Activity Report of the NAOJ Visiting Scholar Program

Host Project/Division: TMT project Name of Host Scientist: Nobunari Kashikawa
Name of Visiting Scholar: Roderik Overzier
Title: Visiting Research Fellow
(Choose the appropriate one)
Period: from 17/11/01 to 17/11/30

I. Report from the visiting scholar

[i] Achievement during the period of stay (in comparison with the initial plan)

(Collaborative Research)

During this visit, we have discussed our ongoing projects related to the Subaru HSC Strategic Program search for protoclusters (Project #96). Following the publication of our two first successful studies (Uchiyama et al. and Toshikawa et al., PASJ, in press) in which a great number of protoclusters was identified, we have engaged in several follow-up projects. A Gemini/GMOS program submitted through Brazil as well as a Keck program submitted through Japan targeted several of the systems discovered in Toshikawa et al. (2017), with somewhat puzzling and inconclusive results. Plans for further spectroscopic followup and processing of these data were made. With the largest sample of protoclusters at z~4 to date in hand, we also discussed and reviewed several follow-up projects, such as a detailed investigation of the (proto-)brightest cluster galaxies (Ito et al., in prep.), cross-correlation of HSC protoclusters and Planck cold sources (Kubo et al., in prep.), and sub-clustering of galaxies in protoclusters (Toshikawa et al., in prep.).

The work performed directly by visitor R. Overzier included further improvements to our methods of comparing observations from the Subaru telescope with predictions from cosmological simulations (Overzier, Kashikawa et al., in preparation). These improvements consist of more accurate simulated galaxy spectra that will form the basis of simulated images and catalogs that can be compared directly with the large number of protoclusters found in the HyperSuprimeCam Wide survey by Toshikawa et al. (2017). The same type of simulated spectra are at the same time also serving to prepare for the Subaru/Prime Focus Spectrograph Galaxy Evolution Survey. Improvements that are being implemented include a more realistic treatment of dust attenuation in high redshift galaxy spectra. A consistency check between these simulated spectra and real data is still underway early 2018.

During the final week of this visit, our team participated in the Prime Focus Spectrograph yearly collaboration meeting at IPMU. The topic of galaxy protoclusters remains an important science driver for the PFS galaxy evolution survey, and the recent publications by our team based on the first large statistical samples of protoclusters found in the HyperSuprimeCam survey offer strong motivations for further exploring the proto-cluster component to PFS. The sensitivity, area and fiber density of PFS are particularly well suited for a spectroscopic study of protoclusters. However, it remains to be tested quantitatively to what extent such structures could be detected and what physical properties can be derived. Various tests based on empirical data as well as new semi-analytic and hydro-simulations are being investigated by us and collaborators to address these questions during the course of 2018.

(Education)

A presentation entitled “What is a “starburst?” was presented as part of the daily Astro-coffee meeting on November 9, 2017.

(Others)

[ii] Any comments on this program

１か月間、充実した研究の進展を持つことができました。学生たちにもよい刺激になったようです。

[iii] List of publications and presentations by the visiting scholar in collaboration with NAOJ staff or graduate students

1. Uchiyama, H., Toshikawa, J., Kashikawa, N., Overzier, R. et al.: Luminous Quasars Do Not Live in the Most Overdense Regions of Galaxies at z ~ 4, PASJ, in press

2. Toshikawa, J., et al.: Systematic Protocluster Search at z ~ 4 based on the HSC Subaru Strategic Program, PASJ, in press

3. Ryo Higuchi, Masami Ouchi, Yoshiaki Ono, Takatoshi Shibuya, Jun Toshikawa, Yuichi Harikane, Takashi Kojima, Akira Konno, Akio K. Inoue, Kenji Hasegawa, Seiji Fujimoto, Tomotsugu Goto, Shogo Ishikawa, Nobunari Kashikawa, Yutaka Komiyama, Roderik Overzier, and Masayuki Tanaka: SILVERRUSH VII. Subaru/HSC identifications of 41 protocluster candidates at z~6-7 with the spectroscopic redshifts up to z = 6.574: implications for cosmic reionization, ApJ, submitted

4. Greene & PFS Galaxy Evolution Working Group: the PFS Galaxy evolution survey, internal team document, in prep.

II. 以下の項目について、受入教員が記入してください。
Report from the host scientist

[iv] 本制度に対する意見、要望など
Any comments on this program

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