FEEDING THE GIANTS: ELTS IN THE ERA OF SURVEYS

SCIENTIFIC RATIONALE

Over the next decade, by the time of first-light of the Extremely Large Telescopes (ELTs), an ncredible wealth of data will become available through many new survey facilities. Astronomy will enter an era of surveys. At the same time, ELTs will open a new parameter space of unprecedented sensitivity and spatial resolution. This workshop is aimed at exploring the synergies between these two approaches. It will review ongoing and forthcoming survey projects and explore the developments that these will bring to a wide range of science areas, including exo-planets, star formation, stellar populations, galaxy formation/evolution and cosmology.

It will address two broad questions:

- Along with surveys conducted by current and forthcoming observatories, how will the upcoming dedicated survey facilities (such as, to name just a few, KEPLER, GAIA, LSST, DES, VST, VISTA, Pan-STARRS, WFIRST, SCUBA-2, WISE, EUCLID, PLATO, SKA and pathfinders, etc.) profit from follow-up by the ELTs?
- To what extent do the ELTs (GMT, TMT, E-ELT) require surveys to prepare scientific breakthroughs?

The goal is to bring together the survey and ELT communities and to define first strategies to maximise the success of both paths.

Feeding the Giants 2011 is jointly organized by OPTICON, INAF-Observatory of Rome, the University of Oxford and ESO. We are grateful to OPTICON for their generous support and to STFC for providing support for UK participants.

Monday, 29th August 2011		
08:30		Registration
09:00		Opening & Welcome
	ELTs and Facilities	
09:10	*Patrick Roche*	The Facilities Landscape in 2020 *Invited Review*
09:50	*Roberto Gilmozzi*	The European Extremely Large Telescope *Invited Review*
10:30	*Patrick McCarthy*	Status of the Giant Magellan Telescope Project *Invited Review*
11:10	COFFEE BREAK	
11:40	*Timothy Davidge*	The Thirty Meter Telescope (TMT) Project *Invited Review*
	Surveys and Facilities	
12:20	*Thijs de Graauw*	The Atacama Large Millimeter/submillimeter Array: Construction and Operations *Invited Review*
12:50	*Mark Clampin*	Overview of the James Webb Space Telescope *Invited Review*
13:20	LUNCH BREAK	
15:30	*Timo Prusti*	GAIA *Invited Review*
16:00	*Phil Marshall*	The Large Synoptic Survey Telescope *Invited Review*
16:30	*Lister Staveley-Smith*	The Square Kilometre Array *Invited Review*
17:00	COFFEE BREAK	
17:30	*Will Sutherland*	Public surveys with VISTA
17:50	*Pietro Schipani*	Commissioning the VST: a new survey machine at ESO Paranal
18:10	*Roberto Scaramella*	Euclid: mapping the geometry of the dark universe
18:30	*William Lee*	The Synoptic All Sky InfraRed Survey (SASIR)
18:50	END OF DAY 1	

Tuesday, 30th August 2011		
	Solar System	
09:00	*Franck Marchis*	Planetary Science in the Eyes of Giant Telescopes *Invited Review*
09:40	*Andrea Milani*	Conditions for a survey of everything to be a Solar System survey
	Extrasolar planets	
10:00	*Anne-Marie Lagrange*	Extrasolar planets and the ELTs *Invited Review*
10:40	*Didier Queloz*	Feeding giant telescopes with transiting planets surveys results
11:00	COFFEE BREAK	
11:30	*Jean-Philippe Beaulieu*	Spectoscopic characterization of exoplanet atmospheres. The synegies of ECHO JWST and ELTs
11:50	*Arnaud Cassan*	EUCLID as a planet hunter : Frozen Mars and Habitable Earths
12:10	*Matthias Tecza*	Experience and recent results from the Gemini-NICI campaign and other planet finding instruments and their application to future ELT exoplanet surveys
12:30	LUNCH	
	Stars and Milky Way	
15:30	*Manuela Zoccali*	Mapping the Galactic Bulge *Invited Review*
16:10	*Marco Castellani*	Gaia in the era of ELT
16:30	*Bacham Eswar Reddy*	Spectroscopic Studies: Galactic Disk populations in the era of GSMTs
16:50	COFFEE BREAK	
	Stellar Astrophysics	
17:20	*Giuseppe Bono*	Stellar systems with the ELTs *Invited Review*
18:00	*Stefan Keller*	Only the best for the Giants: surveys to find the stellar truffles in the Galactic forest
18:20	*Fred Watson*	(1) RAVE - a snack for the giants (2) Galactic Archaeology with HERMES
18:40	*Hans Zinnecker*	First results from SOFIA
19:00	END OF DAY 2 + PUBLIC EVENT @ 21:00	

Wednesday, 31st August 2011		
09:00	*Roger Blandford*	The International case for Giant Segmented Mirror Telescopes *Invited Review*
	Nearby Galaxies	
09:40	*Carme Gallart*	Nearby galaxies: new prospects with ELTs *Invited Review*
10:20	*Laura Greggio*	Resolved Stellar Populations in Virgo in the ELT era
10:40	*Giuliana Fiorentino*	Colour-magnitude diagrams in the E-ELT era.
11:00	COFFEE BREAK	
11:30	*Cirino Pappalardo*	The star formation history of Virgo spiral galaxies. A joint spectral and photometric analysis
11:50	*Chris Evans*	Stellar metallicities beyond the Local Group: the potential of J-band spectroscopy
	Future Instrumentation	
12:10	*Gavin Dalton*	From WEAVE to EVE: Multi-Object Spectroscopy in the next decade
12:30	*Rebecca Bernstein*	Capabilities of the Wide Field Optical Spectrograph for TMT
12:50	*Guy Monnet*	MANIFEST on GMT: complementarity and synergy between ELT and non ELT surveys
13:10		*Conference Photo*
13:30	LUNCH	
15:30	**Social Trip or Free Afternoon**	
	END OF DAY 3	

