News

FY2012 Site Visit

A FY2012 site visit by observers from MEXT and JSPS was conducted on August 1 (Wed) at the Kavli IPMU building on the University of Tokyo's Kashiwa campus. Also, on August 3 (Fri), they visited the Kamioka Branch of the Kavli IPMU for the first time since the launch of the IPMU in 2007. Members of the delegation included WPI Program Director (PD) Toshio Kuroki, Program Officer (PO) in charge of Kavli IPMU Ichiro Sanda, five Working Group members, Tetsuji Miwa, Matthias Staudacher, Yutaka Hosotani, Hiraku Nakajima, and Ian Shipsey, and Mitsuyuki Ueda (Director, World Premier International Research Center Initiative/ Basic Research Promotion Division) from the Research Promotion Bureau of MEXT, and others. Managing Director and Executive Vice President Yoichiro Matsumoto attended from the University of Tokyo Directorate.

Starting with Director Murayama's overview presentation as usual, the site visit followed the last year's program: ample time was allocated for the oral presentations of research reports by principal investigators and faculty members, and also to poster presentations by young researchers including postdoctoral fellows and graduate students.

On August 3, the delegation visited the Kavli IPMU Kamioka Branch. One of the Working Group members, Tetsuji Miwa did not join at this time, but Toru Nakano who is the PO in charge of the Kyoto University's WPI center, iCeMS, newly joined. The observers first heard an overview about the activities of the Kamioka Branch from Kavli IPMU Deputy Director Yoichiro Suzuki, and after the Q&A, they moved into the underground laboratory in the Kamioka Mining Company's Mozumi Mine. There, the delegation visited the experimental sites of XMASS, KamLAND, EGADS, and Super-Kamiokande. Having heard explanations from researchers at the respective experimental site where huge tanks and complicated instruments were placed close together, the observers seemed to be greatly impressed. After the visit to the underground laboratory, the delegation returned to the Kamioka Branch Office and interviewed young researchers who are stationed at Kamioka. The site visit was concluded with a free discussion among the observers and Director Murayama and other Kavli IPMU core members who accompanied the delegation.

Director Murayama presenting an overview at the site visit to the Kavli IPMU at Kashiwa.

The observers as well as attendants arriving at the underground experimental site in the Mozumi Mine of the Kamioka Mining Company.

Fifth Meeting of the Kavli IPMU External Advisory Committee

The fifth meeting of the Kavli IPMU External Advisory Committee was held on July 24, 2012, prior to the WPI site visit, with seven committee members —Roberto Peccei (UCLA, chair), John Ellis (King's College London), Steve Kahn (Stanford/SLAC), Sadayoshi Kojima (Tokyo Tech), David Morrison (UC Santa Barbara), Sadanori Okamura (Hosei), and Nigel Smith (SNOLAB)—in attendance. The committee heard from Director Hitoshi Murayama as well as Associate Director Nobuhiko Katayama on the Kavli IPMU activities and from researchers in various fields on their research reports. The committee also looked at the poster presentations. The committee reviewed the Kavli IPMU's past activities and gave valuable suggestions for the future.

Director Murayama Received a Letter of Appreciation of Global Messengers of "Japan" Project

On September 18, 2012, the Japanese Government's National Policy Unit announced 63 Japanese who carried out notable activities in the international community and contributed to spreading the positive image of "Japan" to a global audience, and Hitoshi Murayama, Director of the Kavli IPMU, was among them. Those 63 people were selected in *The Global Messengers of "Japan" Project* from various fields such as sports, culture, and social contribution, by the selection committee consisting of foreign journalists etc. Letters of appreciation were presented by the Minister of

State for National Policy, Motohisa Furukawa to the selected 63 people.

Hirosi Ooguri Received the Inaugural Simons Investigator Award


Hirosi Ooguri

The Simons Foundation announced on July 24, 2012 that Hirosi Ooguri, the Fred Kavli Professor of the California Institute of Technology and a Principal Investigator of the Kavli IPMU has been selected to receive the Simons Investigator Award in the inaugural year of the award. Ooguri will receive more than $1.3 million over the next ten years for his research. According to the Simons Foundation, the goal of the new program is "to provide a stable base of support for outstanding scientists in their most productive years, enabling them to undertake long-term study of fundamental questions." Nine theoretical physicists, seven mathematicians, and five theoretical computer scientists were appointed as Simons Investigators. Ooguri was the only recipient from the field of particle physics.

Hirosi Ooguri was recognized in his award citation as a "mathematical physicist and string theorist of exceptional creativity and breadth." He was chosen as an investigator for his "innovations in the use of topological string theory to compute Feynman diagrams in superstring models," as well as for his work on Calabi-Yau manifolds which has yielded important new insights into the D-brane and for his essential contribution to the development of the holographic principle of quantum gravity.

