

Hitoshi Murayama Named University Professor

On March 27, 2019, the University of Tokyo announced that Kavli IPMU Principal Investigator Hitoshi Murayama had been given the new title of University Professor. The university established this new title to recognize important individuals within the institution who are making significant contributions to his or her academic field internationally, and who are continuing to lead research activities that will contribute to further developments in their field in the future. Murayama is one of four academics to be given this title, which took effect from April 1.



Hitoshi Murayama

Masami Ouchi Awarded 15th JSPS Prize and Japan Academy Medal

Masami Ouchi, University of Tokyo Institute for Cosmic Ray Research Associate Professor and Kavli IPMU Scientist, was awarded the 15th JSPS (Japan Society for the Promotion of Science) Award and the 15th Japan Academy Medal in recognition of his work



Masami Ouchi

“Observational Studies of the Early Universe with Ly α Emitters.” An award ceremony was held at The Japan Academy on February 7, 2019.

The JSPS Prize recognizes young researchers with fresh ideas, who have the potential to become world leaders in their field. The purpose of the Japan Academy Medal is to honor outstanding young researchers. Up to six awardees (6 researchers this year) are selected every year from among the annual winners of the JSPS Prize (25 researchers this year).

Masamune Oguri Awarded This Year's Hayashi Chushiro Prize

Masamune Oguri, the University of Tokyo Research Center for the Early Universe Assistant Professor and Kavli IPMU Associate Scientist, has been awarded the fiscal year 2018 Hayashi Chushiro Prize.

The prize recognizes researchers who have made significant contributions to planetary science, astronomy, or astrophysics, and has been awarded since 1996 by the Astronomical Society of Japan. The prize itself was made to commemorate the lifetime achievements of outstanding Japanese theoretical astrophysicist Chushiro Hayashi.

Oguri has been recognized for his contribution to the fundamental understanding of gravitational lensing in astronomy. He has for a long time studied gravitational lensing from a theoretical and observational point-of-view, which has provided valuable insight into studies in cosmology and astronomy.

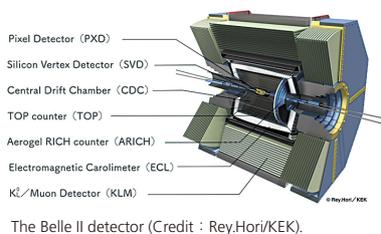


Masamune Oguri

Belle II Experiment Starts Taking Data

Kavli IPMU is participating in the Belle II experiment hosted by KEK. It is an asymmetric electron-positron colliding beam experiment aiming to find new physics beyond the standard model. On March 11, 2019, it was announced the “SuperKEKB” project had started “phase 3,” which meant taking and analyzing real electron-positron collision data.

The SuperKEKB project has involved two major ingredients. One is upgrading the asymmetric electron-positron colliding-beam accelerator KEKB, which was in operation between 1999 and 2010 and broke the world record for electron-positron collision frequency (called luminosity), to the SuperKEKB accelerator. The new accelerator has 40 times higher design luminosity than its predecessor. The other is a new detector called Belle II, placed around the collision point. The project has been moving towards completion, achieving several milestones on the way, which have been called phases 1, 2, and 3. In phase 1, the SuperKEKB accelerator had its first successful test run in February 2017. For phase 2, researchers successfully installed components, including the Belle II detector, into the accelerator. They carried out an electron-positron collision in March 2018 and observed the first collision event by the Belle II detector in April that year. Then, the BEAST (a dedicated detector system for machine commissioning) in the heart of the Belle II detector was replaced with the Vertex Detector (VXD), inching the project towards taking its first real data in the phase 3 period.



The Belle II detector (Credit : Rey,Hori/KEK).

The VXD is particularly important because it will analyze the particles and anti-particles in detail, looking for differences in behavior. If an undiscovered particle such as dark matter does exist, it is likely the VXD would play an important role in its discovery. Such a finding would open a new world of physics. Kavli IPMU researchers had finished constructing and commissioning a part of the Silicon Vertex Detector (SVD), which resides inside the VXD, in May last year (see *Kavli IPMU News* No. 42, p. 17).

The researchers will continue to contribute to the project, analyzing the new data that is about to come in, and hopefully uncover a new branch of physics.