Thursday, 1st September 2011		
	Future Instrumentation - *continued*	
09:00	*Niranjan Thatte*	HARMONI - seeing the froth on the cream
09:20	*Paolo Ciliegi*	Large field of view and ELT : an impossible marriage?
	Time Variability	
09:40	*Shri Kulkarni*	Time Variablity *Invited Review*
10:20	*Nial Tanvir*	GRBs in the era of ELTs
10:40	*Roberto Mignani*	Optical/IR observations of high-energy sources
11:00	COFFEE BREAK	
	Galaxy Evolution and Cosmology	
11:30	*Carlos Frenk*	Galaxy Evolution and Cosmology *Invited Review*
12:10	*Michele Cirasuolo*	The next generation of near-IR spectroscopic surveys with KMOS and MOONS
12:30	*Francois Hammer (Gavin Dalton)*	Kinematics of the extended gas surrounding the most distant galaxies
12:50	LUNCH	
15:30	*Mark Lacy*	SERVing large telescopes with near-infrared data: stellar mass selection at high redshifts
15:50	*Mattia Vaccari*	HerMES : The Herschel Multi-tiered Extragalactic Survey
	World Café	
16:10	*Markus Kissler-Patig*	World Café
18:10	*Gerry Gilmore*	World Café - Conclusions
21:00	**Conference Dinner**	
Late	END OF DAY 4	

Friday, 2nd September 2011		
	Galaxy Evolution and Cosmology	
09:30	*Carlotta Gruppioni*	PACS Evolutionary Probe (PEP): the major Herschel 100/160 micron extragalactic survey
09:50	*Luigi Spinoglio*	FIR Spectroscopic Cosmological surveys with SPICA
10:10	*Paolo Padovani*	The SKA and its pathfinders and their synergy with the ELTs
10:30	*Andrew Bunker*	The first billion years - Star forming galaxies at z>6 with ELTs and JWST
10:50	COFFEE BREAK	
11:20	*Silvio Lorenzoni*	Star-Forming Galaxies at z~8-9 from HST/WFC3: Implications for Reionization
11:40	*Ikuru Iwata*	Our WISH: Feeding the z>10 Targets to ELTs
	Conference Summary	
12:00	*Richard Ellis*	Concluding Remarks *Invited Summary*
12:30	**END OF CONFERENCE**	

ELTs and Facilities

The Facilities Landscape in 2020

Invited Review

Patrick Roche
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THE EUROPEAN EXTREMELY LARGE TELESCOPE

Invited Review

Roberto Gilmozzi
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STATUS OF THE GIANT MAGELLAN TELESCOPE PROJECT

Invited Review

Patrick McCarthy
Giant Magellan Telescope Project
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I will summarize the status of the GMT project with an emphasis on where our science planning interfaces with large survey facilities. Design studies are underway for three survey class spectrographs that could be used to exploit opportunities offered by LSST and other southern survey programs.

THE THIRTY METER TELESCOPE PROJECT

Invited Review

Timothy Davidge
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A brief review of the TMT project will be presented.

SURVEYS AND FACILITIES

THE ATACAMA LARGE MILLIMETER/SUBMILLIMETER ARRAY (ALMA): CONSTRUCTION AND OPERATIONS

Invited Review

Thijs de Graauw
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The Atacama Large Millimeter/submillimeter Array (ALMA) is an international radio observatory under construction in the Atacama region of northern Chile. It is a partnership among Europe, North America and East Asia in cooperation with the Republic of Chile. ALMA is a combination of two arrays of high-precision submm antennas: one made of 50 12-meter antennas which can be arranged in configurations with diameters ranging from about 150 meters to 16 km. The other, the ALMA compact Array (ACA), consists of twelve 7-meter diameter antennas operating in closely-packed configurations of about 50m in diameter. In addition there will be four more 12-meter antennas to provide the "zero-spacing" information, which is critical for making accurate images of extended objects. All together the collecting area will be 6600 square meters. The antennas will be equipped with sensitive (sub)millimeter-wave receivers covering most of the frequency range from 84 to 950 GHz. State-of-the-art microwave, digital, photonic and software systems will be used to capture the signals, transfer them to the correlators as well as maintaining accurate synchronization.

ALMA will enable the astronomical community with a (sub)mm facility to address key questions in all areas of astronomy. It will provide (sub)mm images with Hubble type detail, a velocity resolution of ~100m/s and with great sensitivity and fidelity. This contribution provides an update on the status of construction and reports on progress of the development of the Observatory, the scientific commissioning results and preparations for Early Science observations, to be started later this year. Capabilities for surveys and survey follow-up studies will be addressed.

OVERVIEW OF THE JAMES WEBB SPACE TELESCOPE

Invited Review

Mark Clampin
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The James Webb Space Telescope (JWST) is a large aperture (6.5 meter), cryogenic space telescope with a suite of near and mid-infrared instruments covering the wavelength range of 0.6 μm to 28 μm. JWST's primary science goals are to detect and characterize the first galaxies, and study the assembly of galaxies, star formation, and the formation of evolution of planetary systems. JWST is a segmented mirror telescope operating at ~40K, a temperature achieved by passive cooling of the observatory, via a large, 5-layer membrane-based sunshield. We will review the scientific capabilities of JWST in the context of their synergy with survey facilities, and with the next generation of ground-based Extremely Large Telescopes. We will also present an overview of the observatory design, and report on recent progress in the construction of the observatory and its science instruments.

GAIA

Invited Review

Timo Prusti
ESA

Gaia is a space astrometry mission, a broad survey project following the measurement and operational principles of Hipparcos. It will help solving one of the most difficult yet deeply fundamental challenges in modern astronomy: to create an extraordinarily precise three-dimensional map of about one billion stars throughout our Galaxy and beyond. In the process, it will map their three-dimensional motions, which encode the origin and subsequent evolution of the Galaxy. Through comprehensive photometric and spectroscopic classification, it will provide the detailed physical properties of each star observed: characterising their luminosity, temperature, gravity, and elemental composition. This massive stellar census will provide the basic observational data to tackle an enormous range of important problems related to the origin, structure, and evolutionary history of our Galaxy. In addition, by measuring celestial objects in an unbiased manner, Gaia will provide fundamental data on solar system objects, general relativity and extragalactic objects. The presentation will give an overview of the mission with special emphasis on aspects relevant to optical ground-based Giant telescopes.

THE LARGE SYNOPTIC SURVEY TELESCOPE (LSST)

Invited Review

Phil Marshall
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The Large Synoptic Survey Telescope is a planned 6m-class optical survey telescope with a 10 square degree field of view, designed to reach limiting magnitudes fainter than 24 in each of its 15 second exposures, that will repeatedly image the 20000 square degrees of Southern sky over a period of 10 years. Its 6 filters (ugrizy), high sensitivity and high cadence (a few days, on average) will provide a detailed view of the time-variable sky, while its peta-scale databases of astronomical objects will enable a wide range of galactic and extragalactic science. The goal is to make LSST data products available to scientists around the world, starting at the beginning of the next decade. I will give an introduction to the system and a brief overview of the planned science, highlighting some areas where ELT follow-up observations would be particularly powerful.

