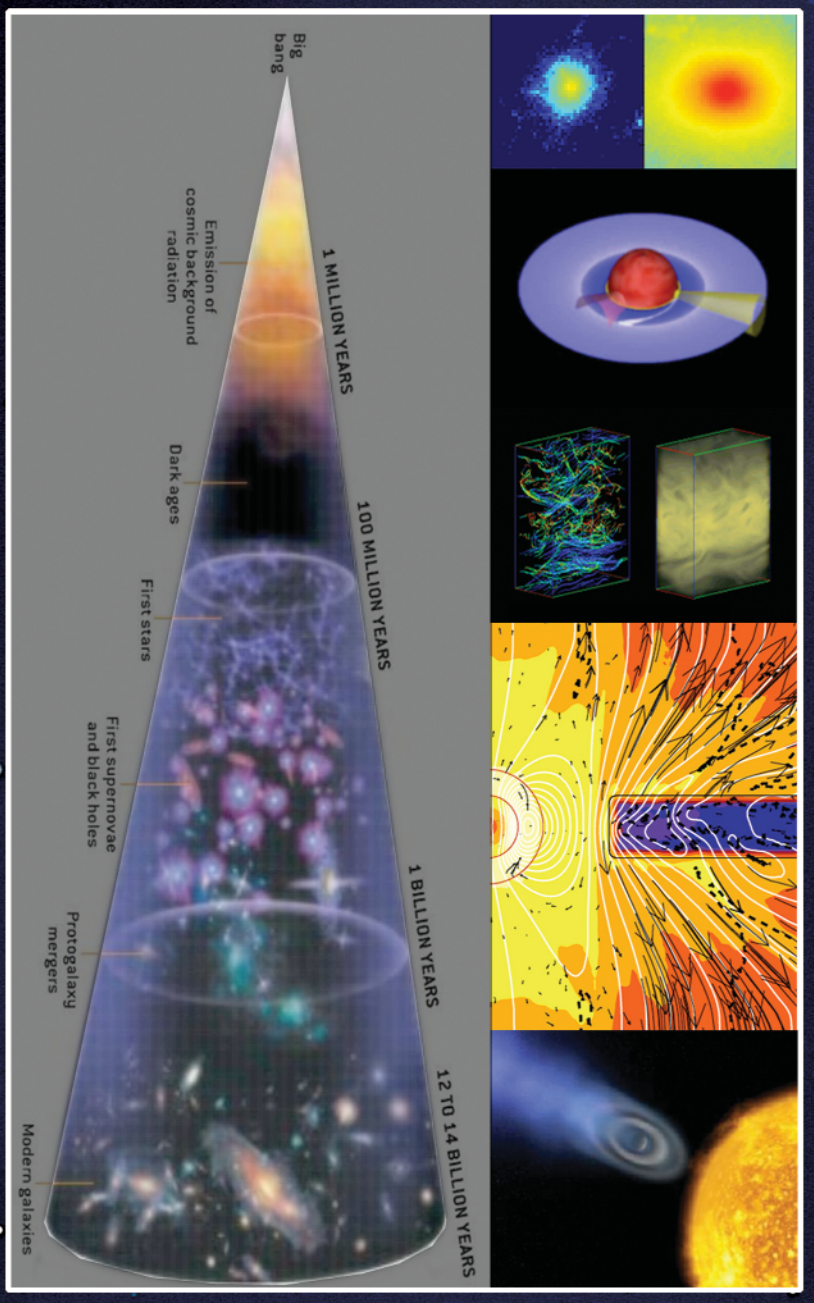
Space Astronomy: The UV window to the Universe



Dedicated to Dr. Willem Wamsteker

El Escorial (Spain), May 28-June 1 2007

ÍNDICE

PROGRAM 7

CONTRIBUCIONES ORALES 15

POSTERS 67

Dedicated to Dr. Willem Wamsteker

Aims:

The network for UV astronomy (NUVA) is defining a road map for UV astronomy at European scale. This conference is organized to provide a discusion forum on the scientific needs for UV instrumentation and to assist in the identification of the key-technologies for this purpose.

Key scientific drivers for UV astronomy are: the study of the chemical enrichment of the Universe, the physics of astronomical engines, the formation and remote detection of life sustainable systems and the determination of the distribution of diffuse matter in the Universe (from ISM to IGM). For this reason, there is a broad list of scientific topics covered by the conference (from the history of star formation accross the Universe and the cosmic web to the evolution of solar-like stars and its influence on their planetary systems) . The role of numerical simulations in our understanding of the major observables will also be addressed.

The final objective of this conference is to identify the prime observables and to specify the instrumentation required to obtain them.

(download Conference poster here)

Scientific Program - List of Participants - Important Deadlines - Registration/Abstracts Submission - Local INFO - Accommodation

SOC: Ana I. Gómez de Castro (co-chair), Noah Brosch (co-chair), Martin Barstow, Luciana Bianchi, Alex Brown, José Cernicharo, Jean Clavel, John Dyson, Roger Ferlet, Gerry Gilmore, Xiaowei Liu, Jayant Murthy, Isabella Pagano, Nino Panagia, Jason Prochaska, Jose Miguel Rodriguez-Espinosa, Boris Shustov, James Stone, Alfred Vidal-Madjar and John Davies (OPTICON)

LOC: Ana I. Gómez de Castro (co-chair), Miguel Mas-Hesse (co-chair), Manuel Cornide, Elisa de Castro, Luis Colina, Ángeles Díaz, Benjamín Montesinos, Paco Najarro, Eva Verdugo, Julia Coloma, Anna Willis (Secretary), Monica Oerke

1st. NUVA CONFERENCE:

Space Astronomy: the UV window to the Universe

El Escorial (Spain), May 28 - June 1 2007

PROGRAM OF THE CONFERENCE:

..... Monday, May 28th .....

9:00 Introductory talk to the Workshop by the UCM Director of Research

Science Session 1: UV surveys, the UV background and the Intergalactic Medium

Chair: Ángeles Díaz

9:30 "The Ultraviolet Sky Surveys: Filling the Crucial Gap in our View of the Universe"

Luciana Bianchi

10:10 "The UV background"

Jayant Murthy

10:50 COFFEE BREAK AND POSTERS SESSION

11:30 "High Ions in Damped Lyman Alpha Systems"

Andrew Fox

11:45 "High Velocity Clouds: Galactic Fuel or Galactic Waste?"

Brad Gibson

12:00 "UVB Fluctuations induced by Radiative Transfer Effects"

Antonella Maselli

12:15 "Metal-Line System Survey: characterizing the Low-Redshift Intergalactic Medium"

Kathy Cooksey

12:30 "Local Lyman Alpha Emitters Studies and their Relevance to High Redshift Ones"

Miguel Mas-Hesse

12:45 "Reionization of the Universe: Character and Observability"

Ilian Iliev

13:00 LUNCH

Instrumentation Session 1: Measuring dark energy in the Universe, Supernovae

Conductor: Antonio Dobado

15:15 Introductory talk by the conductor

15:30 "Is there a paradigm for dark energy?"

Ofer Lahav

16:10 "Supernovae in the ultraviolet"

Pilar Ruiz Lapuente

16:45 "UltraViolet SN observations with SWIFT"

Milena Bufano

17:00 COFFEE BREAK AND POSTERS SESSION

17:30 "An update and the limitations to COS"

Cynthia Froening

18:10 "The WSO/UV project-main characteristics"

Boris Shustov

18:25 "The expected performance of WSO/HIRDES"

Norbert Kappelmann

18:45 "Current and future capabilities of MCP based ultraviolet detector"

John Vallerga

19:00 Summary of the session by the conductor and discussion

.....Tuesday, May 29th .....

Science Session 2: Star Formation and Chemical Evolution

Chair: Michel Dennefeld (TBC)

9:00 "The mid-UV morphology of stars and old stellar populations"

Miguel Chávez

9:30 "The star formation history of early type galaxies"

Alessandro Bressan

10:00 "Two dimensional properties of nearby galaxies"

Fuzhen Cheng

10:15 "An attempt to reconstruct the galactic chemical evolution"

Yulia Milanova

10:30 "Young circumnuclear disks in elliptical galaxies"

Olga Silchenko

10:45 COFFEE BREAK AND POSTERS SESSION

Science Session 3: AGNs and galactic magnetic fields

Chair: Luis Colina

11:30 "Active Galactic Nucleii in the Ultraviolet"

Bradley Peterson

12:10 "The starburst-AGN connection: the role of stellar clusters in AGNs"

Rosa González Delgado

12:30 "Galactic Dynamo and Galactic Winds"

Rainer Beck

13:10 LUNCH

Instrumentation Session 2: The magnetic stability of astronomical objects: disks and atmospheres

Conductor: Ana I. Gómez de Castro

15:00 Introductory talk by the conductor

15:15 "Limitations of the numerical simulations of magnetized accretion disks"

John Hawley

16:00 "Study of general relativistic effects in accretion disks through spectroscopy of the Fe Kalpha line"

Matteo Guainazzi

16:30 "The unstable magnetic quiet Sun: physical mechanisms and UV signature"

Jorge Sánchez-Almeida

17:00 COFFEE BREAK AND POSTERS SESSION

17:30 "Magnetic activity optimal tracers: from radio to X-ray; the relevance of UV astronomy"

Isabella Pagano

18:00 "The Stellar Imager project"

Ken Carpenter

18:30 "The Fresnel interferometric imager: applications in the UV domain"

Denis Serre, Laurent Koechlin, Paul Deba

19:00 Summary of the session by the conductor and discussion

.....Wednesday May 30th.....