Kavli IPMU / ELSI / IRCN 4th Joint Public Lecture: "A Question of Origins"

On January 20, 2019, the 4th Public Lecture series "A Question of Origins" was held at the Miraikan in Odaiba, Tokyo. The first three events of this public lecture series had been jointly hosted by the two WPI centers Kavli IPMU and the Tokyo Institute of Technology's Earth-Life Science Institute (ELSI). This year, the University of Tokyo's International Research Center for Neurointelligence (IRCN), a new WPI center selected in 2017, joined as a co-hosting institute. Kavli IPMU, ELSI, and IRCN respectively pursue the origin of the Universe, the origin of the Earth and life, and the origin of human intelligence. These

three WPI centers planned this public lecture as an event to convey the latest findings of their research in an easy-to-understand way, as well as to offer a diverse range of perspectives under a common theme "A Question of Origins," which is fundamental to mankind.

After an opening address by WPI Program Director Akira Ukawa, ELSI Project Associate Professor Yutetsu Kuruma talked about "understanding the origin of life by an artificial cell synthesis." IRCN Principal Investigator Kuniyoshi Sakai talked about "the origin of human intelligence," and Kavli IPMU Principal Investigator Hiraku Nakajima talked about "a geometrical approach to the origin of the universe."



Kavli IPMU Principal Investigator Hiraku Nakajima giving a talk.

After the lectures, the three speakers took part in a round table discussion entitled "What does it mean to question origins?" which was moderated by Yukihiro Nobuhara, Professor of the Graduate School of Arts and Sciences, the University of Tokyo, who specializes in philosophy of mind. Finally, there was a discussion between the lecturers and the audience, and the event ended successfully.



Round-table discussion. From left to right: Yukihiro Nobuhara, Yutetsu Kuruma, Kuniyoshi Sakai, and Hiraku Nakajima.

AAAS 2019 Annual Meeting in Washington D.C.

The American Association for the Advancement of Science (AAAS) 2019 annual meeting was held at the Marriot Wardman Park in Washington D.C. from February 14 through 17, 2019. At this AAAS annual meeting, the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT), the Japan Society for the Promotion of Science (JSPS), and the WPI centers including the Kavli IPMU jointly hosted the WPI booth for three days starting February 15 to raise global visibility of the WPI program, and make the WPI centers better known by overseas researchers so that they recognize the WPI centers as a place to do their research. During the three days, the WPI booth was visited by about 120 people, including researchers, journalists, and students.

Kavli IPMU Seminars

1. "The activation of black holes and the accretion rates onto them depend both on gas fraction and bulge types"
Speaker: Hassen Yesuf (KIAA Beijing)
Date: Jan 10, 2019
2. "Binary neutron star formation and the origin of GW170817"
Speaker: Chris Belczynski (Nicolaus Copernicus Astronomical Center, Polish Academy of Sciences)
Date: Jan 15, 2019
3. "Melonic supertensor models"
Speaker: Chi-Ming Chang (UC Davis)
Date: Jan 15, 2019
4. "Compensating strong coupling with large charge - Part I"
Speaker: Susanne Reffert (U Bern)
Date: Jan 15, 2019
5. "Decaying particles at the MeV