THE SQUARE KILOMETRE ARRAY

Invited Review

Lister Staveley-Smith
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The Square Kilometre Array (SKA) and the various SKA pathfinders which will precede it represent a new era of radio astronomy. Alongside ALMA and the next-generation optical facilities exemplified by E-ELT, they will revolutionize our understanding of the epoch of reioinization, the birth of the first galaxies, and the evolution of galaxies. Whilst the Lamda-CDM model remains a success in describing the large-scale formation of dark matter halos, much deeper observational data is required to understand the detailed astrophysics of the acquisition of gas, the formation of stars and black holes, and the various feedback processes involved in galaxy formation.

PUBLIC SURVEYS WITH VISTA

Will Sutherland
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I provide an overview of VISTA, the new 4-m wide-field telescope at Paranal, with VIRCAM the 67-Mpixel near-IR camera. VISTA has been operational since late 2009, with most of the time shared between six large public surveys which span a wide range of Galactic and extragalactic science. I will provide a summary of these, and discuss complementarity with imaging surveys at other wavelengths, and future ELTs.

COMMISSIONING THE VST: A NEW SURVEY MACHINE AT ESO PARANAL

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The VST (VLT Survey Telescope) is a 2.6m survey telescope equipped with a 1x1 deg field camera (OmegaCAM). It is going to be the workhorse of ESO observatories for optical surveys in the upcoming years. The project is a joint venture between INAF, under the leadership of the Astronomical Observatory of Capodimonte, and ESO, where INAF provides the telescope and ESO the enclosure. The commissioning of the telescope has started in 2011 with the challenging aim to deliver the instrument to the scientific community in a few months, starting from the end of the mechanical integration. The status of commissioning is here described, as well as the main results achieved.

EUCLID: MAPPING THE GEOMETRY OF THE DARK UNIVERSE

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We will give an overview of Euclid, a mission proposed within the ESA Cosmic Vision program, due for the last downselection in October. Euclid is a survey mission, which aims to cover most of the extragalactic sky, >15000 sq degs, via a well sampled and large Focal Plane with a FoV of 0.5 sq degs. These areas will be observed with in visible for weak lensing, in NIR imaging (24 mag in Y, J and H) for photoz and in NIR slitless spectroscopy to study baryonic oscillations. In addition Euclid will cover two wide areas, each of 20 sq degs and two magnitudes deeper than the main survey. Besides studying WL and BAO, Euclid will deliver a wealth of information on other cosmological probes and non cosmological topics as well. Euclid wide and deep surveys will be extremely valuable for all the other major astronomical facilities.

THE SYNOPTIC ALL SKY INFRARED SURVEY (SASIR)

William Lee
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The SASIR project aims at a synoptic IR (YJHK) wide-field survey with a dedicated 6.5m telescope to be located at San Pedro Martir Observatory (Baja California). Besides performing the deepest all sky IR survey to date for static sources, from QSOs to the local solar neighborhood, SASIR will characterize the transient infrared sky and provide a catalog of sources for ELT study and follow-up. SASIR is a joint endeavor between the Mexican astronomical community, the University of California and the University of Arizona.

SOLAR SYSTEM

PLANETARY SCIENCE IN THE EYES OF GIANT TELESCOPES

Invited Review

Franck Marchis
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I will discuss the potential of Extremely Large telescopes to study our close space neighborhood, mostly the solar system composed of large planets, their satellites and small solar system bodies but also the vicinity of our sun and the exoplanets. Synergic activities with space exploration programs from NASA, ESA and other space agencies will be discussed. The interest of the ELTs in the context of large planetary-oriented surveys such as PanStarrs and LSST will be emphasized.

CONDITIONS FOR A SURVEY OF EVERYTHING TO BE A SOLAR SYSTEM SURVEY

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Multiple usage of the same images for different scientific goals is attractive, but is there a good observing strategy allowing this? For moving objects of our solar system, there are minimum requirements for orbit determination, with implication on observation scheduling, use of filters, exposure times, fill factor, and many other survey parameters. The use of computationally aggressive orbit determination methods may allow to use less observations, but imposes very tight constraints on image quality and processing. The experience with Pan-STARRS 1, and the expectations from LSST, are discussed from this point of view.

EXTRASOLAR PLANETS

EXTRASOLAR PLANETS AND THE ELTS

Invited Review

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Our knowledge on extra-solar planetary systems has dramatically improved since fifteen years, thanks to the discovery of more than 500 planets, with a wide, unexpected range of characteristics and around different types of stars. In the forthcoming years, the number of known exoplanets and their range of properties will expand at an unprecedented rate, thanks in particular to new, large surveys using panoply of already proven or newer techniques which have just become mature. The understanding of the origin of planetary systems and of their diversity, and the search for Earth twins in the Habitable Zone are probably the most important science drivers to these new projects. The ELTs will allow confirming definitely some of the most exciting planet candidates found in these surveys, especially the lightest ones, and discovering new ones. The ELTs will also allow direct imaging of a large variety of planets. They will thus allow exploring the planet (mass, separation) parameter space with an unprecedented coverage. In addition, thanks to the ELTs large apertures, spectroscopic characterization at some level will be possible for most of these planets.

I will briefly describe the data available today, some aspects of the current knowledge on planetary systems formation, and the expectations from forthcoming projects. I will then review the main expectations from the ELTs, emphasizing the synergy with already completed or contemporary surveys.

FEEDING GIANT TELESCOPES WITH TRANSITING PLANETS SURVEYS RESULTS

Didier Queloz
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The success of the WAPS survey and the expectations of finding numerous Neptune and rocky planets orbiting bright stars by its successor NGTS to be installed in 2012 at Paranal and possibly later the future PLATO mission demonstrates how important transiting planets will be for giants telescopes to conduct details analysis on the dynamical history and atmosphere of these planets. I plan to review the key results obtained on exoplanets research made possible by the many transiting planets found on bright stars and their follow-up observations with the current generation of large telescope. I will make an overview of the potential of the next generation of transit survey from the ground (NGTS) and from space (PLATO).

SPECTOSCOPIC CHARACTERIZATION OF EXOPLANET ATMOSPHERES. THE SYNEGIES OF ECHO JWST AND ELTS

Jean-Philippe Beaulieu
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The Exoplanet Characterisation Observatory, EChO, preselected by ESA for the Cosmic Vision M3 program, will be the first dedicated mission to investigate the physics and chemistry of Exoplanetary Atmospheres. It will place our Solar System in context and by addressing the suitability of planets for life will allow us to address some of the fundamental questions of the Cosmic Visions programme:

- What are the conditions for planet formation and the emergence of life?
- Are systems like our Solar System rare or very common?
- How does the Solar System work?

