

MEXT Director General Keisuke Isogai Visits Kavli IPMU

On February 28, 2018, MEXT (Ministry of Education, Culture, Sports, Science and Technology) Director General Dr. Keisuke Isogai of the Research Promotion Bureau visited the Kavli IPMU accompanied by four MEXT officers. They listened to Kavli IPMU Director Hitoshi Murayama's presentation of an overview of the research activities at the Kavli IPMU. Subsequently, the guests joined a tea held in Piazza Fujiwara and enjoyed interacting with young researchers from many countries. In particular, Dr. Isogai enjoyed lively conversations with a number of young astronomers, physicists, and mathematicians.



MEXT Director General Isogai (right) enjoying conversation with a Kavli IPMU researcher. Also see photo on page 3.

"Kavli IPMU-JAXA Joint Research Program on Hard X-Ray and Gamma-Ray Imaging" Launched

In October of last year, the Kavli IPMU and the Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency

(ISAS/JAXA) agreed to start a new collaboration to apply their work in artificial satellite projects, particularly in developing hard x-ray and gamma-ray detectors, with the base of collaborative research activities to be located at the Kavli IPMU. Researchers will work together with the Keio University School of Medicine and the University of Tokyo Graduate School of Pharmaceutical Sciences to transfer their technology to nuclear medicine. In particular, they will work toward seeing the location of cancer stem cells with very high resolution and precise quantification, and, it is hoped, advance research in cancer treatment.

The leading members of the collaboration have arrived or are about to arrive at their posts at the Kavli IPMU. Accordingly, on March 26, 2018, the Kavli IPMU and ISAS/JAXA held a joint press conference at the Ito International Research Center on the University of Tokyo's Hongo campus to announce the launch of the Kavli IPMU-JAXA Joint Research Program on Hard X-Ray and Gamma-Ray Imaging. After the addresses of Kavli IPMU Director Hitoshi Murayama and ISAS Director General Saku Tsuneta, Keio University School of Medicine Professor and Keio University Hospital Vice Director Hideyuki Saya explained the main target of the collaborative research, cancer stem cells. University of Tokyo Executive Director and Vice President and Kavli IPMU Principal Investigator Hiroaki Aihara, who coordinates the collaborative research, presented an overview of the research. A Q&A session, photo session, and on-the-spot interview by reporters followed. There were many reporters eagerly posing questions to the four presenters. (See, photo on page 3).

The 3rd Kavli IPMU / ELSI Joint Public Lecture "A Question of Origins"

On January 21, 2018, the 3rd public lecture, "A Question of Origins" co-sponsored by the Kavli IPMU and Tokyo Institute of Technology's Earth-Life Science Institute (ELSI) was held at the Tokyo Institute of Technology's Kuramae Hall. The purpose of the Kavli IPMU is to pursue the origin of the Universe and the purpose of the ELSI is to pursue the origin of the Earth and life. For these two WPI institutes, this series of public lectures is an opportunity to convey the latest findings of their research in an easy-to-understand way as well as to offer, together with those in different fields from those studied at Kavli IPMU and ELSI, a diversity of perspectives to the audience under the common theme of "A Question of Origins," which is fundamental to humankind. For each of the last two times, a philosopher was invited, while this time, a researcher in the science of art was invited as one of three lecturers. There was an audience of about 300 people.

After an opening address by WPI Program Director Akira Ukawa, Nagoya University Graduate School of Science Dean and Kavli IPMU Principal Investigator Naoshi Sugiyama talked on "Towards Elucidating the Origin of the Universe," ELSI Vice Director Shigeru Ida gave a talk on "Extraterrestrial Life: Liberation from Earth-Centricity — Exoplanets, Icy Moons," and the Tokyo Institute of Technology's Institute for Liberal Arts Associate Professor Asa Ito spoke about "When Shape Is Formed: Rhythm and Body from the Viewpoint of the Science of Art." After the lectures, the three speakers took part in a roundtable discussion entitled "What Does It Mean to Question

Origins?” Finally, there was a discussion between the lecturers and the audience, and the event ended on a high note.



Naosugi Sugiyama giving a lecture.

