

# News

## Kavli IPMU PI Takaaki Kajita Receives the 2015 Nobel Prize in Physics

On October 6, 2015, the Royal Swedish Academy of Sciences announced it would award the 2015 Nobel Prize in Physics to Takaaki Kajita in Japan and Arthur B. McDonald in Canada “for the discovery of neutrino oscillations, which shows that neutrinos have mass.” Dr. Kajita is Director of the University of Tokyo’s Institute for Cosmic Ray Research and a Kavli IPMU Principal Investigator. The Nobel Committee for Physics has recognized his work carried out on atmospheric neutrino oscillations at the Kamiokande and Super-Kamiokande detectors in Kamioka, which produced definite proof that neutrinos have mass.

## 8th External Advisory Committee Meeting

On July 24, 2015, the 8th Meeting of the Kavli IPMU External Advisory Committee was held. News about the Kavli IPMU receiving a WPI funding extension, and how the institute plans to use the extension to tackle competitive challenges were reported to Chairman Steve Kahn (Stanford/SLAC), and committee members John Ellis (King’s College London), Young-Keek Kim (University of Chicago), Sadayoshi Kojima (Tokyo Institute

of Technology), David Morrison (UC Santa Barbara), and Sadanori Okamura (Hosei University). This time, one of the committee members Nigel Smith (SNOLAB) was absent. The Committee also discussed topics such as future support from the University of Tokyo, and the importance of raising the profile and goal of the WPI program for Japan’s future.



Director Murayama presenting an overview to the External Advisory Committee members.

## Hyper Suprime-Cam’s First Dark Matter Map Created

An international team of researchers including the National Astronomical Observatory of Japan, Kavli IPMU, and Princeton University released a dark matter map they had created using the Hyper Suprime-Cam (HSC). This is the first scientific research result produced by HSC. The high-powered HSC mounted on the Subaru Telescope in Hawaii allowed researchers to study 2.3 square degrees of night sky in great detail, revealing nine clumps of dark matter, each weighing as much as a galaxy cluster. The result was published in the July 1 edition of the *Astrophysical Journal*.

## Second and Third Lectures at the “Science Café Universe 2015” Attract Crowds

Inside the giant planetarium at Tamarokuto Science Center in Nishitokyo City on July 5, Kavli IPMU Professor Naoki Yoshida gave a talk titled “Exploring the Milky Way: Intersection between Modern

Cosmology and Cosmoarchaeology” to around 50 guests, many of them being junior high school and high school students. Starting with the Tanabata (the July 7 star festival) legend of Japan and China, Professor Yoshida talked about from the Milky Way galaxy to the large-scale structure of the universe, while projecting images onto the entire planetarium dome.

On July 12, this year’s science café series ended with a session on “Differential Geometry of Shapes: Soft Shapes and Solid Shapes” by Kavli IPMU Assistant Professor Tomoyuki Abe. The 40 or so guests, of which about half were junior high school or high school students, not only heard the lecture but also learned about manifolds by passing around models of shapes, and working on solving equations together. Professor Abe concluded his lecture by briefly addressing the link between geometry and general relativity.



Naoki Yoshida’s Q&A session took place outside the planetarium.



Tomoyuki Abe giving a lecture.

## Booth at the 2015 Super Science High School Student Fair

At the peak of summer, all nine institutes in the World Premier

International Research Center Initiative (WPI) family, including the Kavli IPMU, spent two days meeting students at the 2015 Super Science High School Student Fair (August 5 – 6). The WPI booth was one of 300 booths present at this year's fair. Curious students came up to Kavli IPMU staff asking what kind of research is being carried out to understand the Universe, and what they would need to study to join the Kavli IPMU in the future.

### Women in Science Event Encourages Students to Pursue Research

Teenagers and their parents were invited to hear what sort of research women scientists carry out today, and to take part in experiments of their own during a science event co-hosted by the Institute for Cosmic Ray Research (ICRR) and the Kavli IPMU on August 22, 2015. Thirty-eight junior high school and high school girls listened to ICRR Assistant Professor Michiko Oishi's talk, "Looking for the Origin of Cosmic Rays," and Kavli IPMU Postdoctoral Researcher Yuki Moritani's talk, "Blackholes or Pulsars? Uncovering the Secret behind Gamma-Ray Binaries." Students also assembled a miniature model of an atmospheric Cherenkov telescope array with small parabolic mirrors, and tried their own group experiment using laser light source to see which group could make the most accurate observations. Students commented that they were grateful to be given the chance to talk with speakers.

