

Laureates of Tan Kah Kee Science Awards 2016

Award in Mathematics and Physics



Awardee: ZHOU Xiangyu

Born in 1965 in Chenzhou, Hunan Province, ZHOU received his Ph.D in 1990 from the Institute of Mathematics, Chinese Academy of Sciences (CAS) and a Russian's Doctor of Science from the Steklov Mathematical Institute, Russian Academy of Sciences (RAS) in 1998. He worked as an associate professor at the Steklov Mathematical Institute, RAS from 1990 to 1992 and at the Institute of Mathematics, CAS from 1992 to 1998; and he has been working as a professor at the Academy of Mathematics and Systems Science, CAS since 1998. From 2003 to 2012, he served as Director of the Institute of Mathematics, CAS. Later in 2013, he was elected a Member of CAS.

Prof. ZHOU has been studying several complex variables and complex geometry. As a result he founded his own method to solve some fundamental and difficult problems and has opened a new field in complex geometry, which has great impact on, and made significant contribution to, the development of several complex variables and complex geometry. Related works of his have been published in *Annals of Mathematics*, *Inventiones Mathematica*, *Izvestiy, Ser. Math., Russian Academy of Sciences*, and *Sci. China Math. etc.*

Prof. ZHOU won a National Natural Science Award in 2004, a first-class prize from the Natural Science Award

of the CAS in 1999, and an S. S. Chern Mathematics Award (Chinese Mathematical Society) in 2001. He attended the International Congress of Mathematicians as an invited speaker in 2002 and the Abel Symposium 2013 as a keynote speaker.

Award-winning Achievement:

Solutions of Some Problems in Several Complex Variables

Abstract:

ZHOU solved the extended future tube conjecture, which was listed as an unsolved problem in the *Encyclopaedia of Mathematics of Russia*. His work has been written into the *Mathematical Events of the Twentieth Century* and the *Development of Mathematics 1950–2000* by Academician of Russian Academy of Sciences Prof. Vladimirov and Academician of Sweden Royal Academy of Sciences Prof. Kiselman, respectively. Posed and previously studied by the schools of Bogoliubov and Wightman, the conjecture is of physical meaning and contributes to Hilbert's 6th problem.

ZHOU and his collaborators solved the optimal L^2 extension problem and established the optimal L^2 extension theorem, and further discovered its connections with many other important problems and solved them, while only one connection had been found before. The paper was published in the *Ann. of Math.* in 2015.

ZHOU also solved Demailly's strong openness conjecture on multiplier ideal sheaves, which is of great importance in several complex variables and complex geometry. Many mathematicians have obtained important results under the assumption of the conjecture. The paper was published in the *Ann. of Math.* in 2015.

Last but not least, ZHOU solved the Demailly-Kollar conjecture and the Johnson-Mustata conjecture. The paper was published in the *Invent. Math.* in 2015.



Award in Life Sciences



Awardee: CAO Xuetao

Born in 1964, Prof. CAO currently serves as President of Chinese Academy of Medical Sciences & Peking Union Medical College, Beijing, China. He received his Ph.D. from the Second Military Medical University SMMU (Shanghai, China) in 1990, and became a professor in immunology in 1993 and was appointed as the Director of the Institute of Immunology at SMMU in 2001. Prof. CAO is now Director of the National Key Laboratory of Medical Immunology (since May 2006). He was elected a Member of the Chinese Academy of Engineering in 2005, German Academy of Sciences in 2013 and French Academy of Medicine in 2014. He served as the President of Chinese Society for Immunology for eight years (from Oct. 2006 to Oct. 2014). Currently he serves as the Secretary General of Chinese Society for Immunology (since Oct. 2006), Secretary General of Federation of Immunological Societies in Asia and Oceania FIMSA (since June 2015) and President of Global Alliance for Chronic Diseases GACD (since Dec. 2013). As the corresponding author, he published more than 220 original papers in peer-reviewed journals including *Cell*, *Nature*, *Science*, *Nature Immunology*, and *Cancer Cell*, etc. He works as an editorial board member for a series of prestigious peer-reviewed journals, including *Cell*, *Annual Reviews of Immunology*, *Science Translational Medicine*, and *eLife*.

Prof. CAO's laboratory focuses on the understanding of innate signaling in immunity and inflammation, identification of cell subsets and new molecules in dendritic cell (DC)-initiated immune response and cancer immunotherapy. His group has identified important mediators and regulators of innate signaling, characterized immune subsets with regulatory function in immunity, inflammation and cancer.

Award-winning Achievement:

Dendritic Cell-mediated Immune Regulation and Immunotherapy: From Basic to Clinic

Abstract:

The fundamental question of immunology is to discriminate normal "self" and pathogenic "non-self". Dendritic cells (DC) are regarded as the most important professional antigen-presenting cells which may recognize the invading pathogens and initiate immune response to eliminate the pathogens. However, the immunological functions and the underlying mechanism of DC in initiating and regulating immune response remain to be fully understood. Dr. CAO Xuetao and colleagues have investigated the functions of DC and identified the molecular mechanisms of DC-initiated immune response. After extensive studies, Dr. Cao's group has independently cloned novel molecules from human DC cDNA library, outlined new molecular mechanisms for DC-mediated immune activation and regulation, identified new subset of regulatory DC and pathway for DC differentiation, proposed new clues for DC and macrophages to efficiently activate innate immune response. In addition, they successfully translated the basic knowledge to clinical study, completing Phase II clinical trial of DC vaccine to treat metastatic cancer patients, and now having Phase III trial officially approved by China FDA. More recently, they have identified new epigenetic mechanisms for initiating and resolving inflammation in innate DC and macrophages, outlining potential targets and strategies for the design of anti-inflammatory drugs.