Science Session 4: Disk-Halo Interaction

Chair: James Green (TBC)

9:00 "Galactic Fountain and Disk Halo Interaction"

Miguel de Avillez

9:40 "On the prospects of UV Observatories for Studies of Galaxies-IGM mass exchange"

Boris Shustov

10:00 "OVI in the Local Interstellar Medium"

Martin Barstow

10:20 "Solving the Misteries of the Interstellar Medium with High Resolution UV Spectroscopy"

Jeff Linsky

10:40 COFFEE BREAK AND POSTERS SESSION

Science Session 5: From the ISM to stars and from Stars to planets

Chair: Alfred Vidal-Madjar

11:30 "The formation of planetary systems: a UV view"

Ana I. Gómez de Castro

12:10 "Astrochemistry in strong UV fields"

Jose Cernicharo

12:50 "Characteristics of extrasolar planets and their detectability"

David Ehrenreich

13:30 LUNCH

Free afternoon

(Visit to El Escorial and Conference Dinner)

.....Thursday, May 31st .....

Science Session 6: Outflows and disks accross the HR diagram – I. InteractingBinaries

Chair: Klaus Werner

9:00 "Interacting Binaries"

Domitilla de Martino

9:40 "Colliding winds in symbiotics"

Elena Kilpio

10:00 "Line identification techniques in the FUV - Heavy element absorption patterns in 100 white dwarfs"

David Boyce

10:20 "Very peculiar wind from BD+53 2790, the optical counterpart to 4U 2206+54"

Pere Blay

10:40 COFFEE BREAK AND POSTERS SESSION

El Escorial (Spain), May 28th - June 1st, 2007

Science Session 7: Outflows and disks accross the HR diagram - II. Massive stars

Chair: Xiaowei Liu

11:30 "Outflows from massive stars"

Artemio Herrero

12:20 "High resolution UV spectroscopy for the study of A-type supergiants atmospheres"

Eva Verdugo

12:35 "AGB star intershell abundances inferred from UV spectra of extremely hot post-AGB stars"

Klaus Werner

13:50 LUNCH

Instrumentation Session 3: Instrumentation for Ultraviolet Astronomy

Conductor: Noah Brosch

15:00 Introductory Talk by the Conductor

15:15 "Lunar Telescopes"

James Green

16:00 "WSO: The Field Camera Unit for WSO/UV"

Emanuele Pace

16:15 "High accuracy photometry and astrometry: from HST to WSO"

Giampaolo Piotto

16:30 "WSO: Additional science potential of WSO/UV"

A. Shugarov

16:45 "WSO: LSS - design, performance and scientific objectives"

Liu XiaoWei

17:00 COFFEE BREAK AND POSTERS SESSION

17:30 "The Optical and UV Monitor on board XMM-Newton"

Antonio Talavera

17:50 "The Swift UV/Optical Telescope"

Pete Roming

18:10 Summary of the Session by the Conductor and Discussion

.....Friday, June 1st .....

Special Instrumentation Session 4: Getting into the extreme UV

Chair: John Davies

9:00 "CCD cameras and Spacewire interfaces for HERSCHEL/SCORE suborbital mission"

Alessandro Gherardi

9:30 "Novel narrow filters for imaging in the 50-150nm VUV range"

Mónica Fernández Perea

10:00 "The Stellar And Galactic Environment Survey (SAGE) project"

Martin Barstow

10:30 CONFERENCE SUMMARY by Jeff Linsky

11:15 CONFERENCE CLOSES

CONTRIBUCIONES ORALES

The Ultraviolet Sky Surveys: Filling the Crucial Gap in our View of the Universe

LUCIANA BIANCHI (JOHNS HOPKINS UUNIVERSITY)

GALEX is a NASA ""small explorer"" mission performing imaging and spectroscopic surveys of the sky in the ultraviolet. GALEX provides unprecedented sky maps in two UV bands, comparable to the deepest existing surveys at other wavelengths, and unbiased catalogs of UV sources. I will give a brief overview of the instrument and of the available data, and present selected science results from the first part of the mission. The UV surveys, linked to a multi-wavelength

archive, increase by up to orders of magnitude the catalogs of some classes of astrophysical objects, such as low-redshift QSOs, and provide an unprecedented census of white dwarfs in the Milky Way. A dedicated, deep survey of nearby galaxies offers a snapshot of their recent star formation, shedding new light on the process of star formation and its modalities in different environments and conditions. The UV data, combined with IR and optical data, provide a complete account of the current SF, obscured and unobscured by dust, down to extremely low SFR, and suggest a wide variety of morphologies and conditions across these

galaxies. UV measurements for millions of nearby and distant galaxies map the history and probe the causes of star formation in the universe over the redshift range z=0-2, 80% of the life of the Universe, when most stars and galaxies have formed.

The UV Background

Jayant Murthy

There are many contributors to the diffuse UV background from instrumental dark noise to airglow from the atmosphere, zodiacal light from Solar System dust to Galactic and extragalactic sources. Observations have been difficult and have not been able to constrain theories or have led to theories designed to explain wrong observations. However, the situation has changed in recent years and there is a large body of observations which are reliable and spread over the sky. I will review the observations and explore their impact on recent theories. I will end by discussing possible new observations from upcoming spacecraft.

High Ions in Damped Lyman Alpha Systems

Andrew J Fox (IAP), Patrick Petitjean (IAP), Cedric Ledoux (ESO-Santiago), Raghunathan Anand (IUCAA)

I will review recent VLT/UVES observations of ionized gas in damped and sub-damped Lyman-alpha (DLA/sub-DLA) systems, the highest column density classes of QSO absorber. I will discuss newly discovered correlations between DLA metallicity and high-ion column density, and between DLA metallicity and high-ion line width, which can be interpreted as evidence for high-redshift star formation, and possibly for the enrichment of the surrounding intergalactic medium through galactic winds.

High-Velocity Clouds: Galactic Fuel or Galactic Waste?

Brad K. Gibson (University of Central Lancashire)

Motivated by the apparent order-of-magnitude discrepancy between the observed number of satellite galaxies orbiting their massive hosts (such as the Milky Way), and that predicted by the now-canonical cosmologies in which structure assembles hierarchically, I will explore an alternate suggestion - perhaps the missing satellites are not actually ``missing' at all, but are instead ""in disguise"". The disguise we consider here is that of the mysterious high-velocity gas clouds that cover much of the sky. Is it possible that what have been thought of traditionally as a ""local"" phenomenon, are actually the building blocks massive extragalactic systems? I will discuss the strengths and weaknesses of this hypothesis, and highlight avenues of future research which may provide an unequivocal resolution to this contentious issue. An emphasis will be placed upon the role of UV space astronomy in contributing to our knowledge to date in this field, as well as its potential for the future.

UVB Fluctuations induced by Radiative Transfer Effects.

Antonella Maselli, MPA, Garching Andrea Ferrara, Sissa, Trieste

Despite increasing observational evideces for the existence of UVB fluctuations come from studies of the HI/HeII lya forests, theoretical models of the Intergalactic Medium (IGM)commonly assume the Ultra Violet Background (UVB) to be uniform. Fluctuations in the UVB can in fact arise both (i) from inhomogeneous distribution of ionizing sources and (ii) from radiative transfer effects originating from the filtering of the UVB through the cosmic web. In this talk I will discuss the role of RT effects in inducing fluctuatuions in the intensity as well as in the spectral shape of the UVB in the redshift range 6<z.

Metal-Line System Survey: Characterizing the Low-Redshift Intergalactic Medium

K. Cooksey (Dept. of Astronomy, UC Santa Cruz) J. X. Prochaska (UCO/Lick Observatory & Dept. of Astronomy, UC Santa Cruz)

The low-redshift, z < 1.5, IGM probes the last ten billion years of metal enrichment from galactic feedback processes. We present preliminary results from a survey of intergalactic metal-line absorption systems in the UV spectra of 50 z < 1.5 UV-bright targets. We search archival HST/STIS and FUSE spectra for CIV, SiIV, and OVI doublets and any associated Lya absorption. From CLOUDY models, we approximate the metallicity of the IGM and constrain the ionizing mechanism(s) for the various systems. For about 15 sight lines, we have a complementary galaxy survey, and we look for correlations between galaxies and absorption systems in order to understand the large-scale distribution of the metal-enriched IGM. We also compare the observations with synthetic spectra from cosmological hydrodynamic simulations where we know the input feedback physics.

