Report on APPC-AIP 2016 Congress (III)
AAPPS-DPP Young Research Award

M. Kikuchi (AAPPS-DPP chair), M. Hole (vice chair)

AAPPS-DPP Young research award is AAPPS-DPP award for

1. A young researcher who is less than 40 years old can be nominated (i.e., self-nominated or nominated by others) for this prize based on his/her significant contribution in the study of plasma-related science and engineering. Each candidate shall submit a short explanation and a published paper on the subject.
2. Each previous S. Chandrasekhar winner will look at the submitted short explanations and papers in order to decide his choice of up to 2 papers providing a "significant contribution on in the study of plasma-related science and engineering".

More than 20 young researchers applied to AAPPS-DPP young research award but some cancelled due to travel grant issue (remaining are China (6), Japan (4), India (8), Australia (1), Philippines (1)). Since each laureate select independently, there is ample of possibility of duplication. Outcome is as follows,

Prof. S. Ichimaru selection:
1. **M. B. Dhanya (Vikram Sarabhai Space Centre, India),** Proton entry into the near-lunar plasma wake for magnetic field aligned flow, on "observations of protons in the near-lunar and deeper wake, flowing along interplanetary magnetic fields, which could originate from the tail of the solar wind velocity distribution".
2. **K. Takahashi (Tohoku University, Japan)**, Approaching the theoretical limit of diamagnetic-induced momentum in a rapidly diverging magnetic nozzle, on "measurements of axial momenta for a low-beta plasma injected in a rapidly diverging magnetic nozzle, demonstrating increase in the momentum as the magnetic fields inhibit the cross-field diffusion".

Prof. P. Kaw selection:
1. **K. Takahashi of Tohoku University, Japan** for his outstanding and definitive contributions to the problem of helicon based plasma thruster through studies of theoretical limits of diamagnetic induced momentum in a rapidly diverging magnetic nozzle .
2. **Wei Lu of Tsinghua University, China** for his unique and highly intuitive elucidation of Relativistic Plasma Wakefields in the Blowout regime for particle acceleration.

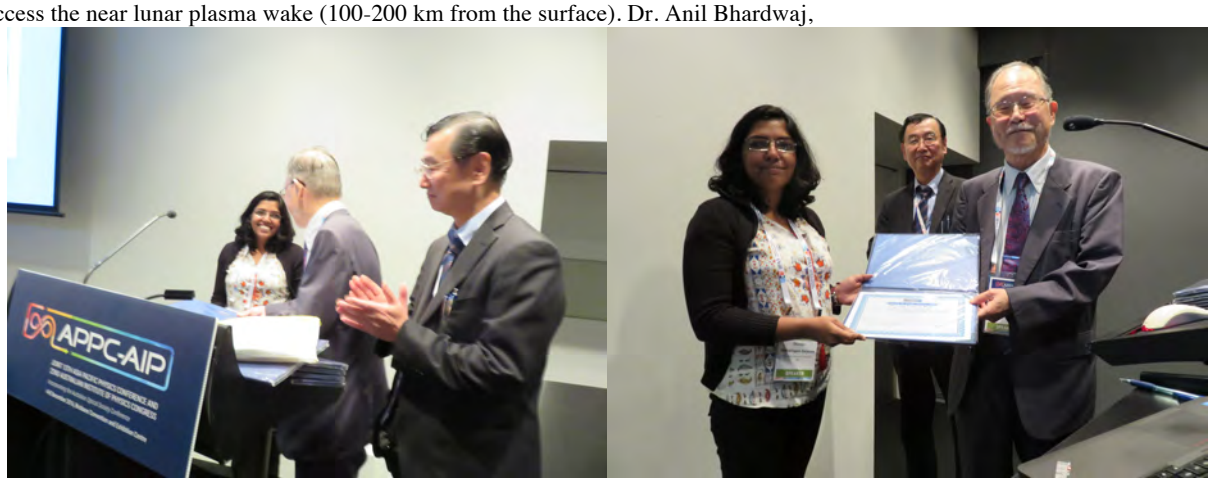
Prof. D. Melrose selection:
1. **Tsyuyoshi Inoue (Nagoya University, Japan)** : For his contributions to the understanding of the acceleration of Galactic cosmic rays at shocks associated with young supernova remnants, in particular his well-cited paper ApJ 744, 71 (2012).
2. **Dr Kazunori Takahashi (Tohoku University, Japan)**: For his experimental work giving insight into the basic plasma physics associated with helicon thruster development.

Congratulations to all recipients!! Especially I note that Prof. Takahashi was named by all three S. Chandrasekhar laureates. I am also delighted to see one lady to receive this award from India.

Ceremony was held just before the conference diner whose photos are shown below. Unfortunately, Prof. Wei Lu has to leave earlier by the change of governmental meeting on his budget.

