

News

Kavli IPMU Celebrates Its 5th Anniversary

The IPMU (now Kavli IPMU) celebrated the fifth anniversary since it was launched from scratch on the University of Tokyo's Kashiwa campus on October 1, 2007. During these five years, the IPMU has been attracting topnotch researchers from all over the world, producing a number of excellent scientific achievements, and increasing its international visibility. As a result, the IPMU was given the highest grade of "S" (superior) in the WPI Interim Review, which was carried out in 2011. Together with the completion of the IPMU Research Building in December 2009, admission to membership in the newly established TODIAS (Today



Celebration lunch at the entrance hall of the Kavli IPMU Research Building



Kavli IPMU staff decorating the entrance hall of the Kavli IPMU Building at night on October 18



Kavli IPMU researchers photographed on October 19, 2012

Institutes for Advanced Study) in January 2011, and becoming the Kavli IPMU by obtaining an endowment from the Kavli Foundation, the IPMU has achieved a great step forward.

On October 19, researchers and staff of the Kavli IPMU gathered and celebrated the 5th anniversary at the institute's Research Building. After introductory talks on selected research topics and self-introductions by newly appointed researchers, Director Murayama gave a speech in which he expressed his hope as well as encouragement for further research prospects at the Kavli IPMU. A dinner party was held afterwards.

University of Tokyo's First International Shokumon Award to Mr. Fred Kavli

The "Shokumon Award" was instituted in 2002 to recognize and thank individuals, corporations, or organizations that made major contributions to the growth of the University programs through private donations, volunteer work and support, establishment of endowed chairs, or research centers. "Shokumon" is the name of the castle gate in the capital of the ancient Chinese state Qi during the civil war era (403-221 B.C.). Under King Wei (356-320 B.C.) and King Xuan (319-300 B.C.), the state treated academics very well, which brought the best minds to the capital Linzi of Qi and led to a flourishing of academic activities. The award is named after

this history.

The University of Tokyo presented the 2012 Shokumon Award to the Chairman of The Kavli Foundation, Fred Kavli, and the CEO of Nissin Foods Holdings Co., Ltd., Koki Ando. Mr. Fred Kavli is the first international recipient of the Shokumon Award. The award ceremony was held on October 2 at Ito Hall on the University's Hongo campus. From The Kavli Foundation, President Robert Conn attended the ceremony on behalf of Fred Kavli.

The prize was awarded to Mr. Kavli in recognition of the fact that annual returns in perpetuity from the endowment established by the donation from the Kavli Foundation will help sustain the Kavli IPMU as a permanent research institute within the University of Tokyo, and also that this is a major contribution to the University of Tokyo in striving toward a new vision of the national university.



Junichi Hamada, President of the University of Tokyo (left), and Robert Conn, President of The Kavli Foundation, (right). Sitting at the far left: Masako Egawa, Executive Vice President of the University of Tokyo.

2012 Open House at UT Kashiwa Campus

An annual open house on the Kashiwa Campus of the University of

Tokyo was held on October 26 and 27, 2012. During the two days, more than 1,700 people visited the Kavli IPMU Building, where various programs were presented, including Guided Building Tours that had proved quite popular in the last year, a Digital Space Theater presented by graduate students utilizing a 4-Dimensional Digital Universe viewer “Mitaka” released by the National Astronomical Observatory of Japan, a 3-D movie “*Story of the Origins of the Universe*” (produced by Sony ExploraScience, supervised by the Kavli IPMU), astronomy quiz sections, and experiencing the *Miura-Ori* (the Miura map fold, special technique for folding used on some solar panel arrays; quoted from *Weblio*). In particular, a lecture by Kavli IPMU Principal Investigator Hiroshi Ooguri, who spoke on “What is Gravity?,” attracted a capacity audience, both in the Kavli IPMU lecture hall where the lecture was delivered and in a seminar room where it was seen through live streaming video. Also, Kavli IPMU Director Hitoshi Murayama gave a lecture entitled “Higgs: Tightly Packed Mysterious Particles Filling the Universe” in the campus-wide Special Public Lectures held at the FS Hall. This lecture was also seen at the Kavli IPMU lecture hall through live streaming video. There were large audiences at both places, and a Q&A was conducted connecting both places. During the two days, more than 7,000 people visited the Kashiwa campus in total.



