Session:	**[B3A-4] S4 : Galaxies, AGN and Cosmology**
Date:	August 20, 2014 (Wednesday)
Time:	11:00~12:30
Room:	Room D (Room 105~106)
Chair:	Nguyen Quynh Lan (Hanoi National University of Education)

[B3A-4-1] **11:00~11:20**

[Invited] Constraints on Pre-Inflation Cosmology and Dark Flow

G. J. Mathews (University of Notre Dame, USA), N. Q. Lan, and T. Kajino

This talk summarizes current constraints on cosmic dark flow and prospects for observing the pre-inflation universe based upon the current limits on the curvature k from the Planck-Collaboration and WMAP 9-yr analysis. If the present universe is slightly open then preinflation curvature will appear as a cosmic dark-flow component of the CMB dipole moment. We summarize current cosmological constraints on this cosmic dark flow and analyze the possible constraints on parameters characterizing the pre-inflating universe in an inflation model with a present-day very slightly open CDM cosmology. We employ an analytic model to show that for a broad class of inflation-generating effective potentials, the simple requirement that the observed dipole moment represents the pre-inflation curvature as it enters the horizon, allows one to set upper and lower limits on the magnitude and wavelength scale of pre-inflation fluctuations in the inflaton field and the curvature of the pre-inflation universe, as a function of the fraction of the total initial energy density in the inflaton field. We estimate that if the current CMB dipole is a universal dark flow (or if it is near the upper limit set by the Planck Collaboration) then the present constraints on CDM cosmological parameters imply rather small curvature k 0.1 for the pre-inflating universe for a broad range of the fraction of the total energy in the inflaton field at the onset of inflation. Such small pre-inflation curvature might be indicative of open-inflation models in which there are two epochs of inflation

[B3A-4-2] **11:20~11:40**

[Invited] 21cm Cosmology

Tzu-Ching Chang (Academia Sinica Institute of Astronomy and Astrophysics, Taiwan)

*To be announced

[B3A-4-3] **11:40~12:00**

[Invited] Probing Galaxy Formation Models in Cosmological Simulations with Observations of Galaxy Groups

Habib Khosroshahi (Institute for Research in Fundamental Science, Iran), Ghassem Gozaliasl, Alexis Finoguenov, Mojtaba Raouf, and Halime MirAghee

Majority of galaxies reside in groups and clusters where they are understood to evolve through galaxy-galaxy interactions. Galaxy groups and clusters are also hosts to some of the most massive galaxies observed in the Universe. Multiple mergers of galaxies in the core of galaxy group can produce such massive galaxies and develop a large luminosity gap or luminosity deficiency, at the vicinity of the formed giant galaxy. This luminosity gap, carries information that allows us to probe the galaxy formation/evolution models in combination with other observables. Employing a wide range of observations from X-ray to radio through optical, combined with the cosmological simulations, we present and discuss the capabilities that the luminosity gap offers to constraint galaxy formation models in the local and the distant universe.
Using the Millennium simulations, we introduce an age-dating routine for galaxy groups and clusters, based

on optically measurable properties of galaxies from photometric and spectroscopic observations. By defining the “age” of galaxy groups and clusters based on the halo mass accumulation we are able to identify a sub-region in the parameter space of, group stellar mass, luminosity of the brightest group galaxy (BGG), the luminosity gap and the physical separation of the BGG and the luminosity centroid, which statistically results in “old” galaxy group halos, e.g. the groups which have acquired over 50 per cent of their present day mass at z=1. Such a sample of galaxy groups with an age indicator is invaluable for connecting the observed properties of galaxies to the halo formation history or age.
Using a large sample of galaxy groups observed by the XMM-Newton X-ray telescope observations as part of the XMM-Large Scale Survey, we carried out a statistical study of the redshift evolution of the luminosity gap for a well defined mass-selected group sample and show the relative success of some of the semi-analytic models in reproducing the observed properties of galaxy groups up to redshift z~1.2. The observed trend argues in favour of a stronger evolution of the feedback from active galactic nuclei at z<1 compared to the models. The slope of the relation between the magnitude of the brightest cluster galaxy and the value of the luminosity gap does not evolve with redshift and is well reproduced by the models, indicating that the tidal galaxy stripping, put forward as an explanation of the occurrence of the magnitude gap, is both a dominant mechanism and is sufficiently well modelled.
We provide observational evidences that the ongoing and the old AGN activities, probed by 1.4 GHz and 610 MHz radio observations, using the GMRT, is linked to the presence of the large luminosity gap, such that giant elliptical galaxies residing in groups with a large luminosity gap (> 2 mag) are dimmer in the radio luminosity, relative to the giant elliptical galaxies with the same optical luminosity but in groups with smaller luminosity gap. These findings offer additional constraints for galaxy formation models when observables such as the radio luminosity becomes available in the future developments of these models.