Local Lyman alpha emitters studies and their relevance to high redshift ones

J.M. Mas-Hesse (CAB), D. Kunth (IAP), et al.

Lyman-alpha emission is an important diagnostic of star formation, in particular at cosmological distances since Lyman-alpha becomes the strongest emission line in the optical-NIR window at redshifts $z > 2.1$. Locally, studies of the Lyman-alpha line in star-forming galaxies have been undertaken ever since the space-ultraviolet has become available. The processes controlling the escape of Lyman-alpha photons can be complex and are still far from being fully understood. Spectroscopic data demonstrate the importance of dust, dynamics, and the morphology of the interstellar medium. Other parameters may play an important role as well. Moreover, imaging studies of local galaxies reveal the importance of diffuse Lyman-alpha emission across the body of host galaxies.

The strength and profile shape of the Lyman-alpha line arise from the properties of the newly forming stars, of the ISM, and of the large-scale host galaxy parameters. Attempts have been made to model the resulting complex Lyman-alpha line profiles, whether in emission or in absorption, for an evolving star forming event in a gas rich galaxy. In principle, Lyman-alpha can be used to probe star-formation rates, clustering properties, and even cosmological applications such as re-ionization.

We will present the latest results from our HST-ACS Lyman alpha imaging programme of star-forming galaxies in the Local Universe, and will discuss the results in the view of evolutionary and radiation transfer models.

Reionization of the Universe: Character and Observability

Ilian Iliev (CITA), Garrelt Mellema (Stockholm), Ue-Li Pen (CITA), Paul Shapiro (Texas), J. Richard Bond (CITA)

We have recently performed the first large-scale radiative transfer simulations of reionization. These are run on top of the largest and most detailed simulations of early structure formation to date, with 4.3 billion particles and resolving halos down to dwarf galaxy scale in a very large, (100/h Mpc)^3, volume. This allowed us to make the first realistic observational predictions at the relevant scales about the Epoch of Reionization based on detailed radiative transfer and structure formation simulations. I would present our predictions for the progress and features of reionization under different scenarios and would also discuss in detail the observability of this epoch with upcoming experiments at redshifted 21-cm line of hydrogen, kinetic Sunyaev-Zeldovich signatures and Ly-alpha source surveys.

Observing Dark Energy with the Next Generation of Galaxy Surveys

OFER LAHAV, UNIVERSITY COLLEGE LONDON

Several independent observations suggest that the Universe is flat and it consists of three main ingredients: Baryons, Dark Matter and Dark Energy, which causes an acceleration of the cosmic expansion. The talk will discuss the design and forecasting for measuring properties of Dark Energy and Dark Matter from new deep imaging surveys, in particular the "Dark Energy Survey" and the DUNE satellite. The effect of accuracy of photometric redshifts on the cosmological results will be discussed.

Supernovae observed in the UV

Pilar Ruiz-Lapuente (Univ. de Barcelona)

We review the use of supernovae to identify the nature of dark energy. The latest developments in this field set strong constraints to several dark energy candidates. The observation of supernovae in the UV are a crucial link in the comparison of low z and high z supernovae. I will show the knowledge gathered in this spectral range from IUE to HST. The overall cosmological status of the supernova method for dark energy studies will be addressed.

UltraViolet SN observations with Swift

Filomena Buffano

We present our preliminary results obtained with the analisys of UV SN spectra taken with Swift satellite. UV data are one of the most powerful tools to understand supenova events. Because of its sensitivity to the metal content of the ejecta, UV emission can directly probe the SN environment, its progenitor systems and therefore the SN explosion mechanisms. The UV flux of SNe is characterized by a strong deficiency, caused by heavy line blanketing, mainly

due to lines from iron peak elements. UV spectroscopy is therefore crucially important in order to study the metallicity of individual SNe but also their environments and evolution over time. Moreover, analyzing the strong emission lines present in the UV, we can study the interaction between the SN shocks with the pre-SN circumstellar material. On the other hand the present and future high-z SN surveys in the optical (by HST), or in the near-IR (by JWST), actually sample the rest-frame UV of these objects. Thus, proper interpretation of these observations requires a better understanding of the SN UV properties. The aim of our project aim is to improve our actual knowledge of the SN behaviour in this range, based on a small sample of SNe with high quality data (provided by IUE and HST space missions).

The Cosmic Origins Spectrograph

C.S. Froning, J.C. Green, S. N. Osterman
(CASA, University of Colorado)

The Cosmic Origins Spectrograph (COS) is scheduled to be installed in the Hubble Space Telescope in the fall of 2008. COS is the most sensitive UV spectrograph that has ever been built and it will enable a new era of of moderate resolution (R = 20,000) UV (1150 - 3200 A) spectroscopy. I will summarize the properties of COS and present the key science goals of the early observations.

The WSO-UV project main characteristics

Boris Shustov (INASAN)

The World Space Observatory UltraViolet (WSO-UV) project is an international space observatory designed for observations in the Ultraviolet domain where some of the most important astrophysical processes can be efficiently studied with unprecedented capability. The observatory includes a single 170 cm aperture telescope capable of high-resolution spectroscopy, long slit low-resolution spectroscopy, and deep UV and optical imaging. The Russian Federal Space Agency (Roscosmos) has confirmed its readiness to lead the WSO/UV Project. The project was included in the Federal Space Program of Russia. WSO-UV is a multipurpose observatory. It will provide observations that are of exceptional importance for the study of many astrophysical problems.

The expected performance of WSO/HIRDES

N. Kappelmann, J.Barnstedt, K.Werner, Institut für Astronomie und Astrophysik, Tübingen, Germany H. Becker-Roß, S. Florek, Institute for Analytical Sciences, Berlin, Germany R. Graue, D. Kampf Kayser-Threde GmbH, Munich, Germany

The World Space Observatory Ultraviolet (WSO/UV) S/C is a multilateral project headed by the Russian Federal Space Agency (Roscosmos). The WSO/UV consist of a 1.7 m reflective telescope feeding UV spectrographs and UV imagers. Within the spectrographs the 102-310 nm spectral band is split to feed two spectrographs, the High Resolution Double Echelle Spectrographs (HIRDES), covering the vacuum-UV range between 102-176 nm and the UV range between 174–310 nm with high spectral resolution (R >50000). Each spectrograph encompasses a stand alone optical bench structure with a fully redundant high speed MCP detector system, the optomechanics and a network of mechanisms. The technical concept is based on the heritage of two previous ORFEUS SPAS missions. The phase-B1 development activities are described considering performance aspects, design drivers, related trade offs and a critical functional and environmental test verification approach.

Current and future capabilities of MCP based ultraviolet detectors

John Vallerga, Oswald Siegmund, Anton Tremsin, Jason McPhate and Barry Welsh

At the heart of future space-based astronomical UV instruments will be a sensitive UV detector. Though there has been a dearth of new UV mission opportunities, detector development has continued. Improvements have been made in spatial resolution, dynamic range, detector size, quantum efficiency and background. At the same time the power and mass required to achieve these goals have decreased. We will review the current capabilities of microchannel plate based detectors, both in the lab and aboard on-orbit spacecraft (SOHO, FUSE, GALEX, COS, Persi-Alice on New Horizons, etc.). We will also discuss what can be expected from the next generation of UV detectors over the next decade.

The Mid-UV morphology of Stars and Old Stellar Populations

Miguel Chavez (INAOE)

Over the past 10 years a group of colleagues and I have worked on the study of absorption line indices computed from high resolution synthetic spectra. The aim of these analyses has been to complement empirical databases for use in stellar population synthesis techniques. In this talk I will concentrate on recent results in the calculation of Mid-UV spectroscopic indices based on the UVBLUE library, for both stellar and single stellar population spectra. I will briefly discuss the potential of these indices to derive the main properties (age and chemical composition) of evolved stellar populations and comment on the comparison between theoretical results and empirical indices measured in IUE spectra of stars and globular clusters. Finally I will mention the series of open problems that need to be explored in more detail for a full exploitation of the UV as a diagnostic of old stellar systems.

The star formation history of early type galaxies

A. Bressan (INAF, Osservatorio Astronomico di Padova)

Local early type galaxies are believed to contain a large fraction of the stellar component in the universe. Ranking their populations in age thus constitutes a milestone to understand the process of mass assembly since the early epochs of the universe. I will review the current picture(s) of the star formation history of early type galaxies, with particular emphasis on the importance of multi-wavelength observations.