EChO is a 1.4m space telescope that will provide simultaneous multi-wavelength (0.4-16 microns) spectroscopic observations with resolutions in the range R=300-20 on a stable platform that will allow very long exposures. The use of passive cooling, few moving parts and well established technology gives a low-risk and potentially long-lived mission. ECHO will observe a large portfolio of exoplanets to study them in their diversity, ranging from hot jupiters, Neptunes and Super Earth orbiting various host stars to habitable super Earth orbiting M dwarfs.

During primary transits (when the planet passes in front of the star), the exoplanet's atmosphere is probed through the detection of absorption features. Before and after secondary transits (when the planet passes behind the star), the reflected/scattered component provides information on molecular abundances through the observation of absorption bands. In the thermal regime, the spectrum can show emission or absorption features, depending on the gradient of the thermal profile. It is important to observe both the reflected/scattered component and the thermal component, and also to observe, for a given atmospheric species, several bands of different intensities to probe different atmospheric levels. I present ECHO, then I will discuss the synergies between ECHO, JWST and ELTs.

EUCLID AS A PLANET HUNTER : FROZEN MARS AND HABITABLE EARTHS

Arnaud Cassan
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In the last fifteen years, astronomers have found over 550 exoplanets including some in systems that resemble our very own solar system. These discoveries have already challenged and revolutionized our theories of planet formation and dynamical evolution. Several different methods have been used to discover exoplanets, including radial velocity, stellar transits, direct imaging, pulsar timing, astrometry, and gravitational microlensing which is based on Einstein's theory of general relativity. So far 10 exoplanets have been published with this method. While this number is relatively modest compared with that discovered by the radial velocity method, microlensing probes a part of the parameter space (host separation vs. planet mass) not accessible in the medium term to other methods. The mass distribution of microlensing exoplanets has already revealed that cold super-Earths (at or beyond the "snow line" and with a mass of around 5 to 15 Earth mass appear to be common. We detected a scale 1/2 model of our solar system, several cold Neptunes/Super Earth, shown that our detection efficiencies extends to 1 Earth mass planets. We have made the first measurement of the frequency of ice and gas giants beyond the snow line, and have shown that this is about 7 times higher than closer-in systems probed by the Doppler method. This comparison provides strong evidence that most giant planets do not migrate very far. Microlensing is currently capable of detecting cool planets of super-Earth mass from the ground (and on favourable circumstances down to 1 Earth), with a network of wide-field telescopes strategically located around the world, could routinely detect planets with mass as low as the Earth. Statistics about Mars to Earth mass planets, extending to the habitable zone will be achieved with space based wide field imagers such as EUCLID or WFIRST. EUCLID is a 1.2m telescope with optical and IR wide field imagers and slitless spectroscopy, proposed to ESA Cosmic Vision to probe for Dark Energy, Baryonic acoustic oscillation, galaxy evolution, and an exoplanet hunt via microlensing. A 4 months microlensing program will already efficiently probe for planets down to the mass of Mars at the snow line, for free floating terrestrial or gaseous planets and habitable super Earth. A 10+ months survey would give a census on habitable Earth planets around solar like stars. This is the perfect complement to the statistics that will be provided by the KEPLER satellite, and these missions combined will provide a full census of extrasolar planets from hot, warm, habitable, frozen to free floating.

EXPERIENCE AND RECENT RESULTS FROM THE GEMINI-NICI CAMPAIGN AND OTHER PLANET FINDING INSTRUMENTS AND THEIR APPLICATION TO FUTURE ELT EXOPLANET SURVEYS

Matthias Tecza
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The Gemini-NICI planet finding campaign is a dedicated survey to search for and directly image planets around ~300 nearby stars with unprecedented sensitivity. Many candidate systems have been discovered, and we are now in the process of confirming these via 2nd-epoch observations. I will summarise the campaign's goals, design, target selection and how this approach can be used to optimise future ELT exoplanet surveys, and how future instrumentation, eg EPICS at the E-ELT, improves the contrast and hence detestability over current 8m telescope instrumentation. I will also present the two candidates detected, confirmed and published by NICI so far -- one of the coolest young 'benchmark' brown dwarfs yet discovered, and a young brown dwarf companion to PZ Tel B on a highly eccentric orbit.

STARS AND MILKY WAY

MAPPING THE GALACTIC BULGE

Invited Review

Manuela Zoccali
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GAIA IN THE ERA OF ELT

Marco Castellani
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I will present a review of the capability of GAIA in the field of galactic stellar population, with particolar emphasis on possibilities opened by a really huge stellar catalogue, such as the one that will be released by GAIA, and the synergies with future projects like ELTs. GAIA will redefine our knowledge of stellar population in the Galaxy, in such a way that every extended survey will surely take advantage from the quality and the quantity of its data.

SPECTROSCOPIC STUDIES: GALACTIC DISK POPULATIONS IN THE ERA OF GSMTS

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I will describe use of large aperture telescopes equipped with the high resolution spectrographs to understand the Milky Way galaxy in more quantitatively. Talk will make emphasis on the GAIA astrometry and the follow up high resolution spectroscopy to identify substructures in the disk, and within the thick and thin disk components. Currently, more accurate kinematic studies and the reach in depths are limited, and the GAIA will improve the situation many folds. Accurate high resolution spectroscopy will help to understand the chronological formation and evolution of the Milky Way.

STELLAR ASTROPHYSICS

STELLAR SYSTEMS WITH THE ELTS

Invited Review

Giuseppe Bono
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We present recent findings concerning deep and accurate near-infrared Color-Magnitude Diagrams of Galactic globular clusters. On the basis of these findings we discuss the impact that ELTs can have on stellar astrophysics and on the absolute age of stellar systems. In particular, we will focus our attention on faint main sequence stars and on evolved evolutionary phases (extreme horizontal branch stars, white dwarfs). Finally, we briefly mention possible avenues among GAIA and ELTs concerning the cosmic distance scale.

ONLY THE BEST FOR THE GIANTS: SURVEYS TO FIND THE STELLAR TRUFFLES IN THE GALACTIC FOREST

Stefan Keller
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We will soon commence a series of surveys targeting the formation and evolution of the Milky Way. As we do so these surveys will find elusive needles in the haystack - stars that are dynamical and chemical tracers of the Milky Way. The SkyMapper telescope will perform the Southern Sky Survey to a limiting magnitude of $g < 23$. This survey is a multi-colour and multi-epoch survey utilising a filter set optimised for stellar astrophysics. Namely, SkyMapper's filter set provides unparalleled resolution of stellar temperature, surface gravity and metallicity within the stellar populations of the Milky Way. This photometric survey will form the input catalogue to surveys utilizing the AAT's AAOmega and HERMES multi-object spectrographs. However, the majority of high impact targets will remain out of reach of current instrumentation. Full exploitation of the extremely metal-poor stars and halo mass tracers such as blue horizontal branch stars and K giants, must await the era of the ELTs. In this talk I will discuss the advances in galactic science that will result from feeding these stars to the giants.