MSJ 2012 Geometry Prize to Yukinobu Toda

Derived categories of coherent sheaves on algebraic varieties are very interesting objects to be investigated because they are related to superstring theories, non-commutative algebras, symplectic geometry, and so on. The Mathematical Society of Japan (MSJ) awarded the 2012 Geometry Prize to Yukinobu Toda, Associate Professor at Kavli IPMU, for "The study of the stability conditions in derived categories and the Donaldson-Thomas invariants."

MSJ's Geometry Prize was established in 1987 by the donation of funds by a group of Japanese researchers in geometry. This prize is awarded to mathematicians who have contributed to the development of geometry in a broad sense, including differential geometry, topology, and algebraic geometry, by obtaining outstanding results, or by accumulated important achievements for many years of research, or by giving excellent guide to young mathematicians by writing books and/or by other means.


Yukinobu Toda

The BCS Prize to the Kavli IPMU Research Building

The Japanese Federation of Construction Contractors announced that the 53rd BCS prize was awarded to 15 architectural structures including the Kavli IPMU research building at The University of Tokyo's Kashiwa campus. The award ceremony will take place on November 20, 2012, at the Imperial Hotel, Tokyo.

The BCS prize was established in 1960 by the Japanese Building Contractors Society at that time under the philosophy that not only the design but also the construction techniques are important in constructing excellent architectural structures and, for that reason, the cooperation among three parties, namely the owner, the designer and the contractor, is essential. The prize is awarded annually to excellent architectural structures in Japan. Note that Professor Hidetoshi Ohno of the Graduate School of Frontier Sciences, at The University of Tokyo, was awarded the AIJ (The Architectural Institute of Japan) Prize 2011 for Design for his achievement in the design of the Kavli IPMU building (see, *IPMU News* No. 14, p.28). Though that prize is awarded to the architect, the BCS prize to the Kavli IPMU building is actually awarded to the architect as well as the owner (The University of Tokyo) and the contractor in view of its philosophy.

Science Café 2012 at Tamarokuto Science Center Well-Received

The Science Café 2012, fourth in this series, was held at the Tamarokuto Science Center in Nishi-Tokyo City, jointly sponsored by the Kavli IPMU and the Tamarokuto Science Center. This year, Sadanori Okamaura (Professor at Hosei University; former Director of the Todai Institutes for Advanced Study) gave the first lecture, entitled "The Baryonic Universe," on June 30, Naoki Yoshida (Professor at Department of Physics, The University of Tokyo and Kavli IPMU Senior Scientist), the second lecture entitled "When the Universe Was Filled with Light," on July 7, and Tomoyuki Abe (Kavli IPMU Assistant Professor) gave the third lecture entitled "Mathematics from Figures—A Small Journey to Three Wonder Worlds of Langlands," on September 8.

The first and third lectures were delivered in a rather small room with a capacity of 80 people, with a typical Science Café style, where a relaxed atmosphere was specifically emphasized so that lecturers could give

quizzes and attendees could talk with the lecturers in a friendly manner. The second lecture was divided into two parts, with the venue of the first part being the Tamarokuto Science Center's new planetarium on its opening day**!** The first part started at 17:00, the closing hour of the Science Center, and Professor Yoshida's presentation was projected onto the planetarium dome. It completely fit with the Star Festival (*Tanabata*, the seventh night of July) evening. The second part, with all the people moved to a different room, was a typical Science Café, with the lecturer closely surrounded by the audience. Every time, the audience —broadly ranging from junior high-school students to septuagenarians— actively asked questions, and Science Café 2012 was a great success.

Professor Sadanori Okamura giving a lecture on June 30.

Professor Naoki Yoshida giving a lecture on July 7. The venue for the first part was the Tamarokuto Science Center's planetarium.

Professor Tomoyuki Abe giving a lecture on September 8.

Summer Science Program for High School Students "Look into the Universe"

On July 28, 2012, 16 high school students joined a hands-on summer science program "Look into the Universe" held by the Kavli IPMU at The University of Tokyo's Kashiwa campus. The program consisted of a cosmology lecture by Eiichiro Komatsu (Director of the Department of Physical Cosmology, Max-Planck Institute for Astrophysics and Kavli IPMU Visiting Senior Scientist) as well as remote lectures via video conference system from the National Astronomical Observatory of Japan's Hawaii Observatory and the XMASS facility of the Kavli IPMU's Kamioka Branch. Students were interested in the forefront research, and they asked a lot of questions. Kavli IPMU Director Hitoshi Murayama as well as Associate Director Nobuhiko Katayama unexpectedly joined the program and they took it as a good chance to directly convey the pleasure of science and, in particular, that of studying the universe, to the students.

