Subaru Telescope International Partnership Workshop – Summary Report

Date: 12 / 28 / 2017

To: The Director of the Subaru Telescope

Workshop chair person	Name	Masaaki Otsuka, Toshiya Ueta, Akito Tajitsu		
	Affiliation Job Title	Assistant Research Scholar/Visiting Scholar, ASIAA (MO) Associate Professor, University of Denver (TU) Sr. Support Astronomer, Subaru Telescope (AT)		
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Workshop title	Planetary Nebula Research with Subaru Telescope in the Era of International Partnership			
Date	12 / 11 / 2017 – 12 / 13 / 2017			
Venue (address)	Lecture Theatre in the Chow Yei Ching Building at the University of Hong Kong			
Number of participants	18 or more			
Workshop overview	Planetary nebulae (PNe) are the most powerful proofs for the chemical and dynamical evolution of galaxies: PNe are bright emission line objects easily observable even in the Galactic bulge and beyond our own Milky Way. PN data simultaneously reveal elemental abundances of nucleocynthesized matter in the nebula and the central star as well as the radial velocity of the system. Gaia will soon provide distances to these PNe in an unprecedented accuracy. Hence, PNe will be the Holy Grail for us to seek indispensable information to understand the evolutionary history of galaxies.Our main objectives are to (1) overview the previous and present studies on PNe, the evolution of low-to-intermediate initial mass stars leading up to and past the PN phase, and the galactic chemical evolution based on the elemental yields derivable from PNe, (2) identify problems concerning the focus research areas mentioned above that can be addressed with the Subaru Telescope, and (3) establish an international collaborative PN research group to promote collaboration among PN researchers in potential Subaru partnership countries. In this workshop, we discussed a variety of PN science topics, including (i) the fundamental properties (i.e., the distance, age, rate of mass loss, and abundances) of PNe, (ii) morpho-kinematics of PNe, (iii) present theoretical issues in understanding the evolution of PN progenitors, (iv) various components of the nebulae beyond the central ionized region and their properties, (v) evolution histories of the Milky Way and M31 though elemental abundances, and even (vi) potential presence of planets around white dwarfs (i.e., the central stars of PNe). In particular, we started formulating a Subaru intensive proposal aiming at performing a spectroscopic survey of Galactic PNe to address issues in both of the stellar and galactic evolution and contribute to both communities, using PNe as unique and critical agents to connect the stellar nucleosynthesis and the history of chemical enrichment in galaxies. We all recognize Subaru's strengths as a major world-class facility having unique capabilities from the UV to mid-IR. We are very keen to take a leadership role in the PN community (especially in the partner country areas) to further enhance the use of Subaru and advance our science cause. We are also eager to take advantage of existing observational resources (i.e., small- to mid-sized telescopes) that each participant has access in each participant's own country to promote our collaborative work. Overall, we think our workshop was a success.			
Discussion on Subaru international operation during the workshop	In general, our research community is not used to think that Subaru is a resource that they can tap into easily, especially for a few from the EAO countries who proposed for the EAO time in the past couple of semesters. However, this perception probably stems from the fact that the normal star category is highly competitive because of the small volume of time request to begin with. Thus, we agreed to ramp up the effort of submitting proposals to Subaru in the future. There was a volume of requests in terms of instrument capabilities: (i) IFU capabilities in the optical and near-IR, and even in the mid-IR; (ii) coverage of the blue UV end in spectroscopy (to cover [O II]3726/29 and the Balmer jump); (iii) K-band filter for COMICS to compare with other near-IR data; (iv) more specific emission line filters for COMICS to do molecular/PAH/Fullerene spectroscopy; (v) extra long-slit filters for HDS ([O II]3726/29, [O III]4363, for example); (vi) addition of the fiber-bundle capability and the blue UV access for PFS. As for operations (more day-to-day specific to increase the Subaru use by international users), we had suggestions such as (1) allowing PIs participate via Zoom/Skype and (2) expand and strengthen documentations and help on data reduction (this would help to boost the use of the archival data, and hence, more general use of the telescope in the long run). Overall, the international participants are keen to use Subaru, but at the same time it appears that Subaru needs to keep proactively engaging them to keep their interests because it is true that there are other resources that they can look to elsewhere.			
Comments on the Subaru WS support program (if any)	Please increase flexibility of the travel support regulation for persons with no bank accounts in Japan.			