(1) RAVE - A SNACK FOR THE GIANTS (ON BEHALF OF THE RAVE COLLABORATION) (2) GALACTIC ARCHAEOLOGY WITH HERMES (ON BEHALF OF FREEMAN ET AL.)

Fred Watson
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(1) The RAVE survey of stellar radial velocities and atmospheric parameters has now amassed half a million spectra for some 420,000 individual objects. This talk will present an overview of the project, highlighting some recent science results. (2) The HERMES multi-object spectrograph will be commissioned on the AAT in early 2013. Its primary science driver is GALAH (GALactic Archaeology with HERMES), a million star survey of velocities and abundance parameters. This talk will present an update on the project.

FIRST RESULTS FROM SOFIA

Hans Zinnecker
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SOFIA, the Stratospheric Observatory for Infrared Astronomy, is now collecting data with its 2.7m telescope aboard a Boeing 747, both in quasi diffraction-limited imaging mode (20-40mu) and in high-resolution spectroscopic mode at 1.2-1.9 THz freq. It will be a workhorse for mid- and far-infrared astronomy after Herschel will run out of cryogen in late 2012. SOFIA has a predicted lifetime of 20 years and will also be deployed to the southern hemisphere; it will hence feed the giants ELT & GMT.

THE INTERNATIONAL CASE FOR GIANT SEGMENTED MIRROR TELESCOPES

Invited Review

Roger Blandford
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The great success of ten meter class ground-based telescopes as well as HST provides a foundation for continuing scientific discovery and answering fundamental questions using thirty meter class ground-based telescopes equipped with adaptive optics. Three projects are well underway and the foreseeable science program guarantees that they will be collectively oversubscribed making great discoveries about the young universe, exoplanets and contemporary galaxies in particular. History encourages one to believe that the unforeseen program will be larger and even more significant. Meanwhile, ambitious survey telescopes, operating throughout the electromagnetic spectrum, have been developed and present a complementary approach to modern astronomical research. In particular, the Large Synoptic Survey Telescope is now on a road to completion by the end of the decade, However, bringing all three projects to fruition at a time of global economic stress is proving to be a challenge and international cooperation will be more important than ever. These issues will be discussed in the context of the US Decadal Survey in Astronomy and Astrophysics and in the light of more recent developments.

NEARBY GALAXIES

NEARBY GALAXIES: NEW PROSPECTS WITH ELTS

Invited Review

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I will review current research on galaxy formation and evolution using the information provided by resolved nearby galaxies, and discuss how this work will likely be expanded by the new observational opportunities offered by the ELTs.

RESOLVED STELLAR POPULATIONS IN VIRGO IN THE ELT ERA

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The expected imaging capabilities of the E-ELT will offer the unique possibility to study resolved stellar populations in high surface brightness regions of galaxies in the Virgo Cluster. We present the results of a detailed study aimed at characterizing the capabilities of E-ELT in the context of two specific applications: the recovery of the star formation history in late type galaxies and the determination of the metallicity distribution in spheroids. We performed end-to-end simulations for these two cases applied to galaxies in the Virgo Cluster. This include: the generation of simulated images of test stellar fields, their photometric measurement, and the detailed comparison with the input data. The derived CMD''s have then been analyzed to assess the accuracy with which the given star formation history and metallicity distribution could be recovered. We find that with E-ELT it will be possible to perform detailed studies of stellar populations in Virgo Cluster galaxies inside the effective radius in ellipticals, and down to the very center of disks.

COLOUR-MAGNITUDE DIAGRAMS IN THE E-ELT ERA

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We present our recent results concerning one of the key science goals for an extremely large telescope (ELT): a study of individual stars down to faint magnitudes in a range of very crowded environments. We studied the capabilities of a multi-conjugate adaptive optics (MCAO) assisted imager working at the diffraction limit, in IJHKs filters, on a 42m diameter ELT to carry out accurate stellar photometry at the distance of the Virgo cluster. As a basis for realistic simulations we have used the phase A studies of the European-ELT project, including the MICADO imager and the MAORY MCAO module. We convolved a complex resolved stellar population, as typical of a dwarf spheroidal galaxy, with the telescope and instrument performance expectations to create realistic images. We then tested the ability of currently available photometric packages (e.g. STARFINDER and DAOPHOT) to handle these simulated images. We also made a simple comparison between these simulations and what can be expected from a single conjugate adaptive optics feed to MICADO and also the NIRCAM imager on the James Webb space telescope. Finally, we will present new cases of an elliptical and of a blue compact dwarf galaxy, discussing the dependence of our results on the selected stellar populations.

THE STAR FORMATION HISTORY OF VIRGO SPIRAL GALAXIES: A JOINT SPECTRAL AND PHOTOMETRIC ANALYSIS

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The Virgo cluster is an ideal laboratory to study environmental effects on galaxy evolution, because it is rich in spirals and dynamically young. From observations we know that the amount of atomic gas in Virgo spirals is less than that of galaxies in the field. In particular cluster spirals show truncated HI disks (Cayatte et al. 1990). For those galaxies that also show a symmetrical stellar distribution, ram pressure stripping is the most probably origin of the gas-disk truncation. Ram pressure stripping is the hydrodynamical interaction between the interstellar medium (ISM) of a spiral galaxy that is moving inside the potential well of a cluster, and the intracluster medium (ICM). If the dynamical pressure exerted by the ICM is larger than the restoring force due to the galactic potential, the galaxy loses gas from the outer disk. Once the gas has left the galactic disk, star formation, that is ultimately fueled by the neutral hydrogen, stops. We can consider the halt in the star formation as a clock that gives the time at which the galaxy passed the cluster center. The stellar populations evolve then passively and this should be detectable both in optical spectra and photometry. In this talk I will present two new methods that allow us to analyze spectra and photometric fluxes jointly. After extensive testing, I will reconstruct the star formation rate of NGC 4388 applying this new tools, to recover the "stripping age", i.e. the time elapsed since the halt of star formation.

