Press Release

Sept. 15 2023
Association of Asia-Pacific Physical Societies (AAPPS)
Division of Plasma Physics (AAPPS-DPP)

Subrahmanyan Chandrasekhar Prize of Plasma Physics

– Professor Katsumi Ida is selected as 10th (2023) Laureate –

The Division of Plasma Physics (CEO: Mitsuru Kikuchi, Chair: Abhijit Sen) under the Association of Asia Pacific Physical Societies (President: Hyoung Joon Choi) has selected Professor Katsumi Ida of the National Institute of Fusion Science, NINS) as the 10th (2023) Laureate of S. Chandrasekhar Prize of Plasma Physics, which is awarded to scientist who have made seminal / pioneering contributions in the field of plasma physics.
Citation:

Katsumi Ida : *For his pioneering contributions to experimental discoveries of a variety of turbulent states of magnetic fusion plasma, including turbulence-driven flow, electric field shear in H-mode state, and the effects of magnetic topologies and non-locality on transport.*

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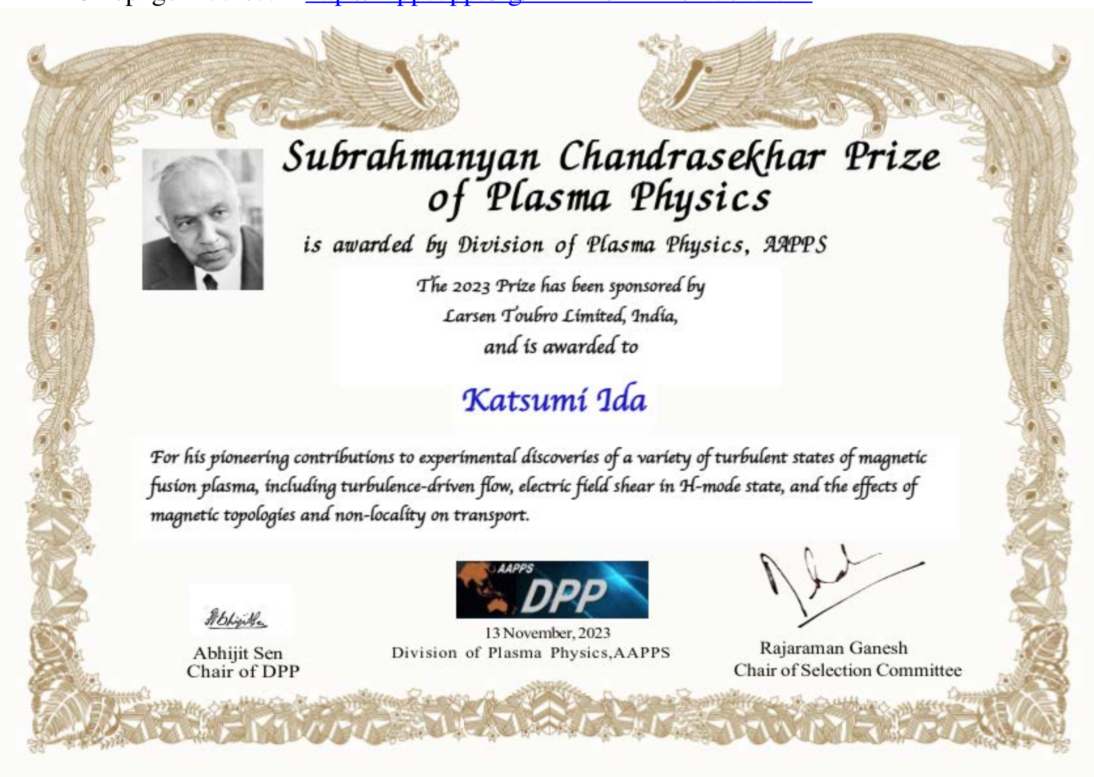
AAPPS-DPP Homepage Address : http://aappsdpp.org/AAPPSDPPF/index.html



Certificates of 2023 S. Chandrasekhar Prize of Plasma Physics
Certificate, medal and cash prize will be given at the 7th Asia-Pacific Conference on Plasma Physics (AAPPS-DPP2023) Nov. 12-17, 2023 at Port Messe Nagoya.

Press Release

On the achievements of Professor Katsumi Ida

Prof. Katsumi Ida

Born in Osaka in 1957, Katsumi Ida obtained his BSc and MSc from The University of Tokyo in 1980 and 1982, respectively. Then he went to Princeton University and worked under supervision of Professor Raymond Fonck in 1984 ~ 1985. He obtained PhD from The University of Tokyo in 1986. He joined the faculty of Nagoya University in 1986 and National Institute for Fusion Science in 1989. He has pioneered a new frontier in experimental studies of turbulent transport in toroidal plasmas and discovered many essential processes described below in the turbulent transport of magnetically confined plasmas in far from equilibrium states. His discoveries have enhanced the value of plasma physics as a modern physics discipline and significantly contributed to the realization of fusion reactors.