Professor Hiroshi Ooguri giving a lecture

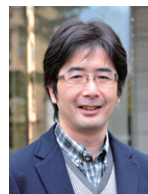
Hiroshi Ooguri Chosen for Fellow of the American Mathematical Society

Hiroshi Ooguri, Kavli Professor at the California Institute of Technology (Caltech) and Principal Investigator at the Kavli IPMU, was selected to join the inaugural group of Fellows of the American Mathematical Society (AMS). The list of the Fellows was made public on the AMS website on November 1, 2012. Professor Ooguri is a theoretical physicist in particle physics. He is working on the development of theoretical tools for applying superstring theory, which attempts to reconcile general relativity and quantum mechanics to questions relevant to high-energy physics, astrophysics, and cosmology. He holds a professorship in both the Physics Department and the Mathematics Department of Caltech. He is working in the area of the interface of physics and mathematics, and his contribution is highly evaluated worldwide, which led to the inaugural Eisenbud Prize from the AMS. In recognition of these achievements, he was selected as an inaugural Fellow of the AMS.

The first group of Fellows of the AMS, including Professor Ooguri, will be officially inducted at the upcoming Joint Mathematics Meetings of AMS and MAA (Mathematical Association of America) in San Diego in January, 2013.

Kunio Inoue Wins Nishina Memorial Prize

On November 9, 2012, the Nishina Memorial Foundation announced that Kunio Inoue, Professor at the Research Center for Neutrino Science, Tohoku University and Principal Investigator at the Kavli IPMU, is a recipient of the 2012 Nishina



Professor Kunio Inoue

Memorial Prize for his “Observation of geologically produced antineutrinos.” His achievement of the first observation of terrestrial anti-neutrinos (geoneutrinos) in the KamLAND experiment, which has established the foundation of development of neutrino geophysics, has been recognized. The award ceremony was held on December 6, 2012.

7th Joint Kavli IPMU-ICRR Public Lecture “Approaching the Mystery of the Universe”

On November 10, 2012, the 7th Kavli IPMU-ICRR (Institute for Cosmic Ray Research) joint public lecture entitled, “Approaching the Mystery of the Universe,” was held at the Koshiba Hall on the University of Tokyo’s Hongo campus, with an audience of about 150 people. This public lecture was also regarded as an event in cooperation with *Japan National Universities FESTA 2012*. Masato Shiozawa, an ICRR Associate Professor as well as a Kavli IPMU Scientist, spoke on, “Probing the World of Elementary Particles and the Universe with the Neutrinos,” and Naoshi Sugiyama, a Professor at Nagoya University and Principal Investigator at the Kavli IPMU, spoke on, “Darkness Dominates the Universe.” The audience listened enthusiastically to the exciting lectures, both experimental and theoretical. After the lectures, a discussion was held over the scheduled time limit to facilitate dialogue between the lecturers and the attendees.



Professor Naoshi Sugiyama giving a lecture

Special Public Lecture by 2011 Nobel Laureate Brian Schmidt

On November 19, 2012, three research centers of the University of Tokyo, the Kavli IPMU, the Research Center for the Early Universe, and the Institute of Astronomy jointly hosted a special public lecture, “The Accelerating Universe,” delivered by Brian Schmidt, 2011 Nobel Laureate in Physics, at the Yasuda auditorium on the University of Tokyo’s Hongo campus.

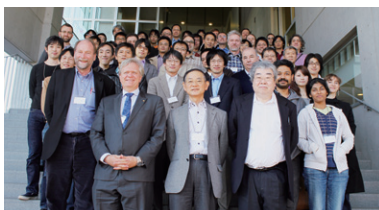
Though the lecture was given late in the afternoon on a Monday, the Nobel Laureate’s lecture attracted an audience of 650, including many high school and university students, who joined after school hours. The audience enjoyed Professor Schmidt’s lecture, which was given in English, with simultaneous interpretation provided in Japanese.