The event provided the 20 or so parents the chance to ask Dr. Moritani and Kavli IPMU project academic support specialist Tomoko Morii about how choosing science as a career has affected them, and what they should do to support their daughters.

A number of parents commented they were able to get a better image of what a woman scientist does, and some of them kept asking questions even after the event had finished.



Conversations at the Kavli IPMU's Fujiwara Interaction Area.

### Contemporary Artist Stays at the Kavli IPMU

Under the Kavli IPMU's first artist-in-residence program, contemporary artist Yasuo Nomura stayed at the institute from August 17 to September 11, 2015. Nomura spent his time taking part in tea time and seminars. At his welcoming party, around 20 Kavli IPMU researchers were treated to his presentation about how he turns Ulam spirals into two-dimensional pieces of art. Around 10 researchers took part in a tour of Nomura's temporary art workshop, where he introduced sketches of pictures he had made that were influenced by the institute, and further five researchers tried their own hands at drawing in Nomura's art workshop. Some researchers requested the art workshop be extended from a few hours to a few days. A number of researchers also said art helped to give them a different perspective to look at their research. "Every day I find something new. It is a perfect environment to stimulate work," said Nomura. Hopefully this will be a start to a long collaboration between art and science.

### Kavli IPMU Seminars

1. "Can we explain AMS-02 antiproton and positron excesses simultaneously by nearby supernovae without pulsars nor dark matter?"  
Speaker: Kazunori Kohri (KEK)  
Date: Jul 01, 2015
2. "Not-so-simple stellar populations in nearby, resolved massive star clusters"  
Speaker: Richard de Grijs (KIAA)  
Date: Jul 02, 2015
3. "How does the black hole nature arise in supersymmetric gauge theories at strong coupling?"  
Speaker: Takeshi Morita (Shizuoka U)  
Date: Jul 03, 2015
4. "(Daniele Faenzi) Homological projective duality for determinantal varieties (Zheng Hua) Some geometric problems associated to the elliptic sklyanin algebras"  
Speaker: Daniele Faenzi (Bourgogne U) and Zhen Hua (HKU)  
Date: Jul 06, 2015
5. "Study of dense QCD matter and its application to physics of compact stars"  
Speaker: Motoi Tachibana (Saga U)  
Date: Jul 06, 2015
6. "(Daniele Faenzi) Homological projective duality for determinantal varieties (Zheng Hua) Some geometric problems associated to the elliptic sklyanin algebras"  
Speaker: Daniele Faenzi (Bourgogne U) and Zhen Hua (HKU)  
Date: Jul 07, 2015
7. "Hunting with CHITAH: Gravitationally Lensed Quasars for Cosmology"  
Speaker: Sherry Suyu (ASIAA)  
Date: Jul 07, 2015