1. **Experimental discovery of intrinsic rotation due to plasma turbulence.**
   He discovered experimentally that an intrinsic toroidal flow could be created [K.Ida et.al. Phys. Rev. Lett. 1995]. He made explicit the essential aspect of turbulent plasma transport that temperature gradients give rise to momentum flow. Making these achievements, he has also made a significant contribution to the realization of fusion reactors, as plasma rotation plays an essential role in steady-state tokamak reactors and in suppressing turbulence. He also received the Nishina Memorial Prize in 2011, and plasma physics has been highly recognized by the entire physics community.
2. **Discovery of a strong electric field in H-mode.**
   The realization of the H-mode was a breakthrough for fusion research. The strong radial electric field (theoretically suggested) was experimentally discovered as the mechanism for its occurrence [K.Ida et.al. Phys. Rev. Lett. 1990]. This became the foundation for subsequent H-mode research. The elucidation of the mechanism, which followed this experimental result, provided the confidence on universality of H-mode manifestation regardless of the device, and strongly supported the development of fusion reactors.
3. **Experimental quantification of the relationship between topology and transport.**
   Plasmas can be confined by nested magnetic surfaces accompanied by magnetic islands (regions with different topologies). He observed experimentally the nature of transport within magnetic islands [K.Ida et.al. Phys. Rev. Lett. 2002]. The difference in transport properties due to topology also affects the global properties of nested magnetic surfaces. This fundamental result improves our ability to make predictions about the global properties of nested magnetic surfaces.
4. **Study of 'non-local transport' in plasmas.**
   Transport phenomena that cannot be explained by diffusion models have been observed in experiments. Phenomena in which the transport flux is not determined by a local gradient are called nonlocal transport. The essential phenomena observed in various aspects, such as transport hysteresis, are formulated [K.Ida et.al., Nucl. Fusion 2015].
5. **Systematizing Experimental Studies of Varieties of Turbulent States.**
   He has authored several excellent review papers [K.Ida, Plasma Phys, Control. Fusion 1998, K.Ida, J.Rice Nucl. Fusion 2014, K.Ida, T.Fujita, Plasma Phys, Control. Fusion 2018] in an ongoing effort to systematize the entire body of advanced experiments on plasma turbulent transport and many confinement modes. Recently he provided new experimental insights into the long-standing issue of the 'hydrogen isotope effect' [K.Ida et.al. Phys. Rev. Lett. 2020].

Total citation of his paper is 11527 with H-index of 51 according to Web of Science and 19366, with H-index of 70 according to Google Scholar.

Appendix:

1. Subrahmanyan Chandrasekhar

Astrophysicist born in India. He received the Nobel Prize in Physics in 1983 *for his theoretical studies of the physical processes of importance to the structure and evolution of stars,* including the Chandrasekhar limit on the mass of white dwarf stars. His research covered several broad areas, as seen from his texts, which included *Principles of Stellar Dynamics* (1942), *Hydrodynamic and Hydromagnetic Stability* (1961), and an influential book based on his lecture notes in *Plasma Physics* (1960).

2. AAPPS: Association of Asia-Pacific Physical Societies

(HP: http://www.aapps.org/main/index.php)

The Association of physical societies in the Asia Pacific region founded by the Nobel Laureate in Physics C.N. Yang, and Professor Akito Arima in 1983. The AAPPS held the 12th Asia Pacific Physics Conference under the president (at that time) Shoji Nagamiya in Makuhari, Japan. The current president is Professor Hyoung Joon Choi, Yonsei University, Korea.

3. AAPPS-DPP: Division of Plasma Physics, AAPPS

(HP : http://aappsdpp.org/AAPPSDPPF/index.html)

The first division under the AAPPS based on the success of the plasma physics program in the APPC-12. This division was formed in January 2014 based on the recommendation of Professor Nagamiya at the AAPPS council. From Nov 28, 2018, AAPPS-DPP becomes legal entity http://aappsdpp.org/DPPhoujin/index.html .

4. Subrahmanyan Chandrasekhar Prize of Plasma Physics

Subrahmanyan Chandrasekhar Prize of Plasma Physics is a top plasma physics prize founded by the AAPPS-DPP in July 2014 and is endorsed by AAPPS. This prize is given to a plasma physicist annually for pioneering and/or seminal contribution to plasma physics. The prize recipients were Professor S. Ichimaru (2014), Professor P. Kaw (2015), Professor D. Melrose (2016), Professors C.Z. Cheng and Lou C. Lee (2017), Professor Toshiki Tajima (2018), Professors Liu Chen and Kazunari Shibata (2019), Professor Hyeon Park (2020), Professor Taik Soo Hahm (2021), Professor Arnab Rai Choudhuri (2022) (http://aappsdpp.org/AAPPSDPPF/prizetable.html).

The 2023 Selection Committee composed of leading plasma physicists in Asia-Pacific region.

Chairman : Professor Rajaraman Ganesh (Institute for Plasma Research)

Members : Professor Yutong Li (Institute of Physics, CAS)
Professor Ding Li (Institute of Physics, CAS)
Professor Yasuaki Kishimoto (Kyoto University)
Professor Yusuke Ebihara (Kyoto University)
Professor Abraham Chian (University of Adelaide)
Professor Donald Melrose (University of Sydney)
Professor Shih-Hung Chen (National Central University)
Professor Lin I (National Central University)
Dr Kitae Lee (KAERI)
Professor Gunsu Yun (POSTECH)
Professor Gurbax Lakhina (Indian Institute of Geomagnetism)
Professor Shishir Deshpande (Institute for Plasma Research)