

2018 Subramanyan Chandrasekhar Prize of Plasma Physics

Professor Toshiki Tajima received at 2nd Asia-Pacific Conference on Plasma Physics

M. Kikuchi, AAPPS-DPP chair

Division of plasma physics annually selects an outstanding plasma physicist for the S. Chandrasekhar Prize of Plasma Physics. DPP's committee selected Professor Toshiki Tajima (the University of California at Irvine) as the 2018 Laureate of S. Chandrasekhar Prize of Plasma Physics. Award ceremony was held at the opening session of the 2nd Asia-Pacific Conference on Plasma Physics held in Kanazawa city on 12 in 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.



Figure 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 John Dawson published in *Physical Review Letters* (1979). This paper received one of the highest citations in the entire field of plasma physics (WoS: 2927 cites, Google scholar: 4346 cites), reflecting its fundamental nature and broad impact.

Using his scheme, the accelerating field can be enhanced more than 6 orders of magnitude larger than the conventional scheme. He predicted even three more orders of magnitude higher field using the tabletop X-ray laser-driven plasma-accelerator. Hundreds of groups and thousands of researchers worldwide are hoping to revolutionize the high-energy physics beyond today's existing frontiers using his invention. His physics inventions are numerous such as the Relativistic Flying Mirror (RFM) to generate coherent X-ray pulse, the Radiation Pressure Acceleration (RPA) for the compact ion acceleration, and the application of this compact ion acceleration to the hadron therapy.

His contribution in physics includes proving the properties of nonlinear vacuum predicted by quantum electrodynamics and explaining the mystery of the cosmic ray acceleration as well as the plasma astrophysics in general. Professor Subramanyan Chandrasekhar worked in wide variety of physics fields. We can see a similarity in Prof. Tajima's approach in sciences. During 2002-2008, Prof Tajima served as Director General of Kansai Research Establishment of JAERI and Kansai Photon Science Institute (KPSI) of JAEA (now is QST). He served as Chairman for International Committee for Ultra Intense Lasers (ICUIL) during 2008-2016. He is recipient of Robert W. Hamilton Award (1997), Farrington Daniels Award (2005), Suwa Prize (2006), Nishina Memorial Prize (2006), The Blaise Pascal Chair awarded (2009), Einstein Professorship of Chinese Academy of Science (2013), Enrico Fermi Prize (2015), Academician (Foreign Member), Russian Academy of Sciences (2016). He has outstanding scientific records of Web of Science cites more than 16000 (H-index of 57) and Google scholar cites more than 23000 (H-index of 70) as of 2018. The 2018 Nobel committee recognized his outstanding work in its citation as [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 surprising coincidence.