1. **Dr. Dhanya Mahalingam Balaram:** "Proton entry into the near-lunar plasma wake for magnetic field aligned flow", Geophysical Research Letters 40(2013)2913:

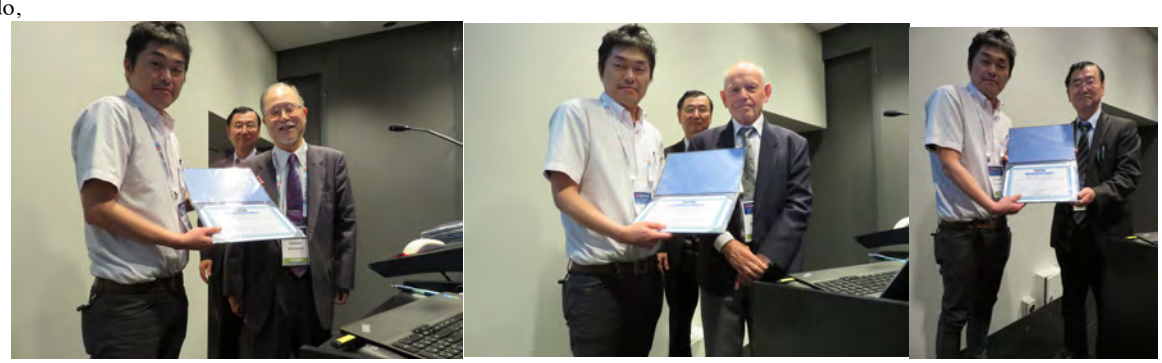
Ms. M. B. Dhanya is a young and dynamic researcher of my Laboratory who has made important contribution to the field of lunar plasma environment, particularly the night-side of Moon. Her research using the observations made by SARA experiment of Chandrayaan-1 mission (1st Indian mission to moon) has significantly improved our understanding on how the solar wind access the near lunar plasma wake (100-200 km from the surface). Dr. Anil Bhardwaj,



Ms MB Dhanya to receive DPP young research award from Prof. S. Ichimaru.

2. **Dr. Kazunori Takahashi:** "Approaching the Theoretical Limit of Diamagnetic-Induced Momentum in a Rapidly Diverging Magnetic Nozzle", PRL 110(2013)195003:

He has performed the direct measurement of the force exerted to the helicon plasma source/thruster, which has opened the door of the helicon thruster development. Since the force (i.e., the thrust in the electric propulsion) is equal in magnitude and opposite in direction to the axial plasma momentum exhausted from the system, this diagnosis identifies the absolute value of the axial plasma momentum. Furthermore, the individual measurements of the force exerted to the axial and radial walls, and to the magnetic nozzle, are performed, by which the detailed plasma momentum interactions with the magnetic field and the physical wall have been revealed His experiments performed in the Australian National University (Australia), Iwate University (Japan), Tohoku University (Japan), have clearly shown that the axial plasma momentum is increased along the magnetic nozzle by the Lorentz force due to the spontaneous azimuthal plasma current (mainly electron diamagnetic drift current) and the radial magnetic fields, even in the current-free helicon plasma, while the experiment also demonstrated that spontaneous ion acceleration, which is often observed in laboratory plasmas, does not give any axial momentum to the plasma, Professor Akira Ando,



Mr K. Takahashi to receive DPP young research award from Prof. S. Ichimaru, Prof. D. Melrose and P. Kaw (MK on his behalf).

