

Kavli IPMU Director Hitoshi Murayama Steps Down. Hiroshi Ooguri Takes Over Directorship

IPMU's founding director Hitoshi Murayama stepped down on October 15, 2018 after 11 years of service (during which IPMU was renamed Kavli IPMU), and Caltech Professor Hiroshi Ooguri has been appointed as the new Kavli IPMU Director. He is one of the founding members of the IPMU, and has been serving as an IPMU and then Kavli IPMU Principal Investigator. Director Ooguri will also serve as a Professor at Caltech. Hitoshi Murayama will remain at the Kavli IPMU as a Principal Investigator while serving as a Professor at UC Berkeley.

American Physical Society's 2019 Hans A. Bethe Prize Goes to Ken'ichi Nomoto

Ken'ichi Nomoto, a Kavli IPMU Senior Scientist, has been awarded the 2019 Hans A. Bethe Prize, which was announced by the American Physical Society on October 23, 2018. This award recognizes outstanding work in theory, experiment, or observation in the areas of astrophysics, nuclear physics, nuclear astrophysics, or closely related fields. The prize,



Ken'ichi Nomoto

consisting of \$10,000 and a certificate, is presented annually.

The 2019 Selection Committee awarded Professor Nomoto with this year's award for his "lasting contributions to our understanding of the nuclear astrophysics of the universe, including stellar evolution, the synthesis of new elements, the theory of core-collapse and thermonuclear supernovae, and gamma-ray bursts." An award ceremony will be held during the American Physical Society April 2019 Meeting in Denver, Colorado.

Kavli IPMU Staff Commended at 2018 Business Transformation Awards for Their Smart Tech

For their efforts in helping new international researchers and visitors navigate their way to the Kavli IPMU on their own, a team of Kavli IPMU administrative staff led by Project Specialist Rieko Tamura has been recognized by this year's University of Tokyo Business Transformation Awards. These awards are given out every year to recognize administrative staff and individual departments that have made a significant contribution to reforming the university.

Tamura's team received this year's Special Prize for their work in developing and running a smartphone app, which provides step

by step information in English about how to take public transport from the international airport, how to find and take the free shuttle bus to Kashiwa campus from the train station, and maps that show where individual researchers' offices are. It also serves all existing researchers at Kavli IPMU by becoming an information hub on seminars of the day, who was visiting that day, and where to find certain administrative staff members.



Kavli IPMU team receives a certificate from University of Tokyo Executive Vice President Tomoka Satomi.

An awards ceremony was held at the Yasuda Auditorium on the University of Tokyo's Hongo campus on December 19, 2018. Nine groups including the Kavli IPMU team were commended by the University of Tokyo President Makoto Gonokami or by Executive Vice President Tomoka Satomi.

Open Campus Kashiwa 2018

As usual, the University of Tokyo's Kashiwa campus held an open

campus for two days on the last Friday and Saturday of October (October 26 and 27 this year). In addition to the activities specific to Kavli IPMU, its Principal Investigator Yasunori Nomura gave a campus-wide special public lecture, entitled “Are there many universes?” at the FS Hall in the Graduate School of Frontier Sciences’ Environmental Studies Building on the second day. This was because Kavli IPMU, together with the Institute for Cosmic Ray Research and the Information Technology Center, took charge of the Special Lectures this year. This campus-wide activity, consisting of three special public lectures given by lecturers nominated from each of the three institutes which take turns being in charge, is held on Saturday. This year, the special public lectures were also seen at the Kavli IPMU lecture hall through live streaming video.



PI Nomura's special public lecture as seen at the Kavli IPMU's lecture hall.

The activities specific to Kavli IPMU, presented at the Kavli IPMU lecture hall, were the following: PI Toshitake Kohno's public lecture entitled “Using Mathematics to Analyze the Shape of the Universe” and a video presentation of the

latter part of an NHK BS Premium satellite TV service program COSMIC FRONT☆NEXT “Hitoshi Murayama's Great Adventures in the Universe: Is there an End?” on the first day, and a dialogue between Kavli IPMU postdoctoral fellows Akishi Ikeda and Michihisa Takeuchi, entitled “Science Onsen: Mathematics×Physics,” on the second day. (What is Science Onsen? Please see *Kavli IPMU News* No. 28, December 2014, p. 33.)



