Durham-Edinburgh eXtragalactic Workshop VIII

12-13 January 2012, Durham University

List of abstracts

Speaker **Andy Taylor**
Affiliation University of Edinburgh
Talk title Euclid
Abstract In this short talk I will give a brief overview of the main science goals of Euclid and how they lead to the requirements on survey design and instruments and data analysis. I also try and indicate where the UK is significantly contributing and can gain scientifically.

Speaker **Wojciech Hellwing**
Affiliation Durham University
Talk title Skewness as a probe of BAO
Abstract We discuss the possibility to use reduced third moment of the density field - the skewness S_3 - as a potentially powerful probe of the BAO signature. According to perturbation theory predictions the amplitude of the skewness at given scale is sensitive to the logarithmic slope of the power spectrum. We present preliminary results of our calculations showing the expected signal of BAO in S_3. The S_3 has major advantages over autocorrelation function since it is linear bias free and is only weakly affected by redshift space distortions. This taken together opens a prospective avenue to use the skewness and data coming from new deep redshift galaxy surveys as a measure of the BAO signal.

Speaker **Baojiu Li**
Affiliation Durham University
Talk title TBD
Abstract TBD

Speaker **Sylvain de la Torre**
Affiliation University of Edinburgh
Talk title Probing the growth rate of structure with the VIPERS survey
Abstract Galaxy spectroscopic surveys are fundamental tools for cosmology allowing us to probe the Universe both geometrically and dynamically. In particular, the observed redshift-space distortions in the power spectrum or correlation function can be used to measure the growth rate of structure which enables us testing dark energy models and gravity on cosmological scales. In this talk, after a short introduction on redshift-space distortions, I will discuss the accuracy of current models in measuring the growth rate parameter. I will then present the on-going VIPERS redshift survey and show preliminary measurements of galaxy clustering and redshift-space distortions.

Speaker **Quan Guo**
Affiliation Durham University
Talk title Satellite Galaxy Number Density Profiles in the Sloan Digital Sky Survey
Abstract We study the spatial distribution of satellite galaxies around isolated primaries using the Sloan Digital Sky Survey (SDSS) spectroscopic and photometric galaxy catalogues. We select isolated primaries from the spectroscopic sample and search for potential satellites in the much deeper photometric sample. For specific luminosity primaries we obtain robust statistical results by stacking as many as 50,000 galaxy systems. We derive accurate projected number density profiles of satellites down to 4 magnitudes fainter than their primaries. We find the normalized satellite profiles generally have a universal form and can be well fitted by projected NFW profiles. The NFW concentra- tion parameter increases with decreasing satellite luminosity while being independent of the luminosity of the primary. The profiles of the faintest satellites show deviations from the NFW form with an excess at small galactocentric projected distances. In addition, we quantify how the radial distribution of satellites depends on the colour of the satellites and the colour and concentration of their primaries.

Speaker **Thomas Kitching**
Affiliation University of Edinburgh
Talk title The CFHTLenS Survey
Abstract The CFHT Lensing Survey presents the an analysis of the CFHT legacy survey optimised for weak lensing. Using the state of the art in photometric redshift and shape measurement techniques as well as raw image processing, allows systematic errors to be below statistical errors in a large field weak lensing survey for the first time. Using this data we present mass maps, and preliminary cosmology results. Presented on behalf of the CFHTLenS team.

Speaker **Ami Choi**
Affiliation University of Edinburgh
Talk title Galaxy-Mass Correlations on 10 Mpc Scales in the Deep Lens Survey
Abstract We use stacked weak gravitational lensing to measure the projected correlation of galaxies with mass from small scales (<few hundred kpc) where the individual galaxy halos dominate out to 15 Mpc where correlated large-scale structure dominates, and we investigate how these profiles vary with galaxy luminosity and redshift. Correlated mass density from multiple halos and large-scale structure beyond the virial radius are detected at high significance. We isolate the contribution from projected large-scale structure and find a larger signal at lower redshift, consistent with the expected growth in LambdaCDM cosmology.

Speaker **Jiaxin Han**
Affiliation Durham University
Talk title Weak Gravitational Lensing from GAMA Groups
Abstract We carry out stacked weaking lensing measurements on the DM profiles of GAMA groups, with background shear measurements provided by those of SDSS galaxies.

We find that the DM halo density profile are consistent with an NFW profile from cluster to group mass scale. Combining the weak lensing measured mass with the lumonisity measurements of GAMA groups, we extend the observational constraints on galaxy formation efficiency to a lower halo mass scale. The weak lensing measured masses are also used to calibrate the dynamical mass and luminosity mass estimations for the GAMA group catalogue, which can then be used for a wide range of other studies.