3. Dr. Wei Lu: "Nonlinear Theory for Relativistic Plasma Wakefields in the Blowout Regime", PRL 96(2006)165002

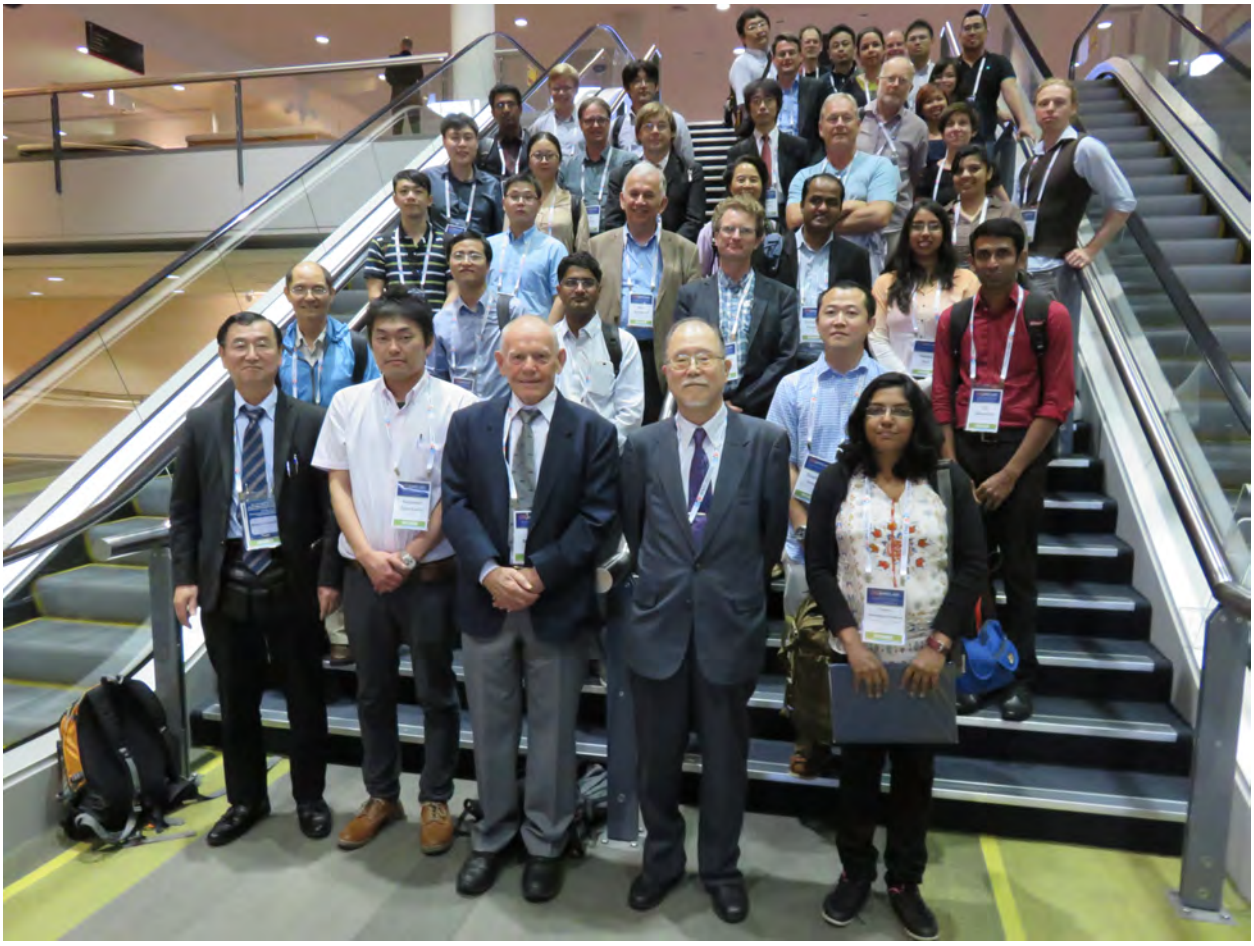
In the past decade, the field of plasma based acceleration has made much progress worldwide. I was very fortunate to be involved in this fast development, and also made my own contribution to the field. Notably, two of my early works on 3D nonlinear plasma wakefield theory (Lu et al., PRL 2006, citation 214) and scaling theory of laser wakefield acceleration in the 3D nonlinear regime (Lu et al., PRSTAB 2007, citation 349) has been well received worldwide as basic theories for the important nonlinear 3D regime of plasma based acceleration. In 2014, one of our predictions on high efficiency uniform acceleration (PRL 06, 08) has been verified experimentally at SLAC, and this work was published on the cover of Nature., Self nomination

Wei Lu from Skype and Prof. Lin I to receive certificate for him.

4. Dr. Tsuyoshi Inoue: "Toward Understanding the Cosmic-ray Acceleration at Young Supernova Remnants Interacting with Interstellar Clouds: Possible Applications to RX J1713.7–3946", The Astrophysical Journal 744(2012)71

Conventional theoretical modeling assuming uniform preshock state strongly suggested that the observed gamma-rays from young SNRs should not be attributed to hadronic origin, but to the inverse Compton process of accelerated electrons. However, performing high-resolution 3D magneto-hydrodynamics (hereafter, MHD) simulations, Dr. T. Inoue developed more realistic model of SNR shock propagation through inhomogeneous ISM. He found that interaction of interstellar cloud and shock wave induce strong magnetic field amplification up to 10^3 times the preshock strength, which is necessary for cosmic-ray acceleration, and that the observed gamma-rays spectrum revealed by Fermi Space Telescope is well explained by the hadronic origin owing to the spectral modification by cosmic-ray diffusion into the shocked clouds. His novel model was immediately recognized and has changed the standard picture of the community of the subject. Prediction has been confirmed recently by Sano et al./ Prof. Shu-ichiro Inutsuka,

Prof. Don Melrose to announce Dr. Inoue as his choice and the certificate.



Group photo of Two S. Chandrasekhar Prize laureates, AAPPS-DPP young research award recipients and session participants.