Two dimensional properties of nearby galaxies

Fuzhen Cheng (USTC), Xu Kong (USTC)

Spatially resolved information about the age, metallicity, and interstellar-medium reddening of galaxies is a powerful tool to study galaxy evolution, since it provides essential clues in star formation history, chemical composition, and enrichment history and environment of galaxies. In this talk, I will report a project, which will study the two dimensional properties of about 50 nearby galaxies, using the UV data from GALEX (FUV and NUV image) and WSO (long-slit spectra), the IR data from Spitzer (IRAC and MIPS), the optical images (BATC/SDSS) and spectra (BAO 2.16m telescopes).

An attempt of the reconstruction of the Galactic chemical evolution

Yu.V.Milanova (Sobolev Astronomical Institute of Saint-Petersburg University),
A.F.Kholtygin (Sobolev Astronomical Institute of Saint-Petersburg University)

We try to restore the chemical history of the Milky Way basing on the detail analysis of the abundance pattern in the Galactic planetary nebulae (PNe) ensemble. A statistical method to determine the realistic abundances of elements in PNe is worked out. We take into account the temperature and density fluctuations in a nebula. The C, N and O abundances and the amplitudes of temperature and density fluctuations for the large sample of PNe are found. The intensity of the UV lines of C, N and O ions are used to find the realistic abundances of these elements. We estimate the primordial CNO abundances in the interstellar medium in dependence of the galactic age. The impact of the newly estimated abundances on the chemical history of the Galaxy is studied. The total C, N, O yields during AGB stage are estimated. We also compare the chemical evolution of Milky Way and the Local group galaxies.

Young circumnuclear stellar disks in elliptical galaxies

Silchenko Olga K., Sternberg Astronomical Institute, Moscow

Giant elliptical galaxies are known to be old stellar systems. However, they may experience rejuvenating events such as accretion of dwarf gas-rich satellites, with a subsequent circumnuclear star formation burst. We will present spectral and photometric observations of two giant elliptical galaxies NGC 759 and NGC 83 where circumnuclear compact stellar disks are forming just now. We think that chemically decoupled cores of elliptical galaxies must form in similar way.

Active Galactic Nuclei in the Ultraviolet

Bradley M. Peterson (Ohio State University)

We highlight the importance of access to the ultraviolet region of the spectrum for understanding the physics of active galactic nuclei, in particular the massive gas flows in the vicinity of the central supermassive black holes.

The Starburst-AGN connection: The role of stellar clusters in AGNs

González Delgado et al (IAA)

Nuclear stellar clusters are a common phenomenon in spirals (Carrollo et al. 2002; Boeker et al. 2002) and in starbursts galaxies (Meurer et al. 1995). Therefore stellar clusters are a natural consequence of the star formation processes in the central regions of spirals. HST UV imaging of a few Seyfert 2 galaxies have resolved circumnuclear starbursts in Seyfert 2 (González Delgado et al 1998) revealing stellar cluster as the main building blocks of the extended emission. However, we do not know whether stellar clusters are always associated with all the type of nuclear activity. We will use UV, optical and NIR high-resolution images provided by HST to find out the role that plays stellar clusters in different type of AGNs.

Galactic Dynamos and Galactic Winds

Rainer Beck (MPIfR Bonn)

Spiral galaxies host dynamically important magnetic fields which can affect gas flows in the disks and halos. Faraday rotation of radio polarization vectors in the disks of some spiral galaxies reveals large-scale patterns which are signatures of coherent fields generated by dynamos, but mostly a superposition of several modes is required. Strong magnetic fields are also observed in radio halos around edge-on galaxies at large distances from the disk, but there is no observation yet of a large-scale coherent dynamo pattern. Field and gas in halos are not always coupled: sometimes the field lines are along the outflow of hot gas, but parallel to the disk in other cases. Halo regions with high radio polarization are excellent tracers of interaction or ram pressure of the intergalactic medium.

Magnetohydrodynamics simulations of accretion disks and jets

John Hawley, Dept. of Astronomy, University of Virginia

Observations are providing increasingly detailed quantitative information about the accretion flows that power such high energy systems as X-ray binaries and Active Galactic Nuclei. These observations have been modeled in some detail by a variety of accretion scenarios, but such models rely on unavoidable assumptions such as regular flow geometry and a simple, parameterized stress. Global numerical simulations offer a way to investigate the basic physical dynamics of accretion flows without these assumptions. We are now carrying out fully three-dimensional general relativistic magnetohydrodynamic simulations of time-dependent inflows into Kerr black holes. The results from recent global simulations of black hole accretion disks will be reviewed, with an emphasis on the influence of the rotating hole on the disk and on jet production.

Some implications of these results for observations will be discussed.

Study of general relativistic effects through X-ray spectroscopy of the iron K-alpha line

Matteo Guainazzi (ESAC/ESA)

In this paper I will review the theoretical basis and observational status of the study of general relativistic effects through spectroscopy of the K-alpha iron line in Active Galactic Nuclei and X-ray binaries. These results are mainly based on samples recently observed by Chandra and XMM-Newton. Basic properties of the black hole (spin) and of the accretion flow (inclination, emissivity dependence) can be investigated through this tecnique. Insights can be also derived on the fraction of objects where the disk is truncated, or dominated by radiatively inefficient flows. Perspective for future studies will be finally outlined.

The unstable magnetic quiet Sun: physical mechanisms and UV signature

Jorge Sánchez Almeida (Instituto de Astrofísica de Canarias)

The changes in the Sun occurring at human timescales can be pinned down to the presence of magnetic fields that evolve restlessly. Among other things, these fields determine the structure of the outer solar atmosphere and, therefore, they are responsible for all the energetic part of the solar spectrum, from the UV to the X-rays. Our understanding of the magnetic fields existing at the base of the atmosphere has changed during the last years. On top of the traditional tracers of solar activity, the new spectro-polarimeters reveal an ubiquitous magnetic field, present even in the quietest regions. They are widespread and of complex topology, containing far more (unsigned) magnetic flux and magnetic energy that all traditional manifestations of solar activity. These so-called quiet Sun magnetic fields are the subject of the contribution. I will summarize their main observational properties, as well as the models put forward to explain them. According to the common wisdom, they are generated by a turbulent dynamo driven by convective motions, either at the (sub-)photosphere or working throughout the convection zone. Their true physical role is not understood yet, but it may be consequential both for the Sun (e.g., in determining the structure of the quiet corona), and for other astronomical objects (e.g., if a turbulent dynamo operates in the Sun, the same mechanism provides a very efficient mean of creating surface magnetic fields in all stars with convective envelopes). I will discuss the impact of the quiet Sun fields on the chromosphere, transition region, and corona, trying to guess what could be the UV signatures of those fields.

Magnetic activity optimal tracers: from radio to X-ray; the relevance of UV astronomy

Isabella Pagano (OAC-INAF)

Observations and analysis of magnetic activity phenomena in the atmospheres of cool stars -- e.g., active regions, flares, stellar cycles -- give insight into the fundamental processes in the heating of chromospheres, transition regions and coronae.

Diagnostics of magnetic activity can be found throughout the whole electromagnetic spectrum; from radio wavelengths, where gyrosincrotron radiation arises from the quiescent and flaring corona, to optical, where important signatures are the Balmer lines, the Ca II IRT and H&K lines, to UV and X ray, the latter mainly due to coronal thermal plasma.

The UV and EUV ranges contains a plethora of emission lines that are powerful diagnostics for the warm (10,000 K) chromospheres, hot (100,000 -- 800,000 K) transition regions and very hot (1--10~MK) coronae. Also very weak coronal winds from cool stars have been identified and characterized thanks to highresolution UV spectra.

Here I review main results from UV/EUV observations of cool stars atmospheres and summarize what can be expected from future UV imaging and spectroscopy measurements.

The Stellar Imager (SI) Project: Resolving Stellar Surfaces, Interiors, and Magnetic Activity

Kenneth G. Carpenter (NASA/GSFC), Karel Schrijver (LMATC), Margarita Karovska (SAO), and the SI Vision Mission Team

The Stellar Imager (SI) is a UV/Optical, Space-Based Interferometer designed to enable 0.1 milli-arcsec (mas) spectral imaging of stellar surfaces and, via asteroseismology, stellar interiors and of the Universe in general. The ultra-sharp images of SI will revolutionize our view of many dynamic astrophysical processes by transforming point sources into extended sources, and snapshots into evolving views. The science of SI focuses on the role of magnetism in the Universe, particularly on magnetic activity on the surfaces of stars like the Sun. Its prime goal is to enable long-term forecasting of solar activity and the space weather that it drives. SI will also revolutionize our understanding of the formation of planetary systems, of the habitability and climatology of distant planets, and of many magneto-hydrodynamically controlled processes in the Universe. In this paper we discuss the science goals, technology needs, and baseline design of the SI Mission (http://hires.gsfc.nasa.gov/si/).