8. "Memories of a Planet (Q&A Session to be followed)"  
Speaker: John Hernlund (ELSI)  
Date: Jul 08, 2015
9. "Matter Effect from Non-Standard Interactions of the Neutrino"  
Speaker: Tatsu Takeuchi (Virginia Tech)  
Date: Jul 08, 2015
10. "Cosmological constraints from weak lensing: present measurements and future challenges"  
Speaker: Fabian Kohlinger (Leiden Observatory)  
Date: Jul 09, 2015
11. "R Parity Violation From Discrete R Symmetries and Recent Nucleon Decay Searches in the Super-Kamiokande Experiment"  
Speaker: Volodymyr Takhistov (UC Irvine)  
Date: Jul 15, 2015
12. "B Physics: New Physics and the Next Generation"  
Speaker: Thomas Browder (Hawaii U)  
Date: Jul 22, 2015
13. "The future of collider physics"  
Speaker: Nima Arkani-Hamed (IAS)  
Date: Jul 22, 2015
14. "The Amplituhedron"  
Speaker: Nima Arkani-Hamed (IAS)  
Date: Jul 23, 2015
15. "Initial results from a new AKARI/IRC data analysis pipeline optimised for extragalactic deep field images"  
Speaker: Helen Davidge (Open U)  
Date: Jul 23, 2015
16. "LHC at 13 TeV: First collisions and future prospects"  
Speaker: Young-Kee Kim (U Chicago) and John Ellis (KCL)  
Date: Jul 23, 2015
17. "Pseudo-Observables in Higgs decays"  
Speaker: Gino Ishidori (UZH)  
Date: Jul 27, 2015
18. "Grassmann Matrix Quantum Mechanics"  
Speaker: Dionysios Theodoros Anninos (IAS)  
Date: Jul 27, 2015
19. "Extremal chiral ring states in AdS/CFT are described by free fermions"  
Speaker: David Berenstein (UC Santa Barbara)  
Date: Jul 29, 2015
20. "Phenomenology of the Higgs Triplet Model at the LHC"  
Speaker: Andrew G. Akeroyd (U Southampton)  
Date: Jul 29, 2015
21. "Around de Jong's conjecture"  
Speaker: Ambrus Pal (Imperial College London)  
Date: Jul 29, 2015
22. "Observing the First Stars with 21-cm Cosmology"  
Speaker: Rennan Barkana (Tel Aviv U)  
Date: Jul 31, 2015
23. "Holographic quantum error-correcting codes: Toy models for the bulk/boundary correspondence"  
Speaker: Beni Yoshida (Caltech)  
Date: Aug 03, 2015
24. "Finding nice generators for braid-like groups"  
Speaker: Tathagata Basak (Iowa State U)  
Date: Aug 04, 2015
25. "Probing spectral bounds from modular bootstrap"  
Speaker: Joshua Qualls (NTU)  
Date: Aug 04, 2015
26. "Multiple Lagrangian Intersections"  
Speaker: Oren Ben-Bassat (U Oxford)  
Date: Aug 05, 2015
27. "Particle cosmological probes on light dark matter"  
Speaker: Kenji Kadota (IBS, Korea)  
Date: Aug 05, 2015
28. "N=(4,4) gauged linear sigma model for exotic five-brane"  
Speaker: Tetsuji Kimura (Tsukuba U)  
Date: Aug 06, 2015
29. "The Higgs mechanism at the graviton level: The Vainshtein mechanism in time domains"  
Speaker: Ivan Arraut (Tokyo Univ of Science / CAS)  
Date: Aug 11, 2015
30. "High-Precision Modeling of Cosmological Structure Formation: a Community-Driven Approach with Halotools"  
Speaker: Andrew Hearin (Yale U)  
Date: Aug 12, 2015
31. "Boundary effect of anomaly-induced action"  
Speaker: Che-Min Shen (LeCosPA)  
Date: Aug 12, 2015
32. "Coronagraphic Imaging of habitable exoplanets"  
Speaker: Olivier Guyon (NAOJ Hawaii Observatory)  
Date: Aug 24, 2015
33. "Hyperscaling-violating Lifshitz hydrodynamics from black-holes"  
Speaker: Yoshinori Matsuo (Crete U.)  
Date: Aug 27, 2015
34. "The BV and MV formalism for the Quantum Master Equation"  
Speaker: Alexander Voronov (U Minnesota)  
Date: Sep 01, 2015
35. "The CMS excess and lepton flavour violation in the (supersymmetric) inverse seesaw"  
Speaker: Cedric Weiland (Universidad Autónoma de Madrid)  
Date: Sep 02, 2015
36. "Galactic Rotation Curves with Dark Matter Self-Interactions"  
Speaker: Ayuki Kamada (UC Riverside)  
Date: Sep 03, 2015