STELLAR METALLICITIES BEYOND THE LOCAL GROUP: THE POTENTIAL OF J-BAND SPECTROSCOPY

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Deep imaging from HST and 8-10m class telescopes is already feeding us with targets for extra-galactic stellar spectroscopy which are beyond the sensitivity of current facilities - effective follow-up requires the light-gathering power and image quality of the ELTs. I will present new simulations of J-band spectroscopy of extragalactic red giants and supergiants, undertaken as part of the EAGLE instrument study, but also relevant for other ELT instruments such as HARMONI, IRIS, and IRMS. In terms of of recovering stellar metallicities for a given target, this method is more sensitive than contemporary methods using the calcium triplet, offering the potential of extragalactic stellar abundances out to tens of Mpc.

FUTURE INSTRUMENTATION

FROM WEAVE TO EVE: MULTI-OBJECT SPECTROSCOPY IN THE NEXT DECADE

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I will describe plans for the WEAVE instrument for the WHT which aims to provide medium and high resolution spectroscopy for 10^6 (10^5) stars from the GAIA catalogue, as well as surveying dark energy and galaxy evolution. I will conclude with a forward look to the extension of these observations to the EVE instrument proposed for the E-ELT.

CAPABILITIES OF THE WIDE FIELD OPTICAL SPECTROGRAPH FOR TMT

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The Multi-Object Broadband Imaging Echellette (MOBIE) is the seeing-limited, wide-field multi-object optical imaging spectrograph planned for first-light operation on the Thirty Meter Telescope (TMT). In this talk, I will focus on its observational modes and capabilities, briefly describe its design, and compare it to the existing instruments that we use on current generation of large telescopes.

MANIFEST ON GMT: COMPLEMENTARITY AND SYNERGY BETWEEN ELT AND NON ELT SURVEYS

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The talk addresses potential scientific breakthroughs opened by fully exploiting the GMT wide-field capability with the combination of the MANIFEST multi-fiber system and the NIRMOS, GMACS and G-CLEF seeing-limited spectrometers. Complementaities and synergies with presently planned large scale surveys are discussed.

HARMONI - SEEING THE FROTH ON THE CREAM

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HARMONI is the first light integral field spectrograph concept for the E-ELT. A workhorse instrument, it covers a large parameter space, from visible to near-infrared wavelengths, working with many different flavours of AO. It provides spectral resolving powers from 4000 to 20000, and a range of spatial pixel scales matched to the diffraction limit, and to the "seeing". HARMONI is designed to satisfy the requirements of a broad mix of scientific programs, from exo-planets to distant galaxies, from resolved stellar populations to spectra of GRBs and nearby galaxies. As an instrument designed for in-depth studies of individual targets, HARMONI will be best suited to observe the high luminosity end of most survey samples. But it will provide incredible detail, with high spatial and spectral resolution - it is built to study the morphologies, kinematics, dynamics and chemical composition of a host of astrophysical sources. We provide a brief overview of HARMONI''s capabilities, and highlight its synergies with other facilities expected to come online in the 2010s and early 2020s.

LARGE FIELD OF VIEW AND ELT : AN IMPOSSIBLE MARRIAGE?

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Over the next decade, the Extremely Large Telescopes (ELT) will open a new parameter space of unprecedented sensitivity and spatial resolution. However, large field of view (suitable for survey studies) and spatial resolution near the diffraction limit are not good friends. Multi-conjugate adaptive optics (MCAO) can provide an image quality comparable to the diffraction limit over an "extended" field of view. The Phase-A study of MAORY, the E-ELT MCAO module, has shown that the corrected field can be up to 2-2.5 arcmin in diameter, including the technical field to search for few faint natural guide stars which are anyhow required. The E-ELT imaging camera MICADO, characterized by superb capabilities in terms of sensitivity, resolution and astrometric precision, uses the central corrected field of MAORY (53"x53", with a pixel scale of 3 mas). An hypothetical imager exploiting the full MCAO-corrected field, keeping in mind the natural guide stars search field and trying to keep the number of detectors to a reasonable value, could cover a maximum field of 1.5x1.5 arcmin with a pixel size of 8-10 mas: such a field would be only a factor ~3 larger in area than MICADO. These numbers confirm the difficulty of the giant telescopes to work alone as survey facilities, highlighting the absolute need for a sinergy among different facilities. The E-ELT MCAO module performance will be reviewed in this contribution, addressing crucial aspects such as size of field of view, wavelength coverage and also natural guide stars requirements, an aspect where the availability of deep (down to H=21) infrared catalogues could be of fundamental importance.

TIME VARIABILITY

TIME VARIABILITY

Invited Review

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GRBs IN THE ERA OF ELTs

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Gamma-ray bursts are amongst the most extreme objects known to astrophysics, and their brightness across a broad wavelength range makes them powerful probes of galaxy evolution. Extremely Large Telescope observations of GRBs, their afterglow light, and host galaxies will provide detailed information about the high redshift universe which cannot be obtained by other means.

OPTICAL/IR OBSERVATIONS OF HIGH-ENERGY SOURCES

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The Fermi Gamma-ray Space Telescope has now discovered almost 2000 gamma-ray sources in its all-sky scan and many more will be discovered during the mission lifetime. The e-ROSITA instrument, to be launched in 2012 on the Spectrum X/gamma mission, will perform the deepest X-ray survey ever since the time of ROSAT and will detect hundreds of thousands X-ray sources. Many of those, will be monitored and observed by the LOFT X-ray mission, recently selected for the ESA M3 call for which MSSL is PI of the main instrument. In this talk, I summarise the needs, perspectives, and plans of multi-band optical follow-ups of high-energy sources to be performed with survey telescopes and the ELTs.

GALAXY EVOLUTION & COSMOLOGY

GALAXY EVOLUTION & COSMOLOGY

Invited Review

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THE NEXT GENERATION OF NEAR-IR SPECTROSCOPIC SURVEYS WITH KMOS AND MOONS

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In recent years, several large spectroscopic surveys at optical wavelength (0.3 - 1 micron) have been undertaken and have provided key information on the formation and evolution of galaxies in the local Universe and up to z~1. However, near-IR spectroscopy at wavelength > 1micron is now crucial to extend our knowledge beyond z~1, through the redshift desert (1.5<z<2.5) and into the epoch of re-ionization at z>7. Here I will present two new facilities that have the potential to revolutionise this field. I will first summarise the current status and the observational programs planned for KMOS, the new multi-object near-IR Integral Field Spectrograph for the VLT, that will start operations at Paranal in early 2012. Exploiting the large multiplex and the ability to perform 3D spectroscopy, KMOS will be a powerful instrument to determine dynamical and chemical properties of galaxies. I will also present a new design for a Multi-Object Optical and Near-infrared Spectrograph (MOONS) selected by ESO for a Phase A study. This new instrument, featuring a large multiplex and a wide wavelength coverage combined with the power of the VLT will provide a unique resource serving a wide range of Galactic, Extragalactic and Cosmological studies. Both KMOS and MOONS will offer a unique source of targets and pave the way for detailed follow-up with the E-ELT.