The Fresnel interferometric imager applications in the UV domain

Denis Serre, Laurent Koechlin, Paul Deba (Observatoire Midi Pyrénées Université Paul Sabatier)

This paper presents a new kind of space imager and some of its applications. The UV domain astrophysical applications will be developed. This imaging telescope : the Fresnel interferometric imager, is an interferometric device involving thousands of subapertures: holes punched in a large and thin foil. Their positioning law, which is close to but different from that of a Fresnel zone plate, causes focalisation by diffraction. The positioning tolerances are very released compared to classical surfacing of optics or interferometric optical path length control, which potentially opens the way to large and lightweight apertures in space. This optical principle also yields very high dynamic range images in the case of compact objects, allowing the mapping of stellar photospheres and stellar environments: dust disks, close companions and possibly exoplanets. Larger fields can also be imaged, although with a lesser dynamic range, such as surfaces of solar system bodies and targets in the galactic or extragalactic domains. The long focal lengths of future large Fresnel arrays will require a two-vessel formation flying. The wavelength domain potentially covered by a given array spans from far UV (100 nm) to mid IR (10 microns), although the instruments wavebands are limited 15% relative spectral width, and only one waveband at a time can be used. The project is at its first stages, studied by the French National Agency (CNES) and proposed to the European Space Agency in the frame of ""Cosmic Vision"". The optical validation and laboratory tests have been made with a miniature 8 cm side prototype (26680 apertures, 23 meter focal length). Future plans are to test a second generation prototype on stellar sources rather than laboratory sources, but from the ground. Due to focal length constraints, the aperture size will be limited to 20 cm. These tests should be completed in 2008-2009. In parallel, a probatory space mission will be studied and follow a validation path, to be launched if successful in 2018 - 2020.

Galactic Fountain and Disk Halo Interaction

Miguel de Avillez (Univ. d'Evora)

On the Prospects of UV Observatories for Studies of Galaxies-IGM mass exchange.

B.M.Shustov (Institute of Astronomy, Moscow)

During their life galaxies exchange in matter and energy with the intergalactic medium (IGM). This complex process is the most important factor in galactic evolution as well in evolution of the IGM. In this contribution the progress in studies of mass exchange between galaxies and the IGM is briefly reviewed.

Special attention is drawn to the mixing problem. The prospects of the future UV space observatories for studies of circumgalactic medium and the IGM at z.

OVI in the local interstellar medium

M.A. Barstow, D. Boyce - University of Leicester B. Welsh - University of California, Berkeley

The search for OVI absorption in the far-UV spectra of hot white dwarfs is important for tracing hot and highly ionized gas in the local interstellar medium. However, the technique is fraught with potential difficulty, since it is hard to distinguish between material lying along the line-of-sight from that contained in and around the star. The best analysis method is to rely on the relative separation in velocity space of photospheric and ISM lines. However, the absolute photospheric velocities are not known for most white dwarfs. An alternative, is to argue on grounds of the high ionization level of OVI, that it must be interstellar in all but the hottest white dwarfs, but this argument is undermined by the presence of other high temperature ions such as NV unambiguously located in the photospheres of relatively cool objects. Several authors have reported the detection of interstellar OVI in a significant number of nearby (d < 100pc) white dwarfs but do not appear to have taken full account of these issues. We have carried out a careful analysis of all the relevant FUSE, HST and IUE spectral data which suggests that in almost all cases the reported interstellar OVI absorption (for nearby sight-lines) is in fact stellar material. The implication of this result is that there is probably no hot gas in the local bubble or at its boundary, a finding that is in accord with the recent work on the origin of the soft X-ray background which points to a similar conclusion.

Solving the Mysteries of the Interstellar Medium with High-Resolution UV Spectroscopy

Jeffrey Linsky JILA/University of Colorado and NIST Boulder
Colrado USA

Measuring the physical, chemical, and kinematic properties of interstellar gas and dust requires high spectral resolution, high sensitivity, and studies of many sightlines. Ultraviolet spectroscopy is the best tool for this study because the ground state transitions of most ions and molecules of interest are located in the UV. High spectral resolution is required because closely-spaced velocity components are commonly seen and line saturation is unknown without sufficient resolution. A fine grid of sightlines is needed to determine the morphological structure of the gas and the heating and cooling processes which may depend on density and shielding from ionizing sources. I will illustrate these requirements for future studies of the ISM by showing how high-resolution spectra obtained with the GHRS and STIS instruments on HST are revolutionizing our understanding of the local ISM. We have recently analyzed data from 157 sightlines toward nearby stars. We find that the gas flow near the Sun can be described by 15 vectors indicating the presence of 15 dynamical structures, which we call clouds, located within 15 pc of the Sun. These warm clouds have different temperatures, nonthermal velocities, and metal depletions. We find that collisions between clouds, often at supersonic velocities, can form shock fronts. Adjacent warm clouds appear to be shielding a nearby cold cloud from external radiation. We also find that the turbulent screens producing scintillation of pulsars and quasars are located where nearby clouds collide tangentially.

The formation of planetary systems: a UV view

Ana Inés Gómez de Castro (Universidad Complutense de Madrid)

Planetary systems are angular momentum reservoirs generated during star formation. This accretion process produces very powerful engines able to drive the optical jets and the molecular outflows. A fraction of the engine energy is released into heating thus the temperature of the engine ranges from the 3000K of the inner disk material to 10MK in the areas where magnetic reconnection occurs. There are many important problems about the nature of the engine, its evolution and the impact of the engine on the chemical evolution of the inner disk. This contribution will focus on describing what is known and which are the key questions still open that require new UV instrumentation to be addressed.

Astrochemistry in strong UV fields

Jose Cernicharo (DAMIR-IEM, CSIC)

Characteristics of extrasolar planets and their detectability

David Ehrenreich (IAP- to be presented by Roger Ferlet)

The large number of planets detected around other stars (> 200) and the refinement of detection techniques has allowed us to go beyond the 'simple' census of objects. It is indeed possible to characterize extrasolar planets. A powerful technique, the transmission spectroscopy, takes advantage of planetary transits to probe the atmosphere of an extrasolar planet, and has proven especially efficient in the ultraviolet/visible wavelength range. I will review the detections already performed in the atmospheres of 'hot Jupiters' and what we can expect in a near future. I will also present simulations detailing what could be done to characterize hypothetical Earth-size planets, on a more long-term range and the ultraviolet/visible telescope required to achieve this.

Accretion in Cataclysmic Variables: the role of multi-band X-ray, UV and optical observations

Domitilla de Martino

Colliding winds in symbiotics

E.Kilpio, D. Bisikalo

Existing observations of symbiotic stars indicate the presence of winds from both components at active stages in these systems. We have carried out the gas dynamic modelling of the outburst development process in the classic symbiotic star Z And in the framework of the colliding winds model. It is shown that contribution from the system of shocks that forms in the area of wind collision is rather significant especially at short wavelengths (UV, EUV, X-rays). The results of modelling allowed us to propose the explanation of the stage-by-stage rise to the light maximum during the outburst that is in good agreement with available observational data.

Line identification techniques in the FUV – Heavy element absorption patterns in 100 white dwarfs

David Boyce, Martin Barstow (University of Leicester)

The far-UV spectral range, and particularly the 912-1180A band covered by FUSE, contains a very large number atomic transitions that might be detected in the atmospheres of hot white dwarfs. Indeed, the density of possible absorption lines is such that there are often several possible counterparts for those we do see, leading to a significant risk of misidentification. Recently, claims have been made for the detection of elements that have not previously been seen in white dwarf atmospheres and we re-examine these through careful analysis of the relative separation in velocity space of photospheric and ISM lines. Using a sample of 100 white dwarf spectra obtained with FUSE we show how looking for common patterns of lines among these spectra is a more reliable way of determining relative photospheric velocities and assigning identifications to individual features. As a result, we can find that many feature that might have been assigned to ""exotic"" species can actually be explained by transitions associated with more usual elements. This technique also allowed us to increase the number of reliable line identification by over a factor 10.

Very peculiar wind from BD+53°2790, the optical counterpart to 4U 2206+54

P. Blay (GACE - ICMUV - Universitat de Valencia, Valencia, Spain) ; M. Ribo (Departament d'Astronomia i Meteorologia, Universitat de Barcelona, Barcelona, Spain) ; I. Negueruela (DFISTS, Univesidad de Alicante, Alicante, Spain)"

BD+53 2790 is a O9.5V star hosted by the HMXRB 4U 2206+54. This system was classified initially as a BeX, but observational evidence soon stressed the need to revise this classification. The permanent assymetry in the Halpha line profiles, the variations in the profile of this line in time scales of hours (while time scales from weeks to months are expected in Be stars), and the lack of correlation between IR observables and Halpha line parameters, strongly suggest that, while BD+53 2790 contains a circunstellar disc, it is not like the one present in Be stars. Furthermore, there is evidence of overabundance of He in BD+53 2790. Together with the presence of an anomalous wind, the possibility to link this star with the group of He rich stars is open. We will discuss the analysis of IUE data from BD+53 2790 and the unexpected finding of a slow and dense wind, very rare for an O9.5V star.