Program

Monday, December 11 (Day 1)

Introduction (Chair: T. Ueta)

09:00 - 09:30 About this workshop - M. Otsuka (ASIAA) & T. Ueta (U. of Denver)

09:30 - 10:30 Introduction of Subaru Telescope - A. Tajitsu (NAOJ/Subaru)

10:30 - 10:50 Coffee Break

10:50 - 11:50 Overview of planetary nebulae - S. Kwok (HKU)

11:50 - 12:30 HASH PN Database (tentative) - Q. A. Parker (HKU)

12:30 - 14:00 Lunch Break

Chemical abundances (Chair: M. Otsuka)

14:00 - 15:00 Stellar evolution and nucleosynthesis - A. Karakas (Monash University)

15:00 - 15:30 Chemical Abundances of Planetary Nebulae in Our Galaxy - T.-H. Lee (W. Kentucky Univ./ASIAA)

15:30 - 16:00 Coffee Break

16:00 - 16:30 Elemental Abundances of Planetary Nebulae in M31 - X. Fang (HKU)

Chemical evolution of galaxies (Chair: A. Tajitsu)

16:30 - 17:15 Elucidating the evolution of the Galactic radial metallicity gradient with our SUBARU PN survey - K. Bekki (University of Western Australia)

17:15 - 18:00 Galactic Archaeology with PN study - T. Tsujimoto (NAOJ)

Workshop Dinner
We will gather at the lobby of Jen Hotel at 6:15 pm and walk together to the restaurant.

Tuesday, December 12 (Day 2)

Dust and molecules in planetary nebulae (Chair: K. Asano)

09:00 - 10:00 Molecules and dust in PNe: the big questions - J. Cami (University of Western Ontario)

10:00 - 10:30 Ground-based observations of PAHs in PNe - R. Ohsawa (U. of Tokyo)

10:30 - 11:00 Coffee Break

Dust and molecules in planetary nebulae Cont'd (Chair: R. Ohsawa)

11:00 - 11:30 Theoretical Study on the Complex Organic Molecules Origin of the UIE bands in the Planetary Nebulae - SeyedAbdolreza (Abdi) Sadjadi (HKU)

11:30 - 12:00 Far-IR dust component in PNe by Herschel - K. Asano (U. of Denver)

12:00 - 12:30 Dusty disks around white dwarfs - Y.-H. Chu (ASIAA)

12:30 - 14:00 Lunch Break

Study of PNe and related objects done/being done with Subaru Telescope

14:00 - 15:30 Short presentations/Q&A/Discussion - T. Ueta (U. Denver), A. Tajitsu (NAOJ/Subaru), M. Otsuka (ASIAA)

15:30 - 16:00 Coffee Break

Potential research initiatives/collaborations using Subaru Telescope

16:00 - 17:00 Discussion - T. Ueta (U. Denver), A. Tajitsu (NAOJ/Subaru), M. Otsuka (ASIAA)

Wednesday, December 13 (Day 3)

More about Subaru

09:00 - 09:30 Proposal review& time allocation - T. Ueta (Univ. of Denver), A. Tajitsu (NAOJ/Subaru)

09:30 - 10:00 Subaru Time Exchange with Keck & Gemini - T. Ueta (Univ. of Denver), A. Tajitsu (NAOJ/Subaru)

10:00 - 10:30 Subaru Intensive/Strategic Programs - T. Ueta (Univ. of Denver), A. Tajitsu (NAOJ/Subaru)

10:30 - 11:00 Coffee Break

11:00 - 11:30 Use of EAO+AAT facilities - M. Otsuka (ASIAA)

11:30 - 12:00 Ideas for Intensive Programs - T. Ueta (Univ. of Denver), M. Otsuka (ASIAA), others

12:00 - 14:00 Lunch Break

Collaboration

14:00 - 16:00 Generating Subaru Telescope Intensive/Normal Program Proposals for S18B

16:00 - 17:00 Future Plans and WS Summary

Participants

Sun Kwok (The University of Hong Kong, HKU, Hong Kong, China)

Xuan Fong (HKU)

Yong Zhang (HKU)

SeyedAbdolreza (Abdi) Sadjadi (HKU)

Quintin Parker (HKU)

Foteini (Claire) Lykou (HKU)

2-3 students (HKU)

Albert Zijlstra (The University of Manchester, UK)

Jan Cami (The University of Western Ontario, Canada)

Amanda Karakas (Monash University, Australia)

Kenji Bekki (University of Western Australia Australia)

You-Hua Chu (ASIAA, Taiwan)

Masaaki Otsuka (ASIAA)

Ting-Hui Lee (W. Kentucky Univ., US./ASIAA)

Toshiya Ueta (University of Denver, US.)

Kentaro Asano (University of Denver)

Tsujimoto Takuji (NAOJ, Japan)

Ryo Ohsawa (The University of Tokyo, Japan)

Akito Tajitsu (Subaru Telescope, NAOJ, Japan)