Speaker **Lars Koens**
Affiliation University of Edinburgh
Talk title Stochastic, non deterministic biasing from lensing and its implications for Redshift Space Distortions
Abstract Weak Gravitational Lensing has proved successful in measuring the bias b and stochasticity parameter r. The measurements seem to suggest stronger nonlinear biasing than simulations predict. If we trust the lensing results and use a model that extents the observations out to larger scales, we can work out the error in the cosmic growth rate as measured by Redshift Space Distortions (RSD). In this talk I will explain the lensing measurements and, subsequently, show the importance of b and r for distinguishing theories of gravity with RSD.

Speaker **Christopher Duncan**
Affiliation University of Edinburgh
Talk title Cosmic magnification as a probe of cosmology
Abstract With the recent success of the Euclid bid, and the wealth of data that this mission will bring, it is more important than ever to understand the full range of independent probes of cosmology at our disposal. In this talk I will motivate the use of magnification bias as a compliment to cosmic shear. I will present a method for obtaining parameter constraints for future surveys using Fisher Matrix analysis of galaxy number density correlations, with the aim of understanding the limitations of a magnification analysis, and it's viability as a probe of cosmology.

Speaker **Vivienne Wild**
Affiliation University of Edinburgh
Talk title Collateral information in cosmological surveys
Abstract Despite the best efforts of the survey designers, information on the physical processes driving galaxy evolution does occasionally make an appearance in large cosmologically minded surveys. Even beyond environment. I will discuss some concepts beyond stellar mass and colour that might interest folks, and present some new statistical techniques I am developing that make use of large amounts of "poor" quality data for understanding those annoyingly multifarious galaxies.

Speaker **Jose Sabater**
Affiliation University of Edinburgh
Talk title Nuclear activity and environment: isolated galaxies versus clusters and compact groups.

Abstract We present a study about the effect of environment and interactions on both radio and optical nuclear activity. In order to determine this effect we compare the prevalence of nuclear activity in samples of galaxies in dense environments (clusters) or affected by interactions (compact groups) with the AMIGA sample of isolated galaxies. Radio nuclear activity is strongly influenced by the environment while the effect of environment on optical nuclear activity seems to be more complex. A careful measurement using a big sample of galaxies derived from the SDSS, and the use of forthcoming deep radio LOFAR surveys, will help us to clarify this point.

Speaker **Louise Ker**
Affiliation University of Edinburgh
Talk title The Search for the Highest Redshift Radio Galaxies in Next Generation Surveys
Abstract High redshift radio galaxies provide a unique opportunity to study the evolution of some of the very earliest radio sources and hence the build-up of the earliest supermassive black holes and proto-cluster environments in the Universe. The existence of a correlation between observed radio spectral index and redshift has long been used as a method for selecting high redshift radio galaxy candidates in large radio surveys. I will discuss a new study which uses 9 highly spectroscopically complete radio samples, selected at different frequencies and flux limits, to determine the efficiency of this method, and compares this with others (radio source size, near-infrared magnitude) commonly used to identify high redshift radio galaxy candidates. This provides a valuable resource for efficiently mining upcoming radio and near-infrared surveys for good high redshift radio galaxy candidates.

Speaker **Michael Hogan**
Affiliation Durham University
Talk title HI Absorbers and Highly Inverted Radio Sources
Abstract Radio observations play an important role in understanding the AGN feedback which is believed to regulate heating and cooling at the centres of galaxy clusters. Multi-wavelength observations have shown that cooling is suppressed in these cores but that some cold molecular gas can form, which can then accrete onto the central SMBH within the BCG. It is mechanical energy from radio-traced outbursts inflating 'cavities' in the hot ICM that is widely believed to couple the energy released to the environment, creating the 'feedback cycle'. Important constraints to this picture come from understanding both the properties of the fuel supply and the resulting activity. The cold gas closest to the central engine is best traced by HI absorption against the core whereas the outburst stage of the AGN activity itself is best traced by radio observations at higher frequencies. Further complicating analysis is the presence of a strong nuclear component, which can in many cases give rise to a strongly inverted spectrum peaking in the range ~5-30GHz. Studies of radio AGN often extrapolate from lower frequencies, which would drastically underestimate jet power for these systems. Obtaining a significant sample of these higher frequency peaked systems is therefore important for understanding their contribution to the population as a whole. Here I will introduce our ongoing work towards addressing these issues and attempt to highlight areas where future, large-scale radio surveys will contribute

to understanding AGN feedback within galaxy clusters.