6th Annual WPI Science Symposium “Unfolding Future”

On February 11, 2018, the 6th Annual WPI Science Symposium “Unfolding Future” was held at the Miraikan in Odaiba, Tokyo, and attracted about 800 people. Previously, it was called the WPI Joint Symposium, which had been held every year to convey leading-edge scientific research activities and their attractive features, in particular, to high-school students who will lead the next generation. As of Fiscal Year 2017, it has been renamed the WPI Science Symposium. This year, Tsukuba University’s International Institute for Integrative Sleep Medicine (IIS) hosted the Symposium, and as its venue was the Miraikan, it was open not only to high-school students but also to a wider audience including families. Because of this, the program was enriched by the inclusion of, in addition to conversations and lectures by scientists, a panel discussion in which the future of science in Japan was discussed by panelists comprised of those from venture business and the science magazine Nature in addition to scientists, and a comedy live show presented by a science communicator certified by the National Museum of Nature and



Naoki Yoshida (second from the right) and Kei Hirose (rightmost).



WPI Booth jointly run by WPI centers.

Science, Tokyo.

From the Kavli IPMU, Principal Investigator Naoki Yoshida presented a special talk with Tokyo Institute of Technology’s Earth-Life Science Institute (ELSI) Director Kei Hirose to introduce attractive features of the Universe and the Earth. In addition, the Kavli IPMU jointly ran a booth with other 10 WPI centers, and participated a one-minute presentation to introduce each WPI center to the audience.

AAAS 2018 Annual Meeting in Austin, Texas

The American Association for the Advancement of Science (AAAS) 2018 annual meeting was held at the Austin Convention Center in Austin, Texas from February 15 through 19, 2018. 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 16 for the purpose of increasing global visibility of the WPI program, and making the WPI centers better known by overseas researchers so that they recognize the WPI centers as their own place of research. During the three days, the WPI booth was visited by about 400 people, including researchers, journalists, students, and families. At this AAAS annual meeting, WPI Program Director Akira Ukawa and WPI Academy Director Toshio Kuroki participated along with the purpose of observing various events held at the meeting.



A group photo of staff joined from MEXT, JSPS, and WPI institutes, taken at the WPI booth. Photo: courtesy of JSPS.

1st Kavli IPMU Artist-In-Residence Program Artist Exhibition

The Kavli IPMU held an exhibition “Reⁿ-Encounter between Science and Art 2018” from March 9 through 25 at the warehouse space KAMATA_SOKO in Ota Ward, Tokyo. Since 2015, the Kavli IPMU has been hosting the Artist in Residence (AIR) program where artists stay in the institute for about a month, during which time they interact with scientists regularly inside a world-leading research institute and work on their new work. To date, the Kavli IPMU’s AIR program has welcomed three artists – painter Yasuo Nomura in 2015, media artist Norimichi Hirakawa in 2016, and sculptor Kentaro Haruyama in 2018. The aim of this exhibition

is to showcase the outcome of the Kavli IPMU's AIR to the general public including specialists in various fields, and at the same time to create a new culture through interactions between science and art as well as to generate publicity for the Kavli IPMU. The program included the exhibition of new pieces of art created by the three artists, Nomura, Hirakawa, and Haruyama, an exhibition to introduce the Kavli IPMU, and various related events including a symposium, workshop, and seminars, where specialists in various fields were invited and discussed the AIR program at the Kavli IPMU, as well as science café talks by Kavli IPMU mathematicians. Listed below is a part of the program for these related events, in which Kavli IPMU researchers participated.

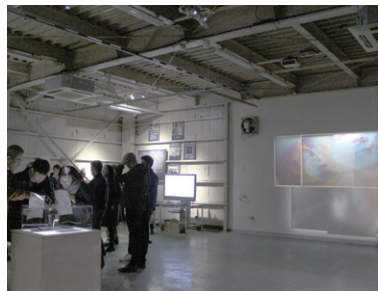
- Science café on March 17, "What do you do in mathematics? — Let's ask! A dialog with a mathematician" by Tomoyuki Abe (Kavli IPMU Associate Professor);
- Science café on March 18, "Amazing McKay correspondence" by Yukari Ito (Kavli IPMU Professor and Nagoya University Graduate School of Mathematics Associate Professor);
- Science café on March 21, "Soap bubbles and spacetime" by Will Donovan (Kavli IPMU Postdoctoral Fellow);
- Symposium on March 10, "From the viewpoint of science and society, and the theory of art practice" where Akishi Ikeda (Kavli IPMU Postdoctoral Fellow, mathematics), and Akemi Sunayama (Kavli IPMU Postdoctoral Fellow, astronomy) participated together with three artists who experienced AIR at the Kavli IPMU, as well as specialists in other areas.