You can also find an interview with Professor Schmidt on pages 18 – 24 in this issue of *Kavli IPMU News*.

Workshop: Supernovae, Dark Energy and Cosmology

On November 20 and 21, 2012, a workshop, “Supernovae, Dark Energy, and Cosmology” was held at the Kavli IPMU lecture hall. This workshop was organized with Nobel Laureate in Physics Brian Schmidt as a guest. His talk was very well attended by researchers from the related fields as well as those from other fields.

During his stay at the Kavli IPMU, Professor Schmidt also joined tea time and communicated with a great many researchers.



Professor Schmidt is standing leftmost in the front row.

Six WPI Research Center Joint Symposium for High School Students Was Held in Tsukuba

On November 24, 2012, a Joint Symposium of the six WPI research centers entitled, “WPI High School Outreach Program: Inspiring Insights into Pioneering Scientific Research,” was held at the International Congress Center Tsukuba Epochal, hosted by the National Institute for Materials Science’s MANA (International Center for Materials Nanoarchitectonics), and co-hosted by other 5 WPI centers. From the Kavli IPMU, Assistant Professor Kevin Bundy spoke on, “How Galaxies Are Formed?,” in English with simultaneous interpretation in Japanese. He explained the mysteries of the galaxies and the universe, and also introduced his own research.

The audience of about 600 comprised mostly high-school students invited from Ibaraki and Chiba Prefectures, with some other participants as well. As the lecturers represented the wide research activities of the six WPI centers, the audience listened enthusiastically to their talks.

As with the first Six WPI Research Center Joint Symposium that was held in Fukuoka last year, each WPI center made poster presentations as well as other demonstrations outside of the lecture hall. After the symposium program was over, all the lecturers were present at the poster presentation space, and they communicated with the attendees. Kevin Bundy was surrounded by a number of high school students.



Kevin Bundy speaking with a high school student

They not only asked questions on his lecture, but also asked for advice on overseas research opportunities.

A New Constraint on Quantum Gravity Theories from Distant Gamma-Ray Burst Observations

Kenji Toma (Osaka University, JSPS Superlative Postdoc) Shinji Mukohyama (Kavli IPMU, Associate Professor), Daisuke Yonetoku (Kanazawa University, Associate Professor), and their colleagues have measured linear polarization in the gamma-ray emissions of distant gamma-ray bursts (GRBs) at the most precise levels to date, using the “GAP (GAMMA-ray burst Polarimeter)” on board JAXA’s small solar power sail demonstrator “IKAROS” spacecraft, and they found that the polarization did not rotate during its journey, as long as several billion light years.

Some quantum gravity theories such as superstring theory predict that structures of space-time at extremely short distances may be totally different from what we think we know, and they predict a possible violation of CPT, which is one of the most fundamental symmetries. Previous measurements indicated that nature obeys CPT at least to a level of one part in 10 million. The new result leads to the most stringent constraint on CPT violation, a level of one part in 10^{15} , i.e., an improvement of 8 orders of magnitude over the previous limits. This result implies that a fundamental symmetry CPT is not violated at extremely small distances which quantum gravity theories deal with. It is expected that quantum gravity theories will be developed in line with this result.

This work was published in the *Physical Review Letters* on December 13, 2012, and highlighted in its online version.

Santa Claus is Coming to Dongri from the Kavli IPMU

This year again, on December 21, 2012, Kavli IPMU Professor Mark Vagins visited Donguri Nursery School on the Kashiwa campus, dressed up as Santa Claus. Professor Vagins had kept his beard growing for some time for this event. The children were delighted, just as if the real Santa Claus visited them.



Professor Vagins visited Donguri, dressed up as Santa Claus.