Speaker **Fernando Buitrago**
Affiliation University of Edinburgh
Talk title Evolution of massive galaxies in the era of large area surveys
Abstract Massive (M_stellar > 10^11 M_Sun) galaxies are found to be already in place at high-z and to change dramatically their structural parameters throughout cosmic time. Their high luminosities allow us to describe their properties in detail, becoming a priviledge test-bed to check the predictions from the LambdaCDM paradigm. We will highlight our work about their size evolution and morphological change from disks to spheroids, and complementing it with 3D spectroscopy observations of their H_alpha emission at z=1.4. We will explore possible connections between our work and EUCLID, describing also future projects with CANDELS and UltraVISTA surveys.

Speaker **Vimal Simha**
Affiliation Durham University
Talk title Parametrising Star Formation Histories
Abstract In order to guide efforts to fit star formation histories to observed colours or spectra, we investigate parametric fits to the star formation histories of galaxies in an SPH simulation finding that some commonly used models fail to describe the star formation histories of SPH galaxies but other simple two parameter models achieve greater success.

Speaker **Massimo Viola**
Affiliation University of Edinburgh
Talk title Flexed universe
Abstract Gravitational flexion, caused by derivatives of the gravitational tidal field, is potentially important for the analysis of the dark matter distribution in gravitational lenses, such as galaxy clusters or the dark matter haloes of galaxies. However the measurement of this signal and its interpretation are not trivial. I will critically discuss those aspects and I will present possible solutions.

Speaker **Emma Grocutt**
Affiliation University of Edinburgh
Talk title The effect of intrinsic alignments and photometric redshift errors on weak lensing tomography constraints
Abstract Cosmic shear is a powerful tool for constraining cosmological parameters, however shear measurements are affected by systematic sources of error that can bias parameter estimates if unaccounted for. These systematics include intrinsic galaxy alignments that mimic the shear signal, and uncertainties in the photometric redshift distribution. With lensing surveys planned that are larger than ever before, these systematic errors may become the limiting factor in lensing analyses. Binning survey galaxies into redshift bins is known as tomography and can help constrain both cosmological and intrinsic alignment parameters more accurately. We investigate the

optimal tomographic binning for a CFHTLenS-like survey incorporating both a realistic photometric redshift distribution and a model for intrinsic alignments. We explore the amount of constraining power a CFHTLenS-like survey has on the intrinsic alignment model and the effect of ignoring these systematics on parameter constraints.

Speaker **David Harvey**
Affiliation University of Edinburgh
Talk title The Cosmic Warzone: Detecting Dark Matter with Cluster Bulleticity
Abstract Measuring the offsets between gas and dark matter in massive galaxy clusters have provided astrophysicists with a unique insight into the nature of dark matter. However the clusters in which these measurements have been taken are rare examples of collisions between halos of similar mass. This talk proposes an extended theory whereby offsets can be measured in any cluster exhibiting substructure. Through extensive simulations it is proved that with a sufficient sample of size an average offset between baryonic and dark matter can be detected.

Speaker **Marika Asgari**
Affiliation University of Edinburgh
Talk title Comic Shear Tomography and Efficient Data Compression using COSEBIs
Abstract Gravitational lensing is one of the leading tools in understanding the dark side of the Universe. The need for accurate, efficient and effective methods which are able to extract this information along with other cosmological parameters from cosmic shear data is ever growing. COSEBIs, Complete Orthogonal Sets of E-/B-Integrals, is a recently developed statistical measure that encompasses the complete E-/B-mode separable information contained in the shear correlation functions measured on a finite angular range. The aim of the present work is to test the properties of this newly developed statistics for a higher dimensional parameter space and to generalize and test it for shear tomography. We use Fisher analysis to study the effectiveness of COSEBIs. We show our results in terms of figure-of-merit quantities, based on Fisher matrices. We find that a relatively small number of COSEBIs modes is always enough to saturate to the maximum information level. This number is always smaller for `logarithmic COSEBIs' than for `linear COSEBIs', and also depends on the number of redshift bins, the number and choice of cosmological parameters, as well as the survey characteristics. COSEBIs provide a very compact way of analyzing cosmic shear data, i.e., all the E-/B-mode separable second-order statistical information in the data is reduced to a small number of COSEBIs modes. Furthermore, with this method the arbitrariness in data binning is no longer an issue since the COSEBIs modes are discrete.

Speaker **Tom Shanks**
Affiliation Durham University
Talk title VST ATLAS Status and Science
Abstract I will describe the status of VST ATLAS and describe the science aims. This will mainly be done in terms of work already done with SDSS. I will cover the use of

samples of Luminous Red Galaxies out to z~1 to measure the Integrated Sachs Wolfe effect and test the accelerated expansion of the Universe. I will also describe new evidence for non-Gaussianity from the LRG clustering correlation function. Finally I will describe the the proposed new 2dF QSO Dark Energy Survey (2QDES) of a half a million quasars which could be based on VST ATLAS. 2QDES is aimed at BAO detection at z~1.5 and a new search for primordial non-Gaussianity.

