

**Kin-Fai Mak and Hai-Bo Yu won the 2016 OCPA Outstanding Young Researcher Award (Macronix Prize)**

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Professor Kin-Fai Mak (Department of Physics, Penn State University) and Professor Hai-Bo Yu (Department of Physics, University of California at Riverside) are the co-winners of the 2016 Outstanding Young Researcher Award (Macronix Prize) of the International Organization of Chinese Physicists and Astronomers (OCPA).

The OYRA (Macronix Prize) is given each year to young ethnic Chinese physicists/astronomers outside of Asia in recognition of their outstanding achievements in physics. The Award carries a total cash prize of US \$2,000 each and a certificate citing the awardee's accomplishments in research.

Professor Yu received his B.S. and M.S. degrees in Physics at Zhejiang University in 1999 and 2002, respectively. He received his Ph.D. degree from University of Maryland, College Park, in 2007, under the supervision of Professor Rabindra Mohapatra. From 2007 to 2013, he held a postdoctoral position at University of California, Irvine, and University of Michigan. Since 2013, he has been an assistant professor in the Department of Physics and Astronomy at University of California, Riverside.

Dr. Yu's research has been focused on identifying the nature of the dark matter that makes up more than 80% of the mass in the Universe. He has pioneered a new self-interacting dark matter (SIDM) theory based on a Yukawa potential. This theory provides a unified explanation for the observed stellar kinematics from dwarf galaxies to galaxy clusters. He and his collaborators proposed a search strategy for hunting dark matter particles at high energy particle colliders, such as the Large Hadron Collider, as well as a theoretical framework for interpreting the search results. His recent research interests include galaxy formation and evolution in SIDM, and cosmological probes of the dark matter sector.

Dr. Yu's work is very well recognized in the field as he is the driving force in proposing and developing a new dark matter paradigm. He has made pioneering contributions in developing a new dark matter theory, self-interacting dark matter (SIDM). In well-studied cold dark matter (CDM) models, dark matter particles are assumed to be cold and collisionless. Despite its success in explaining the large-scale structure of the universe, CDM has long-standing difficulties in accommodating observations on galactic scales. In particular, the inner regions of CDM halos are too dense to be consistent with stellar kinematics. In SIDM, dark matter particles strongly collide each other in dark matter halos, analogous to the collision of billiard balls, lead to heat transfer from hot outer regions to the cold inner regions, reducing the central densities accordingly. The importance of dark matter self-interactions on the halo properties was noticed by Spergel and Steinhardt in 2000. Dr. Yu constructed the first realistic SIDM model based on the Yukawa interaction and developed a method for calculating the dark matter scattering cross section.

After joining UCR in 2013, Dr. Yu has made further progress in this new direction. He proposed a novel solution to simultaneously accommodate the diversity and uniformity of

spiral galaxies within the SIDM framework, derived the strongest bound on the dark matter scattering cross section on cluster scales (one order of magnitude stronger than the Bullet Cluster one), and proposed searches for the dark photon in dark matter direct detection experiments.

Dr. Yu is also responsible for two major contributions to collider searches for dark matter. First, he and his collaborators introduced an effective field theory approach to describe interactions between dark matter and visible matter and proposed a strategy to search for dark matter at high-energy particle colliders like the LHC. This approach captures the key part of dark matter interactions, and greatly simplifies calculations, providing a useful framework for interpreting different dark matter experimental results. Second, Dr. Yu demonstrated the importance of the mono-jet plus missing energy as a search signal for dark matter at particle colliders. Dr. Yu showed for the first time that in some cases, the LHC has a better sensitivity than any other dark matter detection method. Notably, his work generated interest in both the experimental and theoretical communities of particle physics.

The winner of OCPA's 2016 OYRA Award (Macronix Prize) was selected by the following panel of distinguished physicists (in alphabetical order):

Professor Moses Chan	Pennsylvania State University
Professor Xiangdong Ji	University of Maryland and Shanghai Jiaotong University
Professor Jen-Chieh Peng	University of California, San Diego
Professor Lu Jeu Sham	University of California, San Diego
Professor Yuen-Ron Shen	University of California, Berkeley

The OCPA award activity is a continuing program and represents a long tradition of OCPA to recognize outstanding achievements of the members of the ethnic Chinese physics community. Previous OYRA winners include:

Shou-Cheng Zhang	(1992, Stanford University)
Terence Tai-Li Hwa	(1993, UC San Diego)
Zhi-Xun Shen	(1993, Stanford University)
Xiao-Gang Wen	(1994, MIT)
Gang Xiao	(1994, Brown University)
Wai Mo Suen	(1995, Washington University)
Hong Wen Jiang	(1996, UCLA)
Rui Rui Du	(1997, University of Utah)
Zi Qiang Qiu	(1997, UC Berkeley)
Nai-Chang Yeh	(1998, California Institute of Technology)
Wayne Hu	(1999, University of Chicago)
Chung-Pei Ma	(2000, University of Pennsylvania)
Zhen Yao	(2001, University of Texas)
Pengcheng Dai	(2002, University of Tennessee)
Hoi-Kwong Lo	(2002, University of Toronto)

Kun Yang	(2002, Florida State University)
Hui Cao	(2003, Northwestern University)
Jonathan Feng	(2003, University of California at Irvine)
Luming Duan	(2005, University of Michigan)
Cheng Chin	(2006, University of Chicago )
W. Vincent Liu	(2007, University of Pittsburgh)
Ho Bun Chan	(2008, University of Florida)
Feng Wang	(2008, University of California, Berkeley)
Congjun Wu	(2008, University of California, San Diego)
Chong-Yu Ruan	(2009, Michigan State University)
Dongping Zhong	(2009, Ohio State University)
QI, Xiaoliang	(2010, Stanford University)
XU, Cenke	(2011, University of California, Santa Barbara)
GAO, Xuan	(2012, Case Western Reserve University)
CHEN, Yulin	(2012, Oxford University)
FU, Liang	(2013, Massachusetts Institute of Technology)
HO, Shirley	(2014, Carnegie Mellon University)
NI, Kang-Kuen	(2014, Harvard University)
LI, Lu	(2015, University of Michigan)
SHIH, David	(2015, Rutgers University)