Students and Kavli IPMU staff

Hyper Suprime-Cam Ushers in a New Era of Observational Astronomy

The installation of the Hyper Suprime-Cam (HSC), which had been developed by the joint efforts of National Astronomical Observatory of Japan (NAOJ), Kavli IPMU, and other partners, onto the NAOJ's Subaru Telescope in Hawaii took place on August 16-17, 2012, and its engineering first light was successfully achieved starting from the night of August 28. At Kavli IPMU, HSC has been developed as one of the two subprojects of the SuMIRe Project, which is supported by FIRST (The Funding Program for World-Leading Innovative R&D on Science and Technology), and led by Kavli IPMU Director Hitoshi Murayama as a core researcher. For more about the HSC's engineering first light and future survey plan, see page 24.

SDSS III Released the Largest-Ever 3D Cosmic Map

The Sloan Digital Sky Survey III (SDSS-III) team, including some Kavli IPMU researchers, has released the largest-ever three-dimensional cosmic map, as Data Release (DR) 9. It will help the challenge of scientists to explain the mysterious dark matter and dark energy that scientists know makes up 96 percent of the Universe.

At the beginning of the last year, SDSS-III released the largest digital color image of the sky ever made (see *IPMU News* No. 13, page 21). SDSS-III started a six-year plan to extend this image to a 3-dimensional map, and with online release of DR9, the first one third of the cosmic map has been made available.

Clumpy Structure of Supernova Explosions – A Subaru View of Supernova Explosion Mechanism

A group of researchers including Masaomi Tanaka (Assistant Professor at NAOJ, previously IPMU Postdoc), Koji Kawabata (Associate Professor at Hiroshima University), Takashi Hattori (NAOJ researcher), Keiichi Maeda (Kavli IPMU Assistant Professor) and Ken'ichi Nomoto (Kavli IPMU Principal Investigator) have reported that supernova explosions show a clumpy structure, as observed by the Subaru

telescope. The study is expected to advance our understanding of the supernova explosion mechanism which has been a mystery for more than half a century. This result has been published in the July 20, 2012 issue of *The Astrophysical Journal*.

Kavli IPMU Seminars

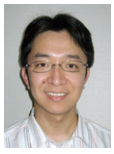
1. "Gromov-Witten theory of Calabi-Yau spaces II"
   Speaker: Yongbin Ruan (University of Michigan)
   Date: Jun 19, 2012
2. "An introduction to Seiberg-Witten Theory for mathematicians"
   Speaker: Yuji Tachikawa (U Tokyo)
   Date: Jun 19, 2012
3. "Asymptotic flatness of higher dimensional spacetimes"
   Speaker: Tetsuya Shiromizu (Kyoto U)
   Date: Jun 20, 2012
4. "Mirror symmetry and modular form"
   Speaker: Yongbin Ruan (University of Michigan)
   Date: Jun 20, 2012
5. "2HDM_MFV Facing Recent LHCb Data"
   Speaker: Minoru Nagai (U Tokyo)
   Date: Jun 27, 2012
6. "Real Galaxies & Virtual Universes"
   Speaker: Roderik Overzier (UT Austin)
   Date: Jun 27, 2012
7. "Multi-wavelength Observations of the Enduring Type IIn Supernovae 2005ip and 2006jd"
   Speaker: Maximilian Stritzinger (Aarhus/Stockholm)
   Date: Jun 28, 2012
8. "New ways of searching for the primordial gravitational wave from large scale structure"
   Speaker: Donghui Jeong (JHU)
   Date: Jun 29, 2012
9. "The derived category of a GIT quotient"
   Speaker: Daniel Halpern-Leistner (UC Berkeley)
   Date: Jul 02, 2012
10. "Towards the Era of High Precision Cosmology"
    Speaker: Nao Suzuki (Lawrence Berkeley National Lab)
    Date: Jul 02, 2012
11. "Torsion points on Jacobian varieties and p-adic Sato theory"
    Speaker: Yuken Miyasaka (Tohoku U)
    Date: Jul 03, 2012
12. "Why do I believe in SUSY more strongly than before the LHC?"
    Speaker: Tsutomu Yanagida (Kavli IPMU)
    Date: Jul 04, 2012
13. "On the rational K2 of a curve of GL2 type over the function field of a curve over a finite field"
    Speaker: Satoshi Kondo (Kavli IPMU)
    Date: Jul 05, 2012
14. "An introduction to Seiberg-Witten Theory for mathematicians"
    Speaker: Yuