Session:	**[B3B-4] S4 : Galaxies, AGN and Cosmology**
Date:	August 20, 2014 (Wednesday)
Time:	14:00~15:30
Room:	Room D (Room 105~106)
Chair:	Dharam (Vir) Lal (National Centre for Radio Astrophysics (NCRA-TIFR))

[B3B-4-1] **14:00~14:15**

Formulation and Constraints on Late Decaying Dark Matter

N. Q. Lan (Hanoi National University of Education, Vietnam), N. T. Giang, G. Mathews, and I-S. Shu

We consider a late decaying dark matter model in which cold dark matter begins to decay into relativistic particles at recent epoch ($z < 1$). A complete set of Boltzmann equation of dark matter particles is derived which is necessary to calculate the evolutions of their energy density and their density perturbations. We show that the large entropy production and associated bulk viscosity from such decays leads to a recently accelerating cosmology consistent with observations. We perform a constraint on the decaying dark matter model with bulk viscosity, by using MCMC method and the combined observational data from the CMB and type Ia supernovae.

[B3B-4-2] **14:15~14:30**

Modeling the Surface Brightness of Early-Type Galaxies

Ing-Guey Jiang (National Tsing Hua University, Taiwan) and Li-Chin Yeh

It is observed through HST that the central surface brightness of early-type galaxies has an interesting diversity. Some have an obvious central flatten part, but the others do not. Thus, these galaxies could be classified into two types, i.e. core galaxies and power-law galaxies. In order to explain this diversity, we propose and construct dynamical models with supermassive binary black hole which could lead to the observational surface brightness, such as those described by Nuker law or Sersic law. After considering the mass and separation of supermassive binary black hole, and also the projection angle, these models could be useful for interpretations of future observational data. Moreover, in reverse, these models could also become good tools to constrain the mass and separation of supermassive binary black hole from the observational data of surface brightness of galaxies.

[B3B-4-3] **14:30~14:45**

Large Gpc Volume Simulations of Reionization Based on Semi-Analytic Galaxy Formation Models

Hansik Kim (The University of Melbourne, Australia), J. Stuart B. Wyithe, Jaehong Park, G. B. Poole, and C. G. Lacey

Redshifted 21cm measurements of the structure of ionised regions that grow during reionization promise to provide a new probe of early galaxy and structure formation. One of the challenges of modelling reionization is to account both for the sub-halo scale physics of galaxy formation and the regions of ionization on scales that are many orders of magnitude larger. To bridge this gap we _rst calculate the statistical relationship between ionizing luminosity and Mpc scale overdensity using detailed models of galaxy formation computed within relatively small volume (~100Mpc/h), high resolution dark matter simulations. We then use a Monte-Carlo technique to apply this relationship to reionization of the intergalactic medium within large volume dark matter simulations (>1Gpc/h). The resulting simulations can be used to address the contribution of very large scale clustering of galaxies to the structure of reionization, and show that volumes larger than 500Mpc/h are required to probe the largest reionization features.

[B3B-4-4] **14:45~15:00**

HST and LAMOST Discover a Dual Active Galactic Nucleus in J0038+4128

Huang Yang (Peking University, China), Liu xiaowei, Yuan Haibo, Xiang Maosheng, and et al.