PI Toshitake Kohno, giving a lecture

Kavli IPMU also presented two-day activities as usual. In addition, the following new activities were presented: “Peek inside Laboratory B!” (the doors to Laboratory B were open to the public; both days), “Make your own bookmark!” (using Kavli IPMU images of the universe to create bookmarks; on Oct. 26), “Bubbles and Mathematics Workshop” (speaker: Tsinghua University Assistant Professor (former Kavli IPMU Postdoctoral Fellow) Will Donovan; on Oct. 27), and “Listen to the Cosmic Microwave Background” (musician Akihiko Matsumoto has composed a piece based on Cosmic Microwave Background data provided by Kavli IPMU researchers; both days).

Over the two days, a total of 11,000 people visited the campus. The Kavli IPMU attracted more than 2,900 people.

Kavli IPMU and ICRR Host 19th Joint Public Lecture

On November 11, 2018, the Nineteenth Kavli LPMU-ICRR (Institute for Cosmic Ray Research) Joint Public Lecture was held at the Yasuda Auditorium on the University of Tokyo's Hongo campus with an audience of about 280 people including high school and junior high school students.

The first lecture entitled “Accelerator Experiments and the High-Energy Universe Are Related Through Hadron Reactions” was given by Takashi Sako, an ICRR Associate Professor, and the second lecture entitled “Superstring Theory as Mathematical Physics” was given by Yutaka Yoshida, a Kavli IPMU Assistant Professor. The two lecturers then had a discussion on the topic of “Particles, Celestial Events, or the World of Mathematics” on the stage. They answered questions from each other, as well as some selected written questions from the audience.



Yutaka Yoshida (left) and Takashi Sako (right), talking on the stage.

3rd “Actually I Really Love Physics! —Career Paths of Female Physics Graduates” Event

On November 17, 2018, the University of Tokyo’s Kavli IPMU, Institute for Solid State Physics, and Institute for Cosmic Ray Research jointly hosted the 3rd “Actually I Really Love Physics! —Career Paths of Female Physics Graduates” event at the Kavli IPMU, and there were 13 participants. Four speakers from companies and research institutes including Kavli IPMU Postdoctoral Fellow Tomoko Morii spoke on their careers. Between the talks, there was a tour of host institutes and a gathering at the Kavli IPMU’s Fujiwara Hall. A friendly atmosphere with tea and cookies served encouraged the participants to actively ask the speakers questions and facilitated interaction among the participants.



Gathering at the Kavli IPMU’s Fujiwara Hall.

“Meet the Scientists!” Event for High School and University Students

On December 4, 2018, Kavli IPMU hosted an event “Meet the Scientists!” at the Media Hall in the University of Tokyo’s Kashiwa Library. This event aimed at the interaction of high school and university students with

young researchers. In addition to Kavli IPMU researchers, many young researchers attending an international conference “Stellar Archaeology as a Time Machine to the First Stars” (held at Kavli IPMU from December 3 to December 7; see page 22) joined in this event.

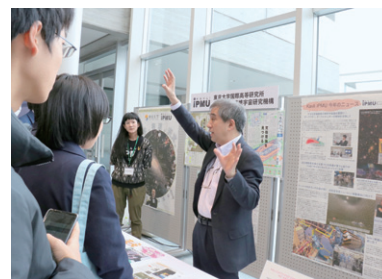
The event was opened with a lecture entitled “Time Travel from the Beginning of Our Universe to the Milky Way Galaxy: Introduction to Stellar Archaeology” given by IPMU Postdoctoral Fellows Miho Ishigaki (in Japanese) and Shing-Chi Leung (in English). Thirteen young researchers from various countries then presented their research on the frontiers of cosmology and astronomy in short presentations. However, one of them was not telling the truth and the audience was asked to find it. Subsequently a mix of researchers and audience was divided into teams and a quiz to test the astronomical knowledge of the audience (asking researchers for hints to answer questions) in team matches was held. Afterward, high school students took the opportunity to chat with scientists, and some students received advice for their future path.