In addition, on March 11, the workshop "Uncovering the basis of science and art through Truth, Good, and Beauty" was held at Tamarokuto

Science Center in Nishi-Tokyo City, where Kavli IPMU Associate Professor Masahito Yamazaki participated with three artists and specialists in mathematical philosophy and aesthetics. They discussed the AIR program at the Kavli IPMU, and shared opinions with the audience.



Left to right, media artist Norimichi Hirakawa, painter Yasuo Nomura, and sculptor Kentaro Haruyama.



Some of the work on display at Kavli IPMU Artist-In-Residence Program Artist Exhibition.

Kavli IPMU Komaba Seminar

1. "Various applications of supersymmetry in statistical physics"
Speaker: Edouard Brezin (LPTENS, Paris)
Date: Nov 9, 2017

Kavli IPMU Seminars

1. "How to break electroweak symmetry naturally?"
Speaker: Jing Shu (Inst Theoretical Physics, Chinese Academy of Sciences)
Date: Oct 20, 2017
2. "Algebraic properties of the monopole formula"

Speaker: Marcus Sperling (U Vienna)

Date: Oct 24, 2017

3. "A journey through loop braid groups"
Speaker: Celeste Damiani (Osaka City U)
Date: Oct 24, 2017
4. "Inflation from High-Scale SUSY Breaking"
Speaker: Kai Schmitz (MPIK)
Date: Oct 25, 2017
5. "Towards birational boundedness of elliptic Calabi-Yau varieties"
Speaker: Roberto Svaldi (U Cambridge)
Date: Oct 31, 2017
6. "Higgs Exempt No-Scale Supersymmetry"
Speaker: Jason Evans (Kavli IPMU)
Date: Nov 01, 2017
7. "The Leptonic Dirac CP Phase from Residual Symmetry and Muon Decay at Rest Experiment"
Speaker: Shao-Feng Ge (Kavli IPMU)
Date: Nov 01, 2017
8. "Homology of $gl(\infty)$ "
Speaker: Kenji Iohara (U Lyon)
Date: Nov 07, 2017
9. "Classical Conformal Blocks and Quasinormal Modes from Isomonodromic Deformations"
Speaker: Fabio Novaes (IIP-UFRN)
Date: Nov 07, 2017
10. "Gravitational interactions of a degenerate quantum scalar field"
Speaker: Pierre Sikivie (U Florida)
Date: Nov 08, 2017
11. "Constraints on the chemical enrichment history in clusters of galaxies from X-ray spectroscopy"
Speaker: Aurora Simionescu (ISAS)
Date: Nov 08, 2017
12. "Topics in Axion Cosmology"
Speaker: Andrew J Long (U Chicago)
Date: Nov 10, 2017
13. "Probabilistic Enumerative