Over the past few years, many efforts have been spent on searching for the kiloparsec-scale active galactic nuclei (AGN) because such system can provide important clues to understand the co-evolution between the AGN activity and host galaxy. In the hierarchical ΛCDM cosmology, galaxies built up via mergers. Binary supermassive black holes (SMBHs) are natural outcomes of galaxy mergers, since almost all massive galaxies are believed to host a central SMBH. In the gas rich case, the strong tidal interactions caused by galaxy mergers can trigger the active galactic nucleus (AGN) by sending a large amount of gas to the central regions. A dual AGN could emerge if the two merging SMBHs are both simultaneously accreting gas in a gas-rich major merger. However, up to now, no more than 20 of close dual AGNs (separations between 1 and 10 kpc) are found. Recently, we report the discovery of a new dual AGN in J0038+4128 with a spatial separation of 4.7 kpc based on the HST images, UV spectra and LAMOST optical spectra. One of them is the Seyfert 1 galaxy with broad emission lines and another one is the Seyfert 2 galaxy with narrow emission lines only. In the HST U-band image, two pairs of bi-symmetric spiral arms are detected in a binary AGN system for the first time. The results are consistent with the numerical simulations of Di Matteo et al. (2005). Being one of a few confirmed kiloparsec-scale dual AGNs exhibiting a clear morphological structure of the host galaxies, J0038+4128 provides a unique opportunity to study the co-evolution of the host galaxies and their central supermassive black holes undergoing a merging process.

[B3B-4-5] **15:00~15:15**

Simulated Star Formation Rate Functions at z ~ 4–7, and the Role of Feedback in High-z Galaxies

E. Tescari (University of Melbourne, Australia), A. Katsianis, J. S. B. Wyithe, K. Dolag, L. Tornatore, P. Barai, M. Viel, and S. Borgani

We studied the role of feedback from supernovae (SN) and black holes in the evolution of the star formation rate function (SFRF) of z ∼ 4–7 galaxies. We used a new set of cosmological hydrodynamic simulations, ANGUS (AustraliaN GADGET-3 early Universe Simulations), run with a modified and improved version of the parallel TreePM-smoothed particle hydrodynamics code GADGET-3 called P-GADGET3(XXL), that includes a self-consistent implementation of stellar evolution and metal enrichment. In our simulations both SN-driven galactic winds and active galactic nuclei (AGN) act simultaneously in a complex interplay. The SFRF is insensitive to feedback prescription at z > 5, meaning that it cannot be used to discriminate between feedback models during reionization. However, the SFRF is sensitive to the details of feedback prescription at lower redshift. By exploring different SN-driven wind velocities and regimes for the AGN feedback, we find that the key factor for reproducing the observed SFRFs is a combination of ‘strong’ SN winds and early AGN feedback in low-mass galaxies. Conversely, we show that the choice of initial mass function and inclusion of metal cooling have less impact on the evolution of the SFRF. When variable winds are considered, we find that a non-aggressive wind scaling is needed to reproduce the SFRFs at z ≥ 4. Otherwise, the amount of objects with low SFRs is greatly suppressed and at the same time winds are not effective enough in the most massive systems.

[B3B-4-6] **15:15~15:30**

Discovery of a Strong Lensing Galaxy Embedded In a Cluster at z = 1.62

Kenneth C. Wong (Academia Sinica Institute of Astronomy and Astrophysics, Taiwan), Kim-Vy H. Tran, Sherry H. Suyu, Ivelina G. Momcheva, Gabriel B. Brammer, Mark Brodwin, Anthony H. Gonzalez, Aleksi Halkola, Glenn G. Kacprzak, Anton M. Koekemoer, Casey J.

Gravitational lensing is a powerful tool for studying the mass structure of galaxies, including their mass profile slope and central dark matter fraction. However, strong lensing galaxies are increasingly rare at higher redshifts – only a handful of such systems at z > 1 are known. In this study, we identify a strong lensing galaxy in the cluster IRC 0218 that is spectroscopically confirmed to be at z = 1.62, making it the highest-redshift strong lens galaxy known. The lens is one of the two brightest cluster galaxies and lenses a background source galaxy into an arc and a counterimage. With *Hubble Space Telescope* grism and

Keck/LRIS spectroscopy, we measure the source redshift to be $z_S = 2.26$. Using *HST* imaging in ACS/F475W, ACS/F814W, WFC3/F125W, and WFC3/F160W, we model the lens mass distribution with an elliptical power-law profile and account for the effects of the cluster halo and nearby galaxies.