Quiz contest in team matches.

7th WPI Science Symposium

On December 27, 2018, the 7th WPI Science Symposium “Transformative Science” was held at Nagoya University’s Toyoda Auditorium in Nagoya, and attracted about 900 people. This Symposium has been held every year to convey leading-edge scientific research activities and their features, in particular, to high school students who will lead the next generation. This year, Nagoya University’s Institute of Transformative Bio-Molecules (ITbM) hosted the Symposium. The Kavli IPMU jointly ran a booth with other 12 WPI centers and participated in a one-minute presentation to the audience. At the Kavli IPMU booth, Nagoya University Professor and Kavli IPMU Principal Investigator Naoshi Sugiyama explained Kavli IPMU’s research activities to high school students.



PI Naoshi Sugiyama explaining Kavli IPMU’s research activities.

Kavli IPMU Seminars

1. “New life in quadratic theories of gravity”
Speaker: Raquel Santos García (UAM)

- Date: Jul 18, 2018
2. "Correlated Gravitational-wave and Neutrino Signal from Accretion-Induced Collapse of White Dwarfs"
Speaker: Shuai Zha (U Hong Kong)
Date: Jul 19, 2018
 3. "Affine Beilinson-Bernstein at the critical level for GL₂"
Speaker: Sam Raskin (U Texas at Austin)
Date: Jul 19, 2018
 4. "Decoupling New Physics: The Standard Model EFT framework and Cosmological Relaxation models"
Speaker: Tevong You (U Cambridge)
Date: Jul 19, 2018
 5. "Stellar rejuvenation and seed black hole mergers in AGN disks"
Speaker: Doug Lin (UCSC)
Date: Jul 30, 2018
 6. "Self-Interacting Dark Matter"
Speaker: Hai-Bo Yu (UC Riverside)
Date: Aug 01, 2018
 7. "Coulomb branches, shifted quantum algebras and modified q-Toda systems"
Speaker: Oleksandr Tsybaliuk (Yale U)
Date: Aug 07, 2018
 8. "Homological characterization of quasi-hereditary algebras"
Speaker: Agnieszka Bodzenta (U Warsaw)
Date: Aug 07, 2018
 9. "Stellar hints for axion hunters"
Speaker: Ken'ichi Saikawa (Max-Planck Inst)
Date: Aug 08, 2018
 10. "Quantizing Deformation Theory"
Speaker: Alexander Voronov (U Minnesota)
Date: Aug 09, 2018
 11. "Speed Limits for Gravity"
Speaker: Scott Melville (Imperial College London)
Date: Aug 22, 2018
 12. "A quantum refinement of equivariant cohomology"
Speaker: Pedram Hekmati (U Auckland)
Date: Aug 28, 2018
 13. "Galactic Dynamics with Gaia DR2"
Speaker: Daisuke Kawata (Univ College London)
Date: Aug 29, 2018
 14. "OPE inversion and large spin perturbation theory"
Speaker: Carlos Cardona (Niels Bohr Inst)
Date: Sep 10, 2018
 15. "RG interfaces"
Speaker: Cornelius Schmidt-Colinet (LMU)
Date: Sep 11, 2018
 16. "Super-instanton counting"
Speaker: Taro Kimura (Keio U)
Date: Sep 11, 2018
 17. "The one-loop matter bispectrum as a probe of gravity and dark energy"
Speaker: Ben Bose (ICG, U Portsmouth)
Date: Sep 12, 2018
 18. "Secrets of PRL"
Speaker: Robert Garisto (American Physical Society)
Date: Sep 12, 2018
 19. "Hot gas outflows in the Milky Way Galaxy"
Speaker: Shinya Nakashima (RIKEN)
Date: Sep 13, 2018
 20. "Gravitational waves as a probe of fundamental physics"
Speaker: Cyril Lagger (U Sydney)
Date: Sep 13, 2018
 21. "Liouville conformal field theory and the DOZZ formula"
Speaker: Vincent Vargas (ENS)
Date: Sep 14, 2018
 22. "The first quasars in the early universe"
Speaker: Chris Done (U Durham)
Date: Sep 14, 2018
 23. "A formula for the motive of the moduli stack of vector bundles on a curve"
Speaker: Victoria Hoskins (Freie Universität Berlin)
Date: Sep 18, 2018
 24. "Geometry of isomonodromy deformations"
Speaker: Yasuhiko Yamada (Kobe U)
Date: Sep 20, 2018
 25. "Zero Dimensional Donaldson-Thomas Invariants of Calabi-Yau 4-folds"
Speaker: Yalong Cao (U Oxford)
Date: Sep 20, 2018
 26. "Open intersection numbers, matrix model, and W-constraints"
Speaker: Alexander Alexandrov (IBS Korea)
Date: Sep 25, 2018
 27. "Clues in the small-scale mass distribution of the dark matter probed by gravitational lensing"
Speaker: Jordi Miralda Escude (Universitat de Barcelona)