KINEMATICS OF THE EXTENDED GAS SURROUNDING THE MOST DISTANT GALAXIES

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The gas content of galaxies is increasing rapidly with the redshift. OPTIMOS-EVE at E-ELT will be able to study the kinematics of the extended ionised gas to z=3.5 (z=13) using the OII (Lyalpha) lines, respectively. Spatially resolved kinematics will provide a significant leap in understanding the different processes that occur within the inner halo of star forming galaxies. Combination with SKA (neutral gas) and ALMA (molecular gas) will bring a full census of the gas kinematics. The needs for preparatory surveys to feed a Multiple Object Spectrograph exploiting the whole field of view of the E-ELT will be discussed, from Galactic stars to distant galaxies.

SERVING LARGE TELESCOPES WITH NEAR-INFRARED DATA: STELLAR MASS SELECTION AT HIGH REDSHIFTS

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SERVS is an 18deg^2 survey to ~2 microJy in the [3.6] and [4.5] micron bands of warm Spitzer, in fields with rich datasets in other wavebands. The key driver for this survey is to obtain stellar masses and photometric redshfts for ~1 million galaxies out to z~5 to study both environmental effects on galaxy formation, and to observe rare objects such as high redshift quasars and rich galaxy clusters in their cosmological context. SERVS provides us with a unique testbed for galaxy formation models, and will be an excellent resource for providing large telescopes with follow-up targets. In this talk I will describe SERVS, and present some early science results on galaxy clusters and AGN feedback.

HERMES : THE HERSCHEL MULTI-TIERED EXTRAGALACTIC SURVEY

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Infrared extragalactic surveys contain a substantial amount of information about the origin of galaxies and active galactic nuclei and thus about the evolutionary history of star formation, metal production and gravitational accretion, presenting a widely complementary view with respect to optical galaxy surveys. The far-infrared/sub-millimetre waveband is of particular importance because it captures the optical and ultra-violet radiation from star formation that has been absorbed by dust and reradiated. Although sub-millimetre surveys to date have been extremely limited, particularly in area and numbers of sources, they have already presented a serious challenge for theorists, revealing many more luminous (i.e. high star formation rate) galaxies at high redshifts than predicted by simple prescriptions within the hierarchical merging paradigm. The Herschel Multi-tiered Extragalactic Survey (HerMES) charts the obscured star formation and its evolution in galaxies throughout cosmic history. HerMES maps the sky using two instruments, Herschel-SPIRE (at 250, 350 and 500 micron) and Herschel-PACS (at 100 and 160 micron), in a nested set of fields closely coordinated with the PACS Evolutionary Probe (PEP) survey that brings unprecedented depth and breadth to galaxy evolution studies. Individual fields range in size from 0.01 to 12 deg^2 and total more than 70 deg^2. HerMES will detect 50-100 thousand galaxies above 5 sigma and will thus measure the total infrared emission of galaxies, study the evolution of the luminosity function, measure their clustering properties, and probe populations of galaxies below the confusion limit through lensing and statistical techniques. HerMES fields are some of the best studied sky areas, making maximum use of ancillary surveys from radio to X-ray wavelengths, and in particular of Spitzer IRAC and MIPS imaging, to facilitate redshift determination, rapidly identify unusual objects, and understand the relationships between thermal emission from dust and other processes. HerMES will thus provide a rich data set legacy for the greater astronomical community to mine for years to come. I will present the survey and its radio to X-ray ancillary datasets, describe some of its early science results and outline opportunities for follow-up in the era of ALMA, Webb and ELTs.

PACS EVOLUTIONARY PROBE (PEP): THE MAJOR HERSCHEL 100/160 MICRON EXTRAGALACTIC SURVEY

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The PACS Evolutionary Probe (PEP) is one of the main Herschel Guaranteed Time extragalactic key projects. It is structured as a "wedding cake" survey, based on four different layers: from the wide and shallow COSMOS field, through medium size areas like the Lockman Hole, all the way down to the confusion limited, pencilbeam observations in GOODS-N and GOODS-S.

The main aim of PEP is to study galaxy evolution and the nature of the cosmic infrared background up to high redshifts by means of deep observations in the far-infrared (70, 100 and 160 micron). Here we describe the scientific motivation for PEP and its role in complementing the Herschel surveys, providing an overview of the first science results over a wide range of galaxy evolution studies. The thousands of extragalactic dusty objects collected by Herschel in the far infrared will await ELT to be resolved and fully characterized, since the amazing resolving power of ELT will be unique in allowing us to understand the detailed physics of these dust-obscured galaxies in the early Universe.

FIR SPECTROSCOPIC COSMOLOGICAL SURVEYS WITH SPICA

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Spectroscopic cosmological surveys in the far-IR with the SAFARI FTS imaging spectrometer onboard of the future JAXA led SPICA mission will be able to study galaxy evolution directly separating and quantifying the star formation and black hole accretion processes in galaxies as a function of redshift. I will show the feasibility of such surveys through simulations that make use of both observed luminosity functions and theoretical models for galaxy formation and evolution. The relations assumed between the line and continuum emission to trace AGN and star formation activity have been derived from the observations of local samples of galaxies. The results indicate that rest-frame mid-IR and far-IR spectroscopy with the SAFARI FTS is very efficient to study galaxy evolution from the local to the distant (z~3) Universe. Different and independent galaxy evolution models predict about 2300-3600 sources to be spectroscopically detected (at S/N=5) in three spectral lines in a 0.5 deg^2 survey of 450 hours of integration time.

THE SKA AND ITS PATHFINDERS AND THEIR SYNERGY WITH THE ELTS

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I present simple but robust estimates of the types of sources making up the faint, sub-microjansky radio sky, which include star-forming galaxies and radio-quiet active galactic nuclei but also low radio power ellipticals and dwarf galaxies. I then estimate the optical magnitudes these objects are likely to have, which are important for source identification and the synergy between the SKA and its various pathfinders with the ELTs. The ELTs will be a match to the next generation radio telescopes but only on small areas and above 0.1 - 1 microJy (at 1.4 GHz). On the other hand, the ELTs might turn out to be the main, or perhaps even the only, facilities capable of securing optical counterparts and especially redshifts of microjansky radio sources.

