Professor Toshiki Tajima Receives the 2018 Subrahmanyan Chandrasekhar Prize of Plasma Physics

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The Division of Plasma Physics annually selects an outstanding plasma physicist for the S. Chandrasekhar Prize of Plasma Physics. The DPP's committee selected Professor Toshiki Tajima of the University of California at Irvine as the 2018 Laureate of the S. Chandrasekhar Prize of Plasma Physics. The award ceremony was held during the opening session of the second Asia-Pacific Conference on Plasma Physics, which took place in Kanazawa, Japan on Nov. 12, 2018.

Citation: *For wide-ranging contributions to plasma physics, in particular for the discovery and invention of extremely intense (relativistic) laser-driven wakefields as robust and long-lasting plasma states, with broad impacts on high energy particle acceleration and other applications, including medicine; in which he exerted leadership to launch high field science and to form large new research communities.*

Fig. 1: T. Tajima receiving S. Chandrasekhar Medal.

Professor Toshiki Tajima is regarded as the father of laser-driven acceleration, as he invented the concept of Laser Wakefield Acceleration (LWFA) in plasma physics with the late Prof. John Dawson. Professors Tajima and Dawson published their concepts with a paper in *Physical Review Letters* (1979); this paper received one of the highest citations in the entire field of plasma physics (Web of Science: 2927 cites, Google scholar: 4346 cites), thus reflecting the concept's fundamental nature and broad impact. Using Prof. Tajima's scheme, the accelerating field can be enhanced more than six orders of magnitude larger than the conventional scheme. He predicted even three more orders of magnitude higher fields using a tabletop X-ray laser-driven plasma-accelerator. Hundreds of groups and thousands of researchers worldwide are hoping to revolutionize high-energy physics beyond today's existing frontiers, using Prof. Tajima's invention. His physics inventions are numerous such as the Relativistic Flying Mirror (RFM) to generate coherent X-ray pulses, the Radiation Pressure Acceleration (RPA) for compact ion acceleration, and the application of this compact ion acceleration to hadron therapy.

Prof. Tajima's contributions to physics include proving the properties of nonlinear vacuums, predicted by quantum electrodynamics; explaining the mysteries of cosmic ray acceleration; and writing textbook in plasma astrophysics. Professor Subrahmanyan Chandrasekhar worked in a wide variety of physics fields, and we can see a similarity in Prof. Tajima's approach to the sciences. From 2002-2008, Prof. Tajima served as director general of the Kansai Research Establishment of the Japan Atomic Energy Research Institute (JAERI) and the Kansai Photon Science Institute (KPSI), which formerly was part of the Japan Atomic Energy Agency (JAEA), but is now is part of the National Institutes for Quantum and Radiological Science and Technology (QST). He served as chairman for the International Committee for Ultra Intense Lasers (ICUIL) from 2008-2016. He is a recipient of the Robert W. Hamilton Award (1997), the Farrington Daniels Award (2005), the Suwa Prize (2006), the Nishina Memorial Prize (2006), the Blaise Pascal Chair (2009), the Einstein Professorship of the Chinese Academy of Science (2013), the Enrico Fermi Prize (2015), and became an Academician (Foreign Member) of the Russian Academy of Sciences (2016). He has more than 16000 (H-index of 57) Web of Science cites, and he has more than 23000 (H-index of 70) Google scholar cites as of 2018. The 2018 Nobel committee also recognized his outstanding work in its citation as follows: "CPA is now the basis for most femtosecond laser systems—including those used in laser eye surgery, in which a pulse of laser light quickly slices open the lens before the surrounding tissue has time to heat up. "I'm glad the committee has recognized this science, which is creating so much value," says Toshiki Tajima, a laser physicist at the University of California, Irvine". It is a wonderful coincidence.