[B3A-4-4] **12:00~12:15**

Revisiting WMAP Beam Profiles via Planck Radio and SZ Catalogues

U. Sawangwit (National Astronomical Research Institute of Thailand, Thailand), J. R. Whitbourn, and T. Shanks

The prime evidence underpinning the standard ΛCDM cosmological model is the CMB power spectrum as observed by WMAP and other microwave experiments. But Sawangwit & Shanks (2010) have shown that the WMAP CMB power spectrum is highly sensitive to the beam profile of the WMAP telescope. Here, we use the source catalogue from the Planck Early Data Release to test further the WMAP beam profiles. We confirm that stacked beam profiles at Q, V and particularly at W appear wider than expected when compared to the Jupiter beam. The same result is also found based on WMAP-CMBfree source catalogues and NVSS sources. The accuracy of our beam profile measurements is supported by analysis of CMB sky simulations. However, the beam profiles from WMAP7 at the W band are narrower than previously found in WMAP5 data and the rejection of the WMAP beam is now only at the ≈3σ level. We also find that the WMAP source fluxes demonstrate possible non-linearity with Planck fluxes. But including ground-based and Planck data for the bright sources may suggest that the discrepancy is a linear offset rather than a non-linearity. Additionally, we find that the stacked Sunyaev-Zel’dovich (SZ) decrements of ≈ 151 galaxy clusters observed by Planck are in agreement with the WMAP data. We find that there is no evidence for a WMAP SZ deficit as has previously been reported. In the particular case of Coma we find evidence for the presence of an O(0.1mK) downwards CMB fluctuation. We conclude that beam profile systematics can have significant effects on both the amplitude and position of the acoustic peaks, with potentially important implications for cosmology parameter fitting.

[B3A-4-5] **12:15~12:30**

The Taipan Survey: Cosmology from the Nearby Universe

Matthew Colless (Australian National University, Australia)

One of the most fundamental tasks in astronomy is to determine the cosmological model describing the physics of the expanding Universe in terms of its matter-energy content and the laws of gravity. Recent observations of the Universe show that our current understanding of the relevant physics is profoundly incomplete, forcing cosmologists to invoke a dark energy that propels acceleration in the present-day expansion of the Universe and affects the growth rate of large-scale structures and the motions of galaxies.
The Taipan survey will measure redshifts for 500,000 galaxies and peculiar velocities for a subset of 50,000

early-type galaxies over the whole southern sky. It will use a refurbished UK Schmidt Telescope at Siding Spring Observatory together with an innovative ‘starbugs’ optical-fibre positioner and a purpose-built spectrograph. The survey will yield the best direct measurement of the present-day expansion rate of the Universe, the largest maps of the density and velocity fields of local structures, and unique new tests of large-scale gravitational physics using galaxy motions, including tests of modified theories of gravity. It will also provide a legacy database for synergy science programs.

The Taipan survey's new map of the Universe will significantly improve current understanding of three fundamental questions about the standard cosmological model:

1. What is the expansion rate of the Universe? The survey will yield a 1% measurement of Hubble's constant, H0, from the baryon acoustic oscillation signature in the large-scale distribution of galaxies. This will be the most precise and direct measurement of H0, and will yield improved measurements of several other fundamental parameters of the cosmological model.
2. What are the density and velocity fields in the local universe? The survey will produce detailed maps of the density and the velocity fields over a much larger volume than all previous surveys. The statistical properties and consistency of these fields provide key tests of the standard cosmological model, and independent measurements of key parameters not accessible from redshift surveys alone.
3. What is the growth rate of structure? The survey will make a stringent test of whether General Relativity is the correct theory of gravity for scales up to a billion light-years, based on two independent and complementary methods for measuring the growth rate of structure from galaxy velocities. Any deviations from the predictions of General Relativity would provide vital clues to modifying the theory of gravity.

Here I will present the overall survey strategy, describe the instrumentation being developed for survey observations, and provide forecasts for the results of the survey based on detailed simulations. The Taipan survey is expected to commence observations in early 2016 and to be completed by 2020.