- Geometry”
Speaker: Antonio Lerario (SISSA)
Date: Nov 14, 2017
14. “GW170817: Electromagnetic Wave Observations”
Speaker: Masaomi Tanaka (NAOJ)
Date: Nov 16, 2017
15. “Computing a categorical Gromov-Witten invariant”
Speaker: Andrei Caldararu (U Wisconsin)
Date: Nov 21, 2017
16. “Discriminants and Brane Monodromy”
Speaker: Edward Segal (U College London)
Date: Nov 21, 2017
17. “Ringel duality as an instance of Koszul duality”
Speaker: Agnieszka Bodzenta (U Edinburgh)
Date: Nov 22, 2017
18. “Categorifying Donaldson-Thomas invariants”
Speaker: Sven Meinhardt (U Sheffield)
Date: Nov 28, 2017
19. “Moonshine and Arithmetic”
Speaker: John Duncan (Emory U)
Date: Nov 28, 2017
20. “MApping the Most Massive Overdensity Through Hydrogen (MAMMOTH)”
Speaker: Zheng Cai (UCSC)
Date: Dec 05, 2017
21. “Kramers-Wannier and electromagnetic duality in lattice field theory”
Speaker: Constantin Teleman (U Oxford / UC Berkeley)
Date: Dec 05, 2017
22. “Deformations of Calabi-Yau categories”
Speaker: Christopher Brav (HSE, Moscow)
Date: Dec 05, 2017
23. “Deep Learning of Quasar Spectra”
Speaker: J. Xavier Prochaska (UC Santa Cruz)
Date: Dec 06, 2017
24. “Motivic realizations of dg-categories, matrix factorizations and vanishing cycles”
Speaker: Anthony Blanc (SISSA)
Date: Dec 07, 2017
25. “Yields and Routes of p-process Nuclei in Cosmic Rays and Supernovae”
Speaker: Motohiko Kusakabe (Beihang U)
Date: Dec 07, 2017
26. “Calabi-Yau moduli space metric for hypersurfaces in weighted projective spaces”
Speaker: Konstantin Aleshkin (SISSA / ITP)
Date: Dec 07, 2017
27. “On the classification of algebraic varieties”
Speaker: Shigefumi Mori (RIMS, Kyoto)
Date: Dec 11, 2017
28. “Which Galactic dust map should I use? Insights from extragalactic tomography”
Speaker: Yi-Kuan Chiang (JHU)
Date: Dec 12, 2017
29. “On ADE link homology”
Speaker: Dmitrii M Galakhov (UC Berkeley)
Date: Dec 12, 2017
30. “Symmetry enhancement and closing of knots in 3d/3d correspondence”
Speaker: Dongmin Gang (SNU)
Date: Dec 12, 2017
31. “Constraining Cosmology and Galaxy Formation with Lyman-alpha absorption”
Speaker: Daniele Sorini (MPIA)
Date: Dec 13, 2017
32. “Beyond the limits of visual insight”
Speaker: Brice Menard (JHU)
Date: Dec 15, 2017
33. “Holographic Screens in Flat Spacetime”
Speaker: Yun-Long Zhang (APCTP)
Date: Dec 18, 2017
34. “Teichmuller TQFT vs Chern-Simons Theory”
Speaker: Victor Mikhaylov (Simons Center for Geometry and Physics)
Date: Dec 19, 2017
35. “On compactifications of 6d $N=(1,0)$ to 4d $N=1$ ”
Speaker: Shlomo Razamat (Technion)
Date: Dec 19, 2017
36. “EFT for new physics in multi-Higgs final states in hadron colliders”
Speaker: Sichun Sun (National Taiwan U)
Date: Dec 20, 2017
37. “Exploring the Universe with the Cosmic Microwave Background”
Speaker: Aritoki Suzuki (LBNL)
Date: Dec 21, 2017
38. “New Frontiers of hard X-ray and gamma-ray imaging — Transferring advanced space technology to ground applications —”
Speaker: Tadayuki Takahashi (ISAS/JAXA)
Date: Dec 21, 2017
39. “Natural and Unnatural SUSY in light of Proton Decay and Gauge Unification”
Speaker: Kazuki Sakurai (Warsaw U)
Date: Dec 22, 2017
40. “Cosmological hints of axionic blue isocurvature”
Speaker: Amol Upadhye (U New South Wales)
Date: Dec 22, 2017
41. “Observation of supernova neutrinos”
Speaker: Masayuki Nakahata (ICRR)
Date: Dec 27, 2017
42. “Cacti groups, an operadic point of view”
Speaker: Anton Khoroshkin (HSE Moscow)