THE FIRST BILLION YEARS - STAR FORMING GALAXIES AT z>6 WITH ELTS AND JWST

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I will discuss the prospects with ELTs and JWST of investigating star forming galaxies in the first billion years (at redshifts beyond 6), through spectroscopic follow-up of a population of Lyman-break galaxies recently discovered with new infrared data WFC3 from HST. The rest-UV colours of these early galaxies are very blue, and spectroscopy has revealed some Lyman-alpha emission at z~6. I will discuss how ELTs and JWST can explore the evolution of this drop-out population, potentially addressing its role in reionizing the Universe, and the evolution of dust, metallicity and the IMF as the Population III epoch is approached.

STAR-FORMING GALAXIES AT Z~8-9 FROM HST/WFC3: IMPLICATIONS FOR REIONIZATION

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I will present a selection of robust galaxy candidates at redshift z ~ 8-9 with recent data from WFC3 on HST, including the Hubble Ultra Deep Field and the Early Release Science images of the GOODS-South field. We now have enough candidates to fit the characteristic number density and the characteristic luminosity for the UV Schechter function at that redshift. We found fewer Lyman-break galaxy at z~8-9 than expected from lower redshift data (z~3-7), and that suggests a significant evolution. Implications for the reionization of the universe will be discussed.

OUR WISH: FEEDING THE Z>10 TARGETS TO ELTS

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Wide-field Imaging Surveyor for High-redshift (WISH) is a future Japanese 1.5m wide-field infrared (1-5micron) space telescope project. Pre-project phase (i.e., pre-Phase A) R&D and conceputual study is being conducted by WISH Working Group under JAXA/ISAS Science Committee since 2008. The primary science goal of WISH is to obtain deep (28AB) and enough wide-area (100 deg^2) multi-color data to get samples of 10^4-10^5 galaxies at z=8-10 and 10^3-4 galaxies at z>10, including 50-100 galaxies above z=14. A large fraction of these galaxies can be detected by the AO-assisted mid-resolution spectroscopy by ELTs. During the surveys, WISH also provides the large new samples of type-Ia SNe whose multi-color light curves are obtained at the rest-frame NIR wavelength. These are also essential targets for AO assisted ELTs. For more information about WISH, please visit http://www.wishmission.org/

CONFERENCE SUMMARY

CONCLUDING REMARKS

Invited Summary

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POSTER CONTRIBUTIONS

DETERMINATION OF PHYSICAL AND GEOMETRICAL ELEMENTS OF THE TWO SHORT PERIOD ECLIPSING BINARY STAR (AK-HER,44 I BOO)

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LARGEST SAMPLE

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I will present my unique catalogue of more than 19,000 radio galaxies, and preliminary and future results from this sample. The sample is unique because it is extremely large, it is only limited in its optical (SDSS) and radio (FIRST) flux (i.e. no bias in colour and redshift), and has large spectroscopic follow up (~11,000 galaxy with good spectra). I will also show how future large telescope and surveys may benefit from the catalogue itself as well as the scientific results.

FEEDING TARGETS TO HIGH RESOLUTION SPECTROGRAPHS ON GIANT TELESCOPES

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Surveys of nearby galaxies with intermediate-sized telescopes on the ground and in space will identify and provide the photometric properties of intrinsically bright stars. These stars will be targets for detailed spectroscopic follow-up by high-resolution spectrographs on giant telescopes, with the goal of measuring chemical properties that probe galaxy evolution. Many key line diagnostics for such work are found at visible wavelengths, and this is also the wavelength region where the light from stars with intermediate spectral types peaks. However, high resolution spectrographs that work at visible wavelengths from ground-based sights (e.g. the HROS on the TMT) will be limited to natural seeing conditions, and so there may be significant contamination from other stars in the input signal. Simulations will be used to assess the impact of crowding on high resolution spectroscopic studies of intrinsically bright stars in nearby galaxies. Information that imaging surveys should provide to properly feed high resolution spectroscopy studies will also be discussed.

THE ELT VIEW OF HIGH REDSHIFT ACTIVE AND INACTIVE GALAXIES

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MICADO is the adaptive optics near-IR imaging camera for the E-ELT. It was designed and optimised to be mounted to the LGS-MCAO system MAORY, and will provide diffraction limited imaging over a wide (about 1 arcmin) field of view. These unique capabilities will allow one to explore the properties of high redshift galaxies with unprecedented sensitivity and spatial resolution. We present simulated images of active and inactive galaxies, that illustrate the outstanding future capability for the investigation of the distant Universe.

LONG-TIME VARIABILITY OF THE COMPTON-THICK SEYFERT 2 GALAXY NGC 4945 FROM SIX YEARS OF INTEGRAL OBSERVATIONS

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The spectral and photometric data on the Compton-thick Seyfert 2 galaxy NGC 4945 obtained by INTEGRAL during the period from January 2003 to February 2009 had been analyzed. The best-fit to the overall time JEM-X + ISGRI spectrum is the heavily absorbed (hydrogen column density NH~4.3*10^24 cm-2) power-law with photon index ~1.5 and exponential cut-off near 150 keV. The ISGRI lightcurves in three energy bands (20-40 keV, 40-60 keV and 60-100 keV) confirm that the source is variable on the months timescale.

DETECTION AND CHARACTERIZATION OF PLANETS WITH EPICS

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EPICS is the high contrast imager proposed for E-ELT. EPICS concept is based on an extreme adaptive optics system, a diffraction suppression module, and two scientific channels: an integral field spectrograph IFS for the near IR (0.95-1.65 micron) and a differential polarimeter (E-POL) for the optical range (600-900 nm). Optics is designed in order to reduce the impact of Fresnel propagation effects, which are very important for observations with ELT's. Simulations show that a contrast of a few 10E-9 can be reached at 0.1 arcsec from the star, and the inner working angle can be as small as 0.02-0.04 arcsec. EPICS should be able to detect a large number of giant planets, several tens Neptune-like planets, as well as a few rocky planets. Science cases include detection and characterization of young planets in star forming regions, nearby planets seen in reflected light, and planets discovered by other techniques (radial velocities, astrometry, and transits). Previous surveys are important to optimize observations in all these fields.

THE E-ELT SITE TESTING IN NORTHERN CHILE AND ARGENTINA

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Here we present a summary of the activities in the context of the E-ELT Site Selection Process in the Southern Hemisphere, in particular in Northern Chile and Argentina. Instruments and sites are listed and campaigns illustrated.

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Additional Notes

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