Kavli IPMU Seminars

1. "Tracing the effects of gas flows in interacting galaxy pairs"
Speaker: Jillian Scudder (Univ. of Victoria)
Date: Oct 02, 2012
2. "Three-dimensional Seiberg duality and generalizations of the Verlinde algebra"
Speaker: Anton Kapustin (Caltech)
Date: Oct 02, 2012
3. "Isocurvatons during inflation: the heavy, the quasi- and the light"
Speaker: Yi Wang (Kavli IPMU)
Date: Oct 02, 2012
4. "Hochschild classes and microlocal Euler classes of sheaves and D-modules (joint work with Masaki Kashiwara)"
Speaker: Pierre Schapira (Université Pierre et Marie Curie)
Date: Oct 03, 2012
5. "A Stringy Mechanism for a Small Cosmological Constant"
Speaker: Henry Tye (Cornell)
Date: Oct 03, 2012
6. "Neutrinos: Kage-Musha in nature which however have a key to understand her fundamental structure"
Speaker: Hisakazu Minakata (Tokyo Metropolitan Univ.)
Date: Oct 03, 2012
7. "The Wasteland of Random Supergravities"
Speaker: Liam McAllister (Cornell)
Date: Oct 09, 2012
8. "4D Wilson Loops, 2D Flux Tubes and Integrability"
Speaker: Pedro Vieira (Perimeter Institute)
Date: Oct 09, 2012
9. "Developments in massive gravity"
Speaker: Kurt Hinterbichler (Perimeter Institute)
Date: Oct 09, 2012
10. "S² partition functions: Coulomb vs Higgs localization and vortices in two-dimensional N=(2,2)"
Speaker: Francesco Benini (Stony Brook)
Date: Oct 10, 2012
11. "LHC Phenomenology of Type II Seesaw"
Speaker: Eung Jin Chun (KIAS)
Date: Oct 10, 2012
12. "New Perspectives on SCFTs"
Speaker: Masahito Yamazaki (Princeton)
Date: Oct 10, 2012
13. "Twisted Gromov-Witten invariants"
Speaker: Valentin Tonita (Kavli IPMU)
Date: Oct 11, 2012
14. "The pseudo-conformal universe"
Speaker: Kurt Hinterbichler (Perimeter Institute)
Date: Oct 16, 2012
15. "Galileons and their Generalizations"
Speaker: Mark Trodden (Univ. Penn)
Date: Oct 17, 2012
16. "Exact results in supersymmetric conformal field theories"
Speaker: Daniel Jafferis (Harvard)
Date: Oct 23, 2012
17. "Effective couplings of the Higgs boson in the light of recent LHC and Tevatron data"
Speaker: Satyanarayan Mukhopadhyay (Kavli IPMU)
Date: Oct 24, 2012
18. "Involutive bi-Lie infinity structure and Floer homology of arbitrary genus"
Speaker: Kenji Fukaya (Kyoto Univ.)
Date: Oct 24, 2012
19. "What turns galaxies off? – Revealing the links between galaxy color, structure and dark matter halo properties"
Speaker: David Wake (Yale)
Date: Oct 24, 2012
20. "Applications of Cardy relation to symplectic geometry"
Speaker: Kenji Fukaya (Kyoto Univ.)
Date: Oct 25, 2012
21. "Simulations of Type Ia Supernova Explosions"
Speaker: Ruediger Pakmor (HITS)
Date: Oct 25, 2012
22. "When and how much can Lagrangian Floer theory determine Gromov-Witten invariant?"
Speaker: Kenji Fukaya (Kyoto Univ.)
Date: Oct 26, 2012
23. "Geometric models of matter"
Speaker: Bernd Schroers (Heriot-Watt Univ.)
Date: Oct 26, 2012
24. "Revealing the origins and environments of Mg II absorbers with the SDSS and 3D-HST"
Speaker: Britt Lundgren (Univ. Wisconsin)
Date: Oct 29, 2012
25. "Conifold Transition in the Landau-Ginzburg B-model"
Speaker: Daniel Pomerleano (Kavli IPMU)
Date: Oct 29, 2012
26. "Two-Sphere Partition Functions and Gromov-Witten Invariants"
Speaker: Mauricio Romo (Kavli