- Date: Sep 25, 2018
28. "The Noether-Lefschetz problem for normal threefolds"
Speaker: Ugo Bruzzo (SISSA)
Date: Sep 25, 2018
29. "Connecting the Dark and Light Side of Galaxy Formation"
Speaker: Piero Madau (UC Santa Cruz)
Date: Sep 26, 2018
30. "How Long do Quasars Shine?"
Speaker: Joe Hennawi (UCSB)
Date: Sep 27, 2018
31. "Discrete 't Hooft anomaly of QCD and constraints on chiral symmetry breaking"
Speaker: Yuya Tanizaki (RIKEN BNL)
Date: Oct 02, 2018
32. "The constraint of void bias on primordial non-Gaussianity"
Speaker: Kwan Chuen Chan (Sun Yat-Sen U)
Date: Oct 03, 2018
33. "Hunting for high-redshift ($z > 6$) quasars with Subaru Hyper Suprime-Cam"
Speaker: Yoshiki Matsuoka (Ehime U)
Date: Oct 04, 2018
34. "Stringy nonlocality and black hole horizons"
Speaker: Matthew Dodelson (Kavli IPMU)
Date: Oct 09, 2018
35. "dark photon: collider, EDM and masslessness"
Speaker: Gang Li (National Taiwan U)
Date: Oct 10, 2018
36. "Cosmology from cosmic shear power spectra with Subaru Hyper Suprime-Cam first-year data"
Speaker: Chiaki Hikage (Kavli IPMU)
Date: Oct 11, 2018
37. "Continuum limit of fishnet graphs and AdS sigma model"
Speaker: Benjamin Basso (LPTENS)
Date: Oct 16, 2018
38. "Higgs mass, strong CP problem and Unification"
Speaker: Keisuke Harigaya (IAS)
Date: Oct 17, 2018
39. "Weyl group action on weight zero MV basis and equivariant multiplicities"
Speaker: Dinakar Muthiah (Kavli IPMU)
Date: Oct 18, 2018
40. "Cohomological Hall algebras associated to Riemann surfaces"
Speaker: Olivier Schiffmann (Universite de Paris-Sud Paris-Saclay)
Date: Oct 18, 2018
41. "On dimensional reduction of 4d $N=1$ Lagrangians for Argyres-Douglas theories"
Speaker: Prarit Agarwal (Seoul National U)
Date: Oct 23, 2018
42. "Towards Scale invariant theory of gravity"
Speaker: Anupam Mazumdar (U Groningen)
Date: Oct 25, 2018
43. "Probing the sterile neutrino portal to Dark Matter with γ rays"
Speaker: Miguel Garcia Folgado (Valencia U)
Date: Oct 26, 2018
44. "What's new in G2?!"
Speaker: Andreas Braun (U Oxford)
Date: Oct 30, 2018
45. "Classification of topological twists of super-Poincare algebras"
Speaker: Richard Eager
Date: Oct 30, 2018
46. "Looking for Dark Matter with atomic clocks and magnetometers"
Speaker: Rodrigo Alonso (Kavli IPMU)
Date: Oct 31, 2018
47. "The properties of extremely red quasars observed during the epoch of peak galaxy formation"
Speaker: Andy Goulding (Princeton U)
Date: Nov 01, 2018
48. "Increasing the complexity of free particle motion by breaking its mechanical nature"
Speaker: Boris Hasselblatt (Tufts U)
Date: Nov 01, 2018
49. "Weak Gravity Conjecture from Unitarity and Causality"
Speaker: Toshifumi Noumi (Kobe U)
Date: Nov 06, 2018
50. "New Venues in Formation and Detection of Primordial Black Hole Dark Matter"
Speaker: Volodymyr Takhistov (UCLA)
Date: Nov 07, 2018
51. "2d extremal correlator in $N=(2, 2)$ SCFT"
Speaker: Jin Chen (CAS)
Date: Nov 08, 2018
52. "Exploring the Dusty and Dynamic Infrared Sky with Spitzer, JWST, and Beyond"