Outflows from massive stars

A. Herrero, IAC, ULL F. Najarro, DAMIR, IEM, CSIC

We present a review of our current knowledge of winds of massive stars and their impact on the structure and evolution of these stars, their surroundings and their host galaxies, and how the UV observations, sometimes coupled with other other wavelength ranges, contributed to it along the past years. Main uncertainties and problems for which UV observations could be crucial in future are also outlined.

AGB star intershell abundances inferred from UV spectra of extremely hot post-AGB stars

K. Werner (Univ. Tuebingen)

The hydrogen-deficiency in extremely hot post-AGB stars of spectral class PG1159 is probably caused by a (very) late helium-shell flash or a AGB final thermal pulse that consumes the hydrogen envelope, exposing the usually-hidden intershell region. Thus, the photospheric element abundances of these stars allow to draw conclusions about details of nuclear burning and mixing processes in the precursor AGB stars. We compare predicted element abundances to those determined by quantitative analyses of FUSE and HST UV spectra performed with advanced non-LTE model atmospheres. A good qualitative and quantitative agreement is found for many species (He, C, N, O, Ne, F, Si) but discrepancies for others (P, S, Fe) point at shortcomings in stellar evolution models for AGB stars.

Lunar Observatories

The Field Camera Unit for WSO-UV

S. Scuderi and the italian FCU team

The Field Camera Unit (FCU) is one of the focal plane instruments aboard the WSO-UV telescope, a 1.7 m UV optimized instrument that will investigate numerous astrophysical phenomena from planetary science to cosmology. The FCU will perform deep UV and diffraction limited optical imaging in both wide and narrow band filters using three channels (FUV, NUV and VIS) optimized in different wavelength ranges and will have also spectropolarimetric capabilities. The total wavelength range covered by the instrument will go from 110 nm to 700 nm. The FCU instrument will be developed and realized by the italian scientific and industrial community. This paper will describe the scientific capabilities of the camera, its architecture and the expected performances.

High accuracy photometry and astrometry: from HST to WSO

Giampaolo Piotto

High accuracy photometry, and sub-milliarcsec astrometry on Hubble Space Telescope WFPC2 and ACS imagers have opened new frontiers for optical and UV astronomy. Exciting and sometimes enigmatic discoveries came out in the last decade. It is of fundamental importance to guarantee the continuation of optical and UV space observations taking the HST legacy and extending it for the second decade of this century.

WSO-UV/LSS - design, performance and scientific objectives

Liu X. W. (PKU) et al.

The current status of the development of the Long-slit Spectrograph (LSS), one of the scientific payloads of the WSO-UV satellite, is summarized, including the design, expected performance and key scientific objectives of the instrument.

The Optical and UV Monitor (OM) on board XMM-Newton

Antonio Talavera and the OMCal Team

The Optical and UV Monitor (OM), is a small telescope co-aligned with the main XMM-Newton X-ray telescopes. It can perform broad band photometry with six lenticular filters covering the range 180 nm to 600 nm. In addition, two grisms allow the user to obtain low resolution spectra in the same range. The detector is an intensified CCD. The instrument is fully callibrated in the standard UBV Johnson system and also in absolute flux for both filters and grisms. Wedescribe the instrument and its calibration. We present some results and usage statitics.

The Swift Ultra-Violet/Optical Telescope

P. Roming, D. Vanden Berk (PSU), M. Page (MSSL), & P. Boyd (GSFC)

Currently there are four operating UV imaging space telescopes, one of which is the Swift Ultra-Violet/Optical Telescope (UVOT). Although the UVOT was primarily built for observations of gamma-ray bursts, it has become a powerful instrument for studying other types of UV and optical astronomical phenomena. Here we discuss the properties of the UVOT and summarize some of the science that has been undertaken with the UVOT. We also present other possible science goals for the UVOT that have not yet been pursued..

CCD cameras and Spacewire interfaces for HERSCHEL/SCORE suborbital mission

A.Gherardi(1); M.Pancrazzi(1); G.Rossi(1); D.Paganini(1); M.Sozzi(2); E.Pace(1); M.Romoli(1).

(1):Dipartimento di Astronomia e Scienza dello Spazio

(2) INAF- Istituto Nazionale di Astrofisica

The HERSCHEL/SCORE is a suborbital mission which will observe the solar corona in UV (H Lya and HeII Lya) and in visible light for measurements of coronal polarization. The coronagraph for such observation is an italian instrument and, in particular, the CCD camera detectors are developed at the XUVLab of the Department of Astronomy and Space Science of Florence University. Such detectors communicate with the onboard computer by means the IEEE1355 Spacewire standard interface (developed in our laboratories) and implement a lot of smart and custom procedures for imaging. The main innovation of SCORE coronagraph is the first use in space of a variable retarder plate based on liquid crystals and the optical design capable of simultaneous observation in UV and Visible light.

Novel narrow filters for imaging in the 50-150 nm VUV range

Mónica Fernández-Perea, Juan I. Larruquert, José A. Aznárez, Manuela Vidal, José A. Méndez.

Instituto de Física Aplicada, Consejo Superior de Investigaciones Científicas.

GOLD, (Grupo de Óptica de Láminas Delgadas) is devoted to the development of novel coatings with challenging performance in the far and the extreme ultraviolet (FUV-EUV, 50 – 200 nm). One of the main goals of this research is providing the communities of astronomy, solar physics and atmospheric physics with coatings with high reflectance or transmittance at a target wavelength or band, and high rejection of the out-of-band at this complicated spectral range. Above the transparency cutoff of MgF2 (115 nm), transmittance filters based on Al/MgF2 multilayers have been developed peaked at wavelengths as short as 124 nm, with a peak transmittance of 27% and a FWHM of 12 nm for a non-aged coating. Below 115 nm, a research on reflectance filters has recently started with very promising results on filters peaked at the 83.4 nm OII spectral line. Fresh filters with 27% peak reflectance at normal incidence and a FWHM of 14 nm have been obtained. Furthermore, the peak reflectance wavelength of these filters can be tuned by rotation. A filter peaked at 83 nm at normal incidence will shift to ~73 nm at 30 degrees from the normal and to ~58 nm at 45 degrees. These novel reflective filters based on Al, Yb and SiO must still demonstrate stability over time.

The Stellar And Galactic Environment Survey (SAGE) project

Martin Barstow

POSTERS

XUV-disk (eXtended UV disk) galaxies

L.Bianchi, D.Thilker, et al. (Johns Hopkins University)

Following our early discovery of UV emission extending up to several times the optical radius in two spiral galaxies, M83 and NGC4625, we examined a current sample of about 200 nearby S0-Sm galaxies in the GALEX Nearby Galaxies Survey (NGS), in order to characterize the extended UV (XUV) disk phenomenon and probe its causes. XUV disks are found in about 30percent of the galaxies. While they show varied morphologies and extents, they can be grouped in two major types. The results give insight regarding star formation (SF) in extremely low density environments (below the traditionally accepted threshold based on azimuthally averaged gas density),the [continuing] formation of outer galaxy disks, and the role of interactions (Thilker et al. 2007).

Acknowledgement. We acknowledge NASA support for construction, operation and data analysis of the GALEX mission, developed in cooperation with the French CNES and the Korean Ministry of Science and Technology.

Stratification effects in the nebula of the symbiotic nova RR Tel from STIS observations

A. Bonchi, F. Onori, A.Altamore, A. Cassatella, P. Selvelli

The optical and UV emission lines present in STIS spectra of RR Tel are analysed with the purpose of deriving the physical conditions within the associated nebula. Important stratification effects are found both in density and electron temperature. There is also evidence for a velocity gradient in the FeII emitting region.

Ultraviolet Spectroscopy as a Tool to Understand the Evolution of Stellar Magnetic Activity

Alexander Brown CASA, U. of Colorado

UV spectroscopy of stellar populations with known ages, both old and young, is a powerful tool to characterise the evolution of stellar magnetic activity and the role of UV radiation fields in the evolution of stellar and protoplanetary systems, because emission line diagnostics are available that sample a wide range of temperatures that are diagnostic of the full magnetically-heated stellar atmosphere, including the transition region, chromosphere, and corona. I will discuss how well existing satellites are suited to observing the large samples of relatively faint UV sources needed for such studies and what capabilities in new instruments would facilitate improved studies. UV and X-ray investigations of both young and old kinematic groups will be compared.