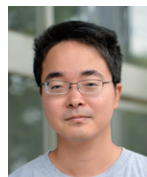
- Date: Jan 09, 2018
43. “Landau-Ginzburg / Calabi-Yau correspondence in one dimension”
Speaker: Yefeng Shen (U Oregon)
Date: Jan 09, 2018
44. “Higgs-Anomaly Mediation: a simple setup with interesting phenomena and flavor safety”
Speaker: Wen Yin (IHEP)
Date: Jan 10, 2018
45. “Thermal Evolution of Neutron Stars”
Speaker: Madeline Kelly (Montana State U)
Date: Jan 10, 2018
46. “On sheaf quantization of Lagrangian submanifolds”
Speaker: Tatsuki Kuwagaki (Kavli IPMU)
Date: Jan 11, 2018
47. “Some results toward the geometry of double-affine flag varieties”
Speaker: Dinakar Muthiah (U Mass)
Date: Jan 16, 2018
48. “Recent Results on GeV Neutrino Interactions”
Speaker: Kevin McFarland (U Rochester)
Date: Jan 16, 2018
49. “Revitalizing the Galaxy 3-Point Correlation Function to Probe Dark Energy”
Speaker: Zack Slepian (UC Berkeley)
Date: Jan 17, 2018
50. “Orbital degeneracy loci”
Speaker: Fabio Tantarri (Universite Lille 1)
Date: Jan 17, 2018
51. “Machine learning for SUSY exploration”
Speaker: JinMin Yang (ITP)
Date: Jan 19, 2018
52. “Probing the origins of astroparticles in the multi-messenger era”
Speaker: Ke Fang (U Maryland)
Date: Jan 19, 2018

53. “Introduction to exact WKB analysis and Borel summability of WKB solutions”
Speaker: Tatsuya Koike (Kobe U)
Date: Jan 23, 2018
54. “P-functors and cyclic covers”
Speaker: Timothy Logvinenko (Cardiff U)
Date: Jan 23, 2018
55. “Detecting Dark Blobs”
Speaker: Dorota M Grabowska (UC Berkeley)
Date: Jan 24, 2018
56. “Inflation, Primordial Black holes and Gravitational Waves – Dawn of Gravitational Wave Astronomy —”
Speaker: Misao Sasaki (Kyoto U)
Date: Jan 24, 2018
57. “Constructing a (conformally organised) basis of operators in QFT”
Speaker: Tom Melia (Kavli IPMU)
Date: Jan 25, 2018
58. “An Illiad and Odyssey of 5d SCFTs”
Speaker: Martin Fluder (Caltech)
Date: Jan 30, 2018

Personnel Changes

Promotion

Masahito Yamazaki, who was Kavli IPMU Assistant Professor, became Kavli IPMU Associate Professor on February 1, 2018



Masahito Yamazaki

Surhud More, who was Kavli IPMU Assistant Professor, became Kavli IPMU Associate Professor on March 1, 2018



Surhud More

Retirement

Kavli IPMU Professor Masataka Fukugita retired on March 31, 2018, and became Kavli IPMU Senior

Scientist on April 1, 2018. At the IPMU/Kavli IPMU, he served as Principal Investigator from the launch of IPMU on October 1, 2007 to March 31, 2012, and as Professor from April 1, 2012.

Moving Out

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 Postdoctoral Fellow Feng Luo [November 1, 2015 – March 15, 2018] moved to Sun Yat-sen University in China as an Associate Professor.

Kavli IPMU Postdoctoral Fellow Kazuya Yonekura [August 1, 2015 – March 31, 2018] moved to Faculty of Arts and Science, Kyushu University as an Assistant Professor.

JSPS Overseas Researcher Hirary Child [September 2, 2017 – February 27, 2018] returned to the Department of Astronomy and Astrophysics, the University of Chicago.

JSPS Postdoctoral Fellow Kyohei Mukaida [April 1, 2015 – March 31, 2018] moved to DESY as a Postdoctoral Fellow.

JSPS Postdoctoral Fellow Genki Oouchi [April 1, 2017 – March 31, 2018] moved to Riken as a Special Postdoctoral Researcher.

Also, Kavli IPMU Postdoctoral Fellow Sho Saito resigned the Kavli IPMU at the expiration of his term, from April 1, 2015 to March 31, 2018.

Erratum to the Printed Version of the *Kavli IPMU News* No. 40

On page 20, left column, line 9, “2017” should be “2007”. (This erratum does not apply to the web version of the *Kavli IPMU News* No. 40).