- scale: connection to dark matter, BBN and the CMB”
Speaker: Sebastian Wild (DESY)
Date: Jan 16, 2019
6. “From Galaxy Zoo to LSST: Citizen Science and the rise of the machines”
Speaker: Chris Lintott (U Oxford)
Date: Jan 16, 2019
 7. “The progenitors of core-collapse supernova explosions”
Speaker: Carl Fields (Michigan State U)
Date: Jan 17, 2019
 8. “Compensating strong coupling with large charge - Part II”
Speaker: Domenico Orlando (INFN)
Date: Jan 17, 2019
 9. “An exploratory study of Higgs-boson pair production at hadron colliders”
Speaker: Chih-Ting Lu (NCTS Taiwan)
Date: Jan 17, 2019
 10. “Graph neural network for stop pair and tt productions at the LHC”
Speaker: Jin Min Yang (ITP, Beijing)
Date: Jan 18, 2019
 11. “Classifying 5d SCFTs using Calabi-Yau 3-folds”
Speaker: Patrick Jefferson (Harvard U)
Date: Jan 22, 2019
 12. “The derived Riemann-Hilbert correspondence”
Speaker: Mauro Porta (U Strasbourg)
Date: Jan 22, 2019
 13. “Partially Composite Supersymmetry”
Speaker: Tony Gherghetta (U Minnesota)
Date: Jan 23, 2019
 14. “The Swampland Conjectures and some Physics Implications”
Speaker: Luis Ibanez (UAM)
Date: Jan 24, 2019
 15. “The Restless Universe (How the Periodic Table Got Built up)”
Speaker: Shri Kulkarni (Caltech)
Date: Jan 24, 2019
 16. “Black hole entropy and (0,4) SCFTs from F-theory”
Speaker: Kilian Mayer (U Utrecht)
Date: Jan 29, 2019
 17. “Supersymmetric Super-GUT Models”
Speaker: Jason Evans (KIAS)
Date: Jan 30, 2019
 18. “Recent progress of Volume Conjectures”
Speaker: Qingtao Chen (NYU, Abu Dhabi)
Date: Jan 31, 2019
 19. “Imprint of double-detonation mechanism in early light curves for Type Ia supernovae”
Speaker: Petr Baklanov (ITEP Moscow)
Date: Jan 31, 2019
 20. “Galaxies and their dark matter halos, an observer’s perspective”
Speaker: Alessandro Sonnenfeld (Leiden U.)
Date: Jan 31, 2019
 21. “The epoch of reionization with the Prime Focus Spectrograph”
Speaker: Sune Toft (DAWN, Copenhagen)
Date: Feb 01, 2019
 22. “Highest weight categories and exact categories”
Speaker: Agnieszka Bodzenta (U Warsaw)
Date: Feb 01, 2019
 23. “Limit on the Axion Decay Constant from the Cooling Neutron Star in Cassiopeia A”
Speaker: Jiaming Zheng (U Tokyo)
Date: Feb 06, 2019
 24. “Precision Cosmology from Gravitationally Lensed Supernovae”
Speaker: Peter Nugent (LBNL)
Date: Feb 07, 2019
 25. “Motivic Chern classes and Iwahori invariants of principal series”
Speaker: Changjian Su (U Toronto)
Date: Feb 12, 2019
 26. “Challenges for cosmology in the swampland era”
Speaker: Pablo Soler (Heidelberg U)
Date: Feb 12, 2019
 27. “Representations of quivers over Frobenius algebras”
Speaker: Tamas Hausel (IST Austria)
Date: Feb 12, 2019
 28. “Non-standard electroweak phase transitions in extensions to the standard model: Monopoles and Scale invariance”
Speaker: Suntharan Arunasalam (U Sydney)
Date: Feb 12, 2019
 29. “Recent advances in lattice weak matrix elements for searching new physics”
Speaker: Amarjit Soni (BNL)
Date: Feb 13, 2019
 30. “A stack of broken lines, associativity, and Morse theory of a point”
Speaker: Hiro Tanaka (MSRI Berkeley)
Date: Feb 14, 2019
 31. “Leptogenesis via Neutrino Oscillation”
Speaker: Yuta Hamada (Crete center for theoretical physics, U Crete)
Date: Feb 15, 2019
 32. “Studying QCD modeling of uncertainties in photon spectra from dark matter annihilation”
Speaker: Adil Jueid (Shanghai Key Laboratory for Particle Physics and Cosmology, Shanghai Jiao Tong U)
Date: Feb 15, 2019
 33. “Schrödinger, Klein-Gordon and Dirac equations, atomic wave functions and operator product expansion”
Speaker: Yu Jia (IHEP, Beijing)
Date: Feb 18, 2019