Speaker **Pablo Arnalte-Mur**
Affiliation Durham University
Talk title Clustering from high quality photometric redshifts: the case of ALHAMBRA
Abstract The ALHAMBRA Survey has mapped an area of 4 deg^2 using a set of 20 medium-band optical filters, and three broad-band NIR filters, down to I~25. It thus provides very accurate photometric redshifts (error < 1.5%) for ~10^5 galaxies. It is well suited for performing studies of cosmic evolution, and can serve as a test bench for future surveys such as PAUS or J-PAS. I will present preliminary results on the clustering of galaxies at intermediate scales up to z=1.5, and discuss the different problems we face when doing this type of measurements with ALHAMBRA.

Speaker **Alexander Mead**
Affiliation University of Edinburgh
Talk title Accurate matter power spectra using the halo model
Abstract The halo model is a widely used theoretical approach which can make many predictions about the details and observational consequences of non-linear structure formation. However, it is currently not competitive with simulations in producing the matter power spectrum accurately. I will show how it is possible to make the halo model prediction for the matter power spectrum accurate by introducing physically motivated free parameters and fitting it to simulation data. Thus it should be possible to quickly produce matter power spectra as a function of cosmology at the level of accuracy required for current and future weak lensing studies. In its finished state this approach should replace the widely used HALOFIT in making predictions for the non-linear power spectrum without resorting to running simulations.

Speaker **Alex Merson**
Affiliation Durham University
Talk title Synthetic Galaxy Catalogues for Future Galaxy Surveys
Abstract The next decade will see an explosion in data from large galaxy surveys. It is crucial to devise new statistical estimators that can exploit all of the information in these enormous catalogues. Synthetic "mock" galaxy catalogues will play a pivotal role in the calibration of these estimators. I will present a method for building state-of-the-art mock galaxy catalogues using a model of galaxy formation combined with a large cosmological N-body simulation. Following this I will discuss a few of the applications of such catalogues, including galaxy group finding and testing the effectiveness of galaxy colour selection techniques.

Speaker **Violeta Gonzalez-Perez**
Affiliation Durham University
Talk title Clustering of Extremely Red Objects
Abstract Using the semi-analytical model developed by Bower et al. 2006, we studied the clustering of Extremely Red Objects (EROs). The model reproduces satisfactorily the observed angular clustering of EROs, once sampling variance is taken into account. Our model predicts a halo occupation distribution that is significantly different from that typically assumed. This is due to the inclusion of AGN feedback, which changes the slope and scatter of the luminosity-host halo mass relation above the mass where AGN feedback first becomes important.

Speaker **Pratika Dayal**
Affiliation University of Edinburgh
Talk title Simulating high-z galaxies
Abstract I will present results concerning the physical connection between two specific classes of high-z galaxies, Lyman Alpha Emitters and Lyman Break galaxies. I will also show results from a recent work concerning the fundamental metallicity relation in high-z galaxies.

Speaker **Shaun Cole**
Affiliation Durham University
Talk title PS1 Hawaii Meeting Summary
Abstract Summary of the January 2012 PS1 Consortium Meeting in Hawaii

Speaker **Daniel Farrow**
Affiliation Durham University
Talk title Pan-STARRS1: Developing Completeness Masks for Clustering
Abstract For large scale structure in the Pan-STARRS1 photometric survey one needs to measure the incompleteness of galaxy catalogues as a function of celestial coordinates. The survey's unique strategy means depth can vary on all scales including down to a few arcseconds, correcting for these small scale effects across the whole sky presents a new challenge. We introduce a method, based on maps of the image variance, which can estimate depth down to arcsecond scales fast enough to apply to large areas. We present early clustering measurements by applying our method to the Small Area Survey 2, a ~60 deg^2 demonstration area of Pan-STARRS1. Once fully developed we will be able to create completeness masks with which to correct depth variations over the whole 3pi steradians of the completed survey.

Speaker **Nigel Metcalfe**
Affiliation Durham University
Talk title Current status of PS1 Surveys
Abstract A brief report on the depth, coverage and availability of data for the PS1 3-pi and Medium Deep surveys.

Speaker **Stephen Fine**
Affiliation Durham University
Talk title Reverberation mapping at high redshift using Pan-STARRS
Abstract Reverberation mapping offers one of the best techniques for studying the inner regions of QSOs. However, the large amount of time required to build up reverberation mapping cross-correlations means the technique has only been used on a handful of the nearest Seyferts. I will discuss a method of combining modern time-resolved surveys (in particular Pan-STARRS) and multi-object spectroscopy to significantly reduce the amount of time required to perform reverberation mapping, potentially allowing the cores of high-redshift ($z<2.5$) QSOs to be studied for the first time.