- IPMU)
Date: Oct 30, 2012
27. "A Higgs Boson Near 125 GeV Beyond the Minimal Supersymmetric Standard Model"
Speaker: Steve F. King (Univ. Southampton)
Date: Oct 30, 2012
28. "Flavour Symmetry Models after Daya Bay and RENO"
Speaker: Steve F. King (Univ. Southampton)
Date: Oct 31, 2012
29. "Mathematical theory of mutually unbiased bases"
Speaker: Alexey Bondal (Kavli IPMU / Steklov)
Date: Oct 31, 2012
30. "Effects of Radiative Feedback on Reionization and the Local Universe"
Speaker: Marcelo Alvarez (CITA)
Date: Nov 01, 2012
31. "Construction of (quasi-)phantom categories on some surfaces of general type"
Speaker: Pawel Sosna (Hamburg)
Date: Nov 05, 2012
32. "A problem of Jacques Tits and Chevalley groups over F_1 "
Speaker: Oliver Lorscheid (IMPA)
Date: Nov 06, 2012
33. "A story of de- and re-coupling: supersymmetry breaking in string models"
Speaker: Lukas Witkowski (Oxford)
Date: Nov 07, 2012
34. "Detectable signature of first stars in 21-cm"
Speaker: Anastasia Fialkov (Tel Aviv)
Date: Nov 08, 2012
35. "Mirror Symmetry of Catalan Numbers and Quantum Curves"
Speaker: Motohico Mulase (UC Davis)
Date: Nov 08, 2012
36. "The Wide-field Infrared Survey Explorer: Implementation and Solar System Science"
Speaker: Edward Wright (UCLA)
Date: Nov 12, 2012
37. "Higher Chow cycles on Abelian surfaces"
Speaker: Ramesh Sreekantan (Indian Statistical Institute)
Date: Nov 13, 2012
38. "Light dark matter: the motivation, the theory, the ongoing search"
Speaker: Alex Kusenko (UCLA / Kavli IPMU)
Date: Nov 14, 2012
39. "WISE Observations of Stars, Galaxies and Star Formation, and QSOs"
Speaker: Edward Wright (UCLA)
Date: Nov 16, 2012
40. "Understanding the shape of non-Gaussianity"
Speaker: Andrei Frolov (Simon Fraser)
Date: Nov 19, 2012
41. "War on Lambda: fighting the cosmological constant problem"
Speaker: Antonio Padilla (Nottingham)
Date: Nov 19, 2012
42. "part 1: Algebra, Geometry, and Hydrogen Atom
part 2: Wall-Crossing and Quiver Invariant"
Speaker: Piljin Yi (KIAS)
Date: Nov 20, 2012
43. "Supernovae, the Accelerating Cosmos, and Dark Energy"
Speaker: Brian Schmidt (Australian National Univ.)
Date: Nov 20, 2012
44. "Some Mutant Forms of Quantum Mechanics"
Speaker: Tatsu Takeuchi (Virginia Tech)
Date: Nov 21, 2012
45. "Quantum backreaction in string theory"
Speaker: Oleg Evnin (Chulalongkorn Univ.)
Date: Nov 21, 2012
46. "Experimental tests of R^2 -inflation and its minimal extensions"
Speaker: Dmitry Gorbunov (INR Moscow)
Date: Nov 22, 2012
47. "Quantum symmetry in homological representations of braid groups"
Speaker: Toshitake Kohno (U. Tokyo)
Date: Nov 22, 2012
48. "Ising Model D-Branes from String Field Theory"
Speaker: Martin Schnabl (Institute of Physics ASCR)
Date: Nov 26, 2012

Personnel Changes

Promotion

Keiichi Maeda, previously Kavli IPMU Assistant Professor, was promoted to Kavli IPMU Associate Professor on December 16, 2012.



Moving Out

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

Kavli IPMU postdoctoral fellow Scott Carnahan [September 1, 2010 – November 15, 2012] moved to Division of Mathematics, Graduate School of Pure and Applied Sciences, the University of Tsukuba as an Assistant Professor.

Kavli IPMU postdoctoral fellow Mircea Voineagu [August 1, 2010 – December 31, 2012] moved to the University of New South Wales in Australia as a lecturer.

JSPS postdoctoral fellow Johannes Schmude [October 4, 2010 – October 31, 2012] moved to Riken Nishina Center for Accelerator-Based Science as a Special Postdoctoral Researcher.