34. "Fundamental physics with multi-messenger cosmology"
Speaker: Alvise Raccanelli (CERN)
Date: Feb 18, 2019
35. "The fundamental plane for Gamma-Ray Burst X-ray afterglows"
Speaker: Maria Dainotti (Jagiellonian U / Stanford U)
Date: Feb 19, 2019
36. "Towards new science with LSST: Tools and techniques for mining large datasets"
Speaker: Mario Juric (U Washington)
Date: Feb 21, 2019
37. "Intrinsic Mirror Symmetry"
Speaker: Mark Gross (U Cambridge)
Date: Feb 25, 2019
38. "Flux compactifications and the hierarchy problem"
Speaker: Wilfried Buchmuller (DESY)
Date: Feb 25, 2019
39. "Towards a 5-sigma constraint on the sum of the neutrino masses"
Speaker: Francisco A. V. Navarro (Center for Computational Astrophysics, Flatiron Inst)
Date: Feb 25, 2019
40. "Holographic Complexity in the Jackiw-Teitelboim Gravity"
Speaker: Kanato Goto (U Tokyo)
Date: Feb 26, 2019
41. "Mimetic Gravity: Pros and Cons"
Speaker: Mohammad Ali Gorji (Inst for Research in Fundamental Sciences)
Date: Feb 26, 2019
42. "Tabletop experiments using light and atom"
Speaker: Shoji Asai (U Tokyo)
Date: Feb 27, 2019
43. "Firewalls in General Relativity"
Speaker: Surjeet Rajendran (UC Berkeley)
Date: Feb 28, 2019
44. "Broad composite resonance and its signals at the LHC"
Speaker: Ke-Pan Xie (Seoul National U)
Date: Mar 01, 2019
45. "Integrated approach to cosmology"
Speaker: Andrina Nicola (Princeton U)
Date: Mar 01, 2019
46. "Equivalent Calabi-Yau manifolds via GLSM"
Speaker: Michal Kapustka (Inst of Mathematics, Warsaw)
Date: Mar 05, 2019
47. "Black hole entropy, hyperbolic 3-manifold and analytic torsion"
Speaker: Dongmin Gang (Seoul National U)
Date: Mar 05, 2019
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Personnel Changes

The following people left the Kavli IPMU to work at other institutes. Their time at the Kavli IPMU is shown in square brackets.

Kavli IPMU Professor Tsutomu Yanagida [October 1, 2007 – March 31, 2017 as an IPMU/Kavli IPMU Principal Investigator and April 1 2009 – March 31, 2019 as an IPMU/Kavli IPMU Professor] moved to Shanghai Jiao Tong University as a Distinguished Chair Professor.

Kavli IPMU postdoctoral fellow Chengcheng Han [September 16, 2015 – March 31, 2019] moved to Nanjing Normal University as a postdoctoral fellow.

Kavli IPMU postdoctoral fellow Akishi Ikeda [April 1, 2015 – March 31, 2019] moved to Osaka University as a Specially Appointed Associate Professor (Part time).

Kavli IPMU postdoctoral fellow Shigeki Inoue [April 1, 2016 – March 31, 2019] moved to NAOJ as a

project researcher.

Kavli IPMU postdoctoral fellow Miho Ishigaki [April 01, 2013 – August 31, 2015 as a JSPS postdoctoral fellow, and then – January 31, 2019 as a Kavli IPMU postdoctoral fellow] moved to Tohoku University as a project researcher.

Kavli IPMU postdoctoral fellow Michihisa Takeuchi [October 1, 2014 – March 31, 2019] moved to the center for Theoretical Studies, Nagoya University as an Associate Professor.

JSPS postdoctoral fellow Naonori Sugiyama [November 1, 2014 – March 31, 2016 as a Kavli IPMU postdoctoral fellow, and then – March 31, 2019 as a JSPS postdoctoral fellow] moved to NAOJ as a Project Assistant Professor (NAOJ Fellow).

Editor's Note

As announced on page 3, this is the last issue of Kavli IPMU News. The editor thanks all the readers of this magazine. Since the launch of IPMU, many administrative members contributed in publishing IPMU News / Kavli IPMU News. I would particularly like to thank Rika Tanaka and Miyuki Onuki, who served as assistant editors during certain periods, Fusae Miyazoe, Tomomi Hijikata, Marina Komori, and Motoko Kakubayashi, who served as members of the public relations team, Aya Tsuboi, who uploaded the magazine online, Yuuko Enomoto, Midori Ozawa, Akiko Fujita, and Rieko Tamura, who provided various information, and Kayoko Kubota, Ayako Nakada, Mika Miura, and Shoko Ichikawa, who managed the list of mailing addresses for IPMU News / Kavli IPMU News.

Editor: Kenzo Nakamura