UV irradiation of CO2 ices

José Cantó, Miguel A. Satorre, Ramón Luna, Manuel Domingo (UPV)

The OIII Bowen fluorescence mechanism in the symbiotic star Z Andromedae: changes of the efficiency

R. Carini, A. Cassatella, P. Selvelli

The OIII Bowen fluorescence mechanism in the symbiotic star Z And is studied during both activiy and quiescence phases. It is found that the efficiency of the photon transfer from the HeII 1640 A line to the OIII flurescence lines is strongly enhanced during the active phases, in coincidence with the observed broadening of the emission lines.

Stellar activity in low main sequence stars: new results on the correlation with mass, age and rotation

Angelo Cassatella, INAF-IFSI Daniela Cardini, INAF- IASF

We have carried out a study of the rotation--activity--age relationships in a large sample of single late--type main sequence stars. The study is based on rotation period data from the literature, and on our measurements of the Mg II line chromospheric flux in 117 stars for which IUE high resolution spectra and Hipparcos parallaxes were available. The main results of this study are: a) The rotation period decreases linearly with increasing mass in stars of the same age, and evolves as a power of age as t^0.45. This result estends the validity of Skumanich results, valid for 1 Msun stars to the range of masses 0.25 to 1.29 M Msun. Based on this results stellar ages can be evaluated if rotation periods and masses are known. b) Describing stellar activity as a function of the Rossby number is equivalent to describing it as a function of stellar age, at least with the values of the convective turnover times actually in use. These latter appear to be a linear function of mass which mimics very closely the dependence of rotation period on colour index.

WD census in NGC 2420

DE MARTINO C., BIANCHI L., PAGANO I.

WSO-UV Field Camera Unit preliminary optical design

L. Gambicorti (Dep. of Astronomy and Space Science of Unifersity of Firenze), D. Magrin (INAF -Astronomical Observatory of Padova), M. Munari, E. Pace (Dep. of Astronomy and Space Science of Unifersity of Firenze), S. Scuderi (INAF -Astronomical Observatory of Catania)

The Field Camera Unit (FCU) is one of the focal plane instruments aboard the WSO-UV telescope, a 1.7 m UV-optimized space observatory that will investigate numerous astrophysical phenomena from planetary science to cosmology. The telescope has a Ritchey-Chretien configuration with a FOV of 30 arcmin, optical quality of the two mirrors of lambda/30 rms at 633 nm, and is capable of 12.05 arcsec/mm angular resolution on the focal plane. The FCU, an Italian lead project, will have three channels that will cover a wide spectral range going from 110 nm to 700 nm. It will have imaging and spectropolarimetric capabilities. This paper describes the preliminary optical design of the 3 channels and the expected optical performances.

WEAK WINDS IN ORION?

M. Garcia (1), A. Herrero (1,2) & S. Simón-Díaz (1,3) 1- Instituto de Astrofisica de Canarias, E-38200 La Laguna, Tenerife, Spain 2- Departamento de Astrofisica, Universidad de La Laguna, E-38071 La Laguna, Tenerife, Spain 3- LUTh, Observatoire de Meudon, 92195 Meudon Cedez, France

The theory of radiatively driven winds apparently fails to predict the wind momentum of low luminosity (log L/Lo<5.2) early-type stars from metal poor environments like the SMC, but there also some Galactic cases. The reason of this alleged theoretical breakdown is still unknown. Hile it may hint a metallicity dependent threshold luminosity to initiate the wind, it may also relate to age, the discrepant objects being too yound to have turned it on. Starting from previous quantitative analysis of their optical spectra, we study the ultraviolet spectra of a sample of OB-type stars in Orion, to constrain their wind terminal velocity and mass loss rate. Orion is a young star forming region, thus our results will contribute to ascertain whether there is a "weak wind-young object" connection.

Spectropolarimetry of evolved stars with circumstellar envelopes. I. The protoplanetary nebula AFGL2

V.Klochkova, V.Panchuk, M.Yushkin Special Astrophysical Observatory

To distinguish photospheric and circumstellar spectral features, high resolution spectroscopy (R=75000) and spectropolarimetry (R=15000) of the bipolar protoplanetary nebula AFGL2688 have enabled with the 6m telescope of the Special Astrophysical Observatory. The linear polarization of the northern lobe was measured at 5000-6600AA. We conclude that 1) the polarization in the continuum and photospheric lines is 52%; 2) the emission in NaD lines and the Swan bands is formed in the circumstellar envelope; 3) the polarization of the emission features is negligible compared to that of the photospheric light; 4) circumstellar envelope has a low density. Sodium line emission is observed at least to distances of 10 arc sec from the center of the northern lobe.

Extremely red objects: dust attenuation and classification

Xu KONG (Center for astrophysics,USTC)

In this talk, I will report our results for extremely red objects in two large fields, using the data from the Spitzer, VLT, NTT and Subaru telescopes. We classified EROs in two subclasses: old passive galaxies (OGs) and dusty starburst galaxies (DGs) by different methods, and determined the SFRs, E(B-V) of DGs, and also analyzed the space clustering properties of DGs and OGs.

A UV study of shell galaxies in poor groups

Antonietta Marino, Roberto Rampazzo, Ginevra Trinchieri, Ruth Grutzbauch (OAPD-INAF)

Shells in early-type galaxies are faint, sharp edged-features, believed to be the fossil remnant of an accretion/merging event. Shell galaxies are typically found in low density environments, such aspoor groups. We consider a few examples and present their UV properties extracted from GALEX and XMM-Optical Monitor observations. We aim at investigating shell galaxies evolution in the context of their environment.

ON THE IMPROVEMENT OF THE REDDENING CORRECTION FROM ULTRAVIOLET SPECTRA

Carmen Morales et al. (LAEFF-INTA)

The energy distribution of astrophysical sources is strongly affected by interstellar reddening. Probably the most accurate method to determine the reddening correction is to use the interstellar dust feature around 2200 AA. However, the reported accuracy on the colour excess E(B-V) obtained from the 2200 A bump with traditional methods is usually not better than ± 0.05 dex. Such an uncertainty implies a large uncertainty on de--reddened fluxes of about 51\% at 1300 AA and about 18\% at 3000 AA. We aim to set up a method capable of reducing the error bar on E(B-V) by a factor of two. Once selected a large sample of low and high reddening stars, the study will proceed in two parallel ways: a) to study the correlation between E(B-V) and the equivalent width of the 2200 AA bump and, b) to maximize, as a function of E(B-V), the matching between stellar spectra and Kurucz model atmosphere spectra in the (Spectral Type, Gravity, Metallicity) space. In this way we expect to reduce the uncertainty on de--reddened fluxes from about 51\% to about 18\% at 1300 AA.

The SOURCE facility: using the UV synchrotron beam radiation for testing optical sytems and detector

Emanuele Pace Dipartimento di Astronomia e Scienza dello Spazio, Università di Firenze (Italy)

The SOURCE facility is an UV test facility using the unique features of the synchrotron beam radiation to characterise, calibrate, test optical systems up to 1 m diameter and detector or detector assemblies (even large focal plane arrays). The synchrotron large and continuous spectrum from 30 nm up to 650 nm is available for experiments and a special testing procedure has been developed and is available to perform time response analysis with resolution down around 100 picoseconds. The facility is going to be upgraded for testing mirrors with diameter up to 4 m and it will be accessible from mid 2008.

The Data Handling Unit for the World Space Observatory

M.Pancrazzi(1); A.Gherardi(1); E.Pace(1); S.Scuderi (2).
(1):Dipartimento di Astronomia e Scienza dello Spazio di Firenze (2): INAF- Istituto Nazionale di Astrofisica - Catania

The World Space Observatory (WSO) is a space telescope conceived to observe the universe in the UV. The instrument payload consists of three spectrographs and one Field Camera Unit (FCU) composed by three cameras for UV and visible light imaging.FCU instrument(responsibility of Italian team) will produce a huge quantity of data to be transferred in a short time to the control ground stations. The XUVLab of the Department of Astronomy of Florence University is developing the Data Handling Unit for FCU instrument. Since the data volume will be very huge it cannot be possible to store images on the computer mass storage for a long time. At the moment the proposed satellite interface is the MIL1553B which represents a bottleneck dued to its low data rate. In order to avoid very long images transfer time (which could be a very strong constraint against scientific requirement),we are designing a communication interface that uses an hybrid architecture which is capable of high-speed and reliable data transfer.

UV perspectives on the physics of Luminous Blue Variables and their role in the galaxies evolution

V. F. Polcaro, R. Viotti et al

Understanding the nature of variable stars on the upper H-R diagram is important to shed light on the late evolutionary stages of very massive stars and on the chemical evolution of galaxies. We analyse the behaviour of galactic and extragalactic LBVs - such as eta Car, AG Car, and GR290 and Var A in M33 - in the framework of proposed models, and discuss the crucial role of UV observations in the determination of the stellar luminosity, temperature, and wind structure during different variability phases.