37. "Heavy Higgs searches in a Higgs-portal B-L Model"  
Speaker: Banerjee Shankha (Harish-Chandra Research Inst)  
Date: Sep 04, 2015
38. "Schubert, Dunkl, Grothendieck, Givental and Gromov and Witten Calculi for flag varieties"  
Speaker: Anatol Kirilov (Kyoto U)  
Date: Sep 10, 2015
39. "Frozen"  
Speaker: Yuji Tachikawa (U Tokyo)  
Date: Sep 11, 2015
40. "The Verlinde Formula in logarithmic conformal field theory"  
Speaker: Simon Wood (ANU)  
Date: Sep 16, 2015
41. "Two Higgs Doublets under Non-Abelian SU(2)<sub>H</sub>"  
Speaker: Wei-Chih Huang (TU Dortmund)  
Date: Sep 25, 2015
42. "Resurgence, exact quantization and complex instantons"  
Speaker: Gokce Basar (U Maryland)  
Date: Sep 28, 2015
43. "CMS recent results & Higgs CP study using  $H \rightarrow \tau\tau$  final state"  
Speaker: Yuta Takahashi (CERN, CMS collaboration)  
Date: Sep 28, 2015
44. "Dimensions of derived categories of commutative rings"  
Speaker: Ryo Takahashi (Nagoya U)  
Date: Sep 28, 2015
45. "Unitarization of gravity scattering amplitude"  
Speaker: Yu-tin Huang (National Taiwan U)  
Date: Sep. 29, 2015
46. "Cosmic Reionization On Computers"  
Speaker: Nick Gnedin (Fermilab / U Chicago)  
Date: Sep 30, 2015

## Personnel Changes

### Reappointment

Yu Nakayama was appointed as a Kavli IPMU Postdoctoral Fellow on September 1, 2015. He had been at the Kavli IPMU from September 1, 2011 to August 31, 2012 and September 1, 2013 to August 31, 2014 as a Kavli IPMU Postdoctoral Fellow. He then stayed at the Division of Physics, Mathematics and Astronomy, the California Institute of Technology as a Shirman Fairchild Research Assistant Professor.

Miho N. Ishigaki was appointed as a Kavli IPMU Postdoctoral Fellow on September 1, 2015. She had been at the Kavli IPMU from April 1, 2013 to August 31, 2015 as a JSPS Postdoctoral Fellow.

Atsushi Shimono was appointed as a Kavli IPMU Postdoctoral Fellow on August 1, 2015. He had been at the Kavli IPMU from September 1, 2011 to July 31, 2015 as a Kavli IPMU Academic Support Specialist.

### 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 Claire Nicole Lackner [September 1, 2012 – May 31, 2015] moved to Element Analytics in the US as a Data Scientist.

Kavli IPMU Postdoctoral Fellow Jonathan David Maltz [September 16, 2013 – September 17, 2015] moved to the University of California, Berkeley as a Postdoctoral Researcher.

Kavli IPMU Postdoctoral Fellow Charles Milton Melby-Thompson [September 1, 2012 – September 20, 2015] moved to Fudan University in China as a Postdoctoral Research

Fellow.

Kavli IPMU Postdoctoral Fellow Rene Meyer [September 8, 2012 – September 30, 2015] moved to Stony Brook University as a Postdoctoral Associate.

Kavli IPMU Postdoctoral Fellow Satyanarayan Mukhopadhyay [October 1, 2012 – September 30, 2015] moved to the Department of Physics and Astronomy, the University of Pittsburgh as a Postdoctoral Fellow.

Kavli IPMU Postdoctoral Fellow Mauricio Andres Romo Jorquera [July 16, 2012 – September 15, 2015] moved to the Institute for Advanced Study as a Postdoctoral Researcher.

Kavli IPMU Postdoctoral Fellow Charles Martin Siegel [August 16, 2015 – August 15, 2015] moved to the U.S. Department of Energy's Pacific Northwest National Laboratory as a Postdoctoral Fellow.

JSPS Postdoctoral Fellow David Alexander McGady [May 1, 2015 – August 31, 2015] returned to Princeton University.

JSPS Postdoctoral Fellow Hironao Miyatake [April 1, 2014 – August 31, 2015] moved to the California Institute of Technology/NASA Jet Propulsion Laboratory as a Postdoctoral Fellow.

JSPS Postdoctoral Fellow Natsumi Nagata [April 1, 2014 – August 31, 2015] moved to the University of Minnesota as a Keith A. Olive Postdoctoral Fellow.