- Speaker: Ryan Lau (JAXA/Caltech)
Date: Nov 08, 2018
53. "Demazure-Lusztig operators, Whittaker functions and crystals"
Speaker: Anna Puskás (Kavli IPMU)
Date: Nov 08, 2018
54. "Searching for the first non-Gravitational Signal of Dark Matter in the Galactic Center"
Speaker: Oscar Macias (Kavli IPMU & GRAPPA)
Date: Nov 09, 2018
55. "Galaxy Clusters: A Standard Cannon for Cosmology"
Speaker: Chris Miller (U Michigan)
Date: Nov 12, 2018
56. "Novel signature of Type II Seesaw model at the LHC"
Speaker: Dilip Ghosh (Indian Association for the Cultivation of Science)
Date: Nov 12, 2018
57. "On the generalised Dubrovin's conjecture for Grassmannians"
Speaker: Anton Fonarev (HSE Moscow)
Date: Nov 13, 2018
58. "Singularity theorems and the stability of compact extra dimensions"
Speaker: Jose M. M. Senovilla (U of the Basque Country, Bilbao)
Date: Nov 14, 2018
59. "Searching for Dark Matter with X-ray lines"
Speaker: Kenny Ng (Weizmann Inst of Science)
Date: Nov 14, 2018
60. "Modular Symmetry in flavors"
Speaker: Morimitsu Tanimoto (Niigata U)
- Date: Nov 15, 2018
61. "Cosmology with DES lensing beyond the power spectrum"
Speaker: Daniel Gruen (Stanford U)
Date: Nov 15, 2018
62. "Virtual classes in analytic geometry"
Speaker: Mauro Porta (U Strasbourg)
Date: Nov 15, 2018
63. "Understanding AGN evolution with large (X-ray) surveys: current constraints and prospects for eROSITA"
Speaker: Andrea Merloni (MPE, Garching)
Date: Nov 19, 2018
64. "Categorified non-commutative deformations and abelian hulls"
Speaker: Agnieszka Bodzenta (U Warsaw)
Date: Nov 21, 2018
65. "Birational geometry of symplectic quotient singularities"
Speaker: Alastair Craw (U Bath)
Date: Nov 21, 2018
66. "Fundamental physics studies with high energy missions"
Speaker: Andrea Santangelo (U Tuebingen)
Date: Nov 22, 2018
67. "Type Ia supernova progenitor issue: recent progress and future prospect"
Speaker: Hiroya Yamaguchi (ISAS/JAXA)
Date: Nov 27, 2018
68. "Moduli of Heterotic String Compactifications and Effective Actions"
Speaker: Eirik Eik Svanes (ICTP Trieste)
Date: Nov 27, 2018
69. "Magnificent Four with colors"
Speaker: Nicolò Piazzalunga (Stonybrook U)
Date: Nov 27, 2018
70. "How the Planck satellite helped decode the role of Planck's quantum in the emergence of our Universe from the Planck-mass era"
Speaker: Richard Bond (CITA, U Toronto)
Date: Nov 28, 2018
71. "Astrophysical systematics to weak lensing: challenges and opportunities"
Speaker: Elisa Chisari (U Oxford)
Date: Nov 29, 2018
72. "The Kinematics of Inflation, Preheating and Heating: a Playground for Kolmogorov-Sinai and Shannon Entropies"
Speaker: Richard Bond (CITA, U Toronto)
Date: Nov 29, 2018
73. "Where are the SUSY Higgs Bosons?"
Speaker: Sven Heinemeyer (IFT/IFCA (CSIC), Madrid/Santander)
Date: Dec 03, 2018
74. "Physics Beyond Colliders - Exploring Physics Beyond the Standard Model"
Speaker: Joerg Jaeckel (Heidelberg U)
Date: Dec 03, 2018
75. "Space Probes of the Highest Energy Particles: POEMMA & EUSO-SPB"
Speaker: Angela Olinto (U Chicago)