Spectroscopic study of chemically peculiar stars: importance of UV observations

M. Sachkov and T.Ryabchikova, Intitute of Astronomy RAS

Recent progress in observational studies of CP stars, especially roAp stars, was achieved by considering high time resolution spectroscopy in addition to the classical high-speed photometric measurements. High-quality time-resolved measurements of magnetic pulsators revealed a surprising diversity in the pulsational behaviour of different lines in the roAp spectra. This allowed to reconstruct 3-D structure of roAp atmospheres. We summarize the discussions on UV spectroscopic investigations: the vertical gradients of abundances in the atmospheres, Doppler imaging technique, radial velocity measurements of lines of different ions.

Additional science potential of WSO/UV

A.S. Shugarov, M.E. Sachkov

Examination of technical parameters of Fine Guide System at T-170M telescope in view of possibility to use it as an additional science instrument. Possibility of additional scientific programs, such as astrometry and fast photometry. Consider the way of simultaneous usage of several scientific instruments.

High Resolution UV Spectroscopy for the study of A-type Supergiants atmospheres

E. Verdugo (ESAC/ESA), A. I. Gomez de Castro (CSIC/UCM) and A. Talavera (ESAC/SERCO)

A-type supergiants are intrinsically the brightest stars at visual wavelengths, and therefore one of the best potential extragalactic distance indicators. These stars present a complex atmospheric physics with a large energy and momentum density of the radiation field, in combination with an extended and tenous atmosphere and a stellar wind. One of the best tracers of these expanding envelopes are the UV lines of different ions (mainly MgII, AlII, SiII, CII and FeII). The scarce works on the UV spectrum of these stars show that high resolution UV spectroscopy and variability analysis are crucial to make progress in the understanding of A-type supergiants atmospheres. A number of important issues remain open. We summarize here the major findings on the winds of A-supergiants in the UV range and the derived open questions. Simultaneously, we address the critical importance of a UV mission to solve them.

The high temperature component of the AG Dra symbiotic system: The impact of past and future UV observations

R. González-Riestra (XMM SOC, VILSPA, Spain), R.F. Viotti (IASF-Roma,INAF,Italy), C. Rossi (La Sapienza University, Roma, Italy), et al.

We discuss the many interesting features of the symbiotic binary AG Dra with special regards to its variable supersoft X-ray emission and to the role that UV observations have had and will have in unveiling the nature of this and other interactive binaries.

Long Slit Spectrograph for WSO/UV: some design considerations

Dr. Maxim Yushkin, V.E. Panchuk, B.M. Shustov, M.V. Yushkin

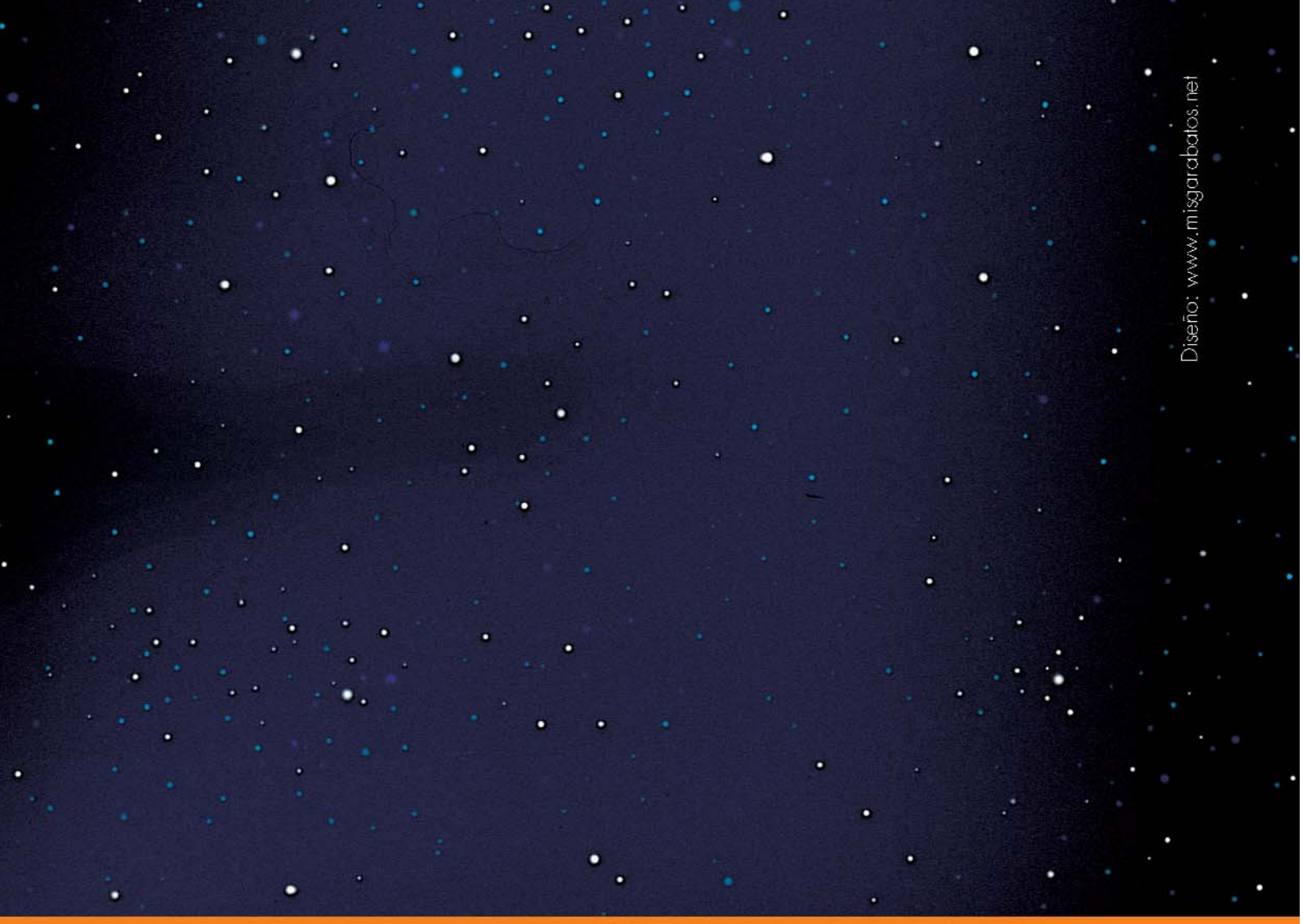
We examine an earlier proposed two-channel design if Long Slit Spectrograph (LSS) for WSO/UV. There are some disadvantages in such scheme of the spectrograph. First, the two-channel design is not satisfied requirements for spectral and spatial resolution. Second, none of the photocathode types is able to provide high quantum efficiency in the operative wavelength interval of LSS. Consequently, it is need to use separate detectors in the each channel. Third, the detector(s) on the Rowland circle must be placed in front of the focal plane of the telescope, i.e., in the volume occupied by the field-camera unit, thereby limiting substantially the stiffness and stability of the entire module of the optical bench of T-170 telescope (and requires complete redesign of the arrangement of the focal plane of the telescope). We suggest considering a new layout of LSS with fixed optical elements based on the aperture segmentation principle. We propose to subdivide the entire spectral range of LSS into three channels. To solve the problem of placing the detector (near the optical table), a varied line -space grating is mounted farther away from the entrance slit and produces the spectrum image at a smaller distance compared with a conventional Rowland spectrograph.

FUV spectroscopy of the central star of the planetary nebula Sh 2-216

Marc Ziegler (Institut fuer Astronomie und Astrophysik, Universitaet Tuebingen, Germany), Thomas Rauch (Institut fuer Astronomie und Astrophysik, Universitaet Tuebingen, Germany), Klaus Werner (Institut fuer Astronomie und Astrophysik, Universitaet Tuebingen, Germany), Jeffrey W. Kruk (Department of Physics and Astronomy, Johns Hopkins University, Baltimore, MD 21218, USA), Cristina Oliveira (Department of Physics and Astronomy, Johns Hopkins University, Baltimore, MD 21218, USA)

We present a detailed NLTE spectral analysis of the FUV spectrum of the central star of the planetary nebula Sh 2-216. The FUSE spectrum is strongly contaminated by interstellar absorption and thus, we have to simultaneously model both, the stellar as well as the interstellar spectrum in order to identify strategic metal lines which are only accessible in the FUV wavelength range and necessary to determine the photospheric parameters reliably.

NOTES



Diseño: www.misgarabatos.net

NUVA

VNIVERSITAS COMPLVTENSIS MATRITENSIS

OPTICON

esa

ASTRO CAM
Astrofísica Comunidad de Madrid

CSIC

gmv
INNOVATING SOLUTIONS