- Date: Dec 03, 2018
76. "On Lorentz-invariant massive spin-2 theories"
Speaker: Atsushi Naruko (Tohoku U)
Date: Dec 03, 2018
77. "Warped Black Holes in Lower-Spin Gravity"
Speaker: Max Riegler (Université libre de Bruxelles)
Date: Dec 04, 2018
78. "21-cm cosmology after 2021"
Speaker: Anze Slosar (BNL)
Date: Dec 05, 2018
79. "The origin of the electroweak symmetry breaking"
Speaker: Jing Shu (Inst Theoretical Physics, Chinese Academy of Sciences)
Date: Dec 06, 2018
80. "Hamiltonian truncation and the S₃ partition function"
Speaker: Matthijs Hogervorst (Perimeter Inst)
Date: Dec 11, 2018
81. "Dual exponentials and their quantization"
Speaker: Andrea Appel (U Edinburgh)
Date: Dec 11, 2018
82. "Sbottoms as probes to MSSM with nonholomorphic soft interactions"
Speaker: Samadrita Mukherjee (Indian Association for the Cultivation of Science)
Date: Dec 12, 2018
83. "Dispatches from the sub-GeV Dark Matter Frontier"
Speaker: Tien-tien Yu (U Oregon)
Date: Dec 14, 2018
8. "Unification of integrability in

- supersymmetric gauge theories"
Speaker: Junya Yagi (Perimeter Inst)
Date: Dec 18, 2018
85. "Path integrals, finite temperature, and lattices"
Speaker: David McGady (NBIA)
Date: Dec 18, 2018
86. "Predicting proton decays from low energy SUSY spectrum"
Speaker: Kazuki Sakurai (Warsaw U)
Date: Dec 26, 2018
87. "Symmetric gauge theories and Lieb-Schultz-Mattis-type constraints"
Speaker: Xu Yang (Boston College)
Date: Dec 27, 2018

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 Assistant Professor Takahiro Nishimichi [April 1, 2010 – March 31, 2013 as a JSPS postdoctoral fellow, April 1, 2015 – December 31, 2018 as a Kavli IPMU Assistant Professor] moved to Yukawa Institute for Theoretical Physics, Kyoto University as an Associate Professor.

Kavli IPMU postdoctoral fellow Atsushi Shimono [September 1, 2011 – July 31, 2015 as a Project Academic Support Specialist, then – October 31, 2018 as a Kavli IPMU postdoctoral fellow] moved to Graduate School of Media and Governance, Keio University as a Project Assistant

Professor

Kavli IPMU postdoctoral fellow Jin Mann Wong [October 1, 2017 – October 11, 2018] moved to Fetch.AI as a Research Scientist.

JSPS postdoctoral fellow Tilman Hartwig [October 21, 2017 – November 30, 2018] moved to School of Science, The University of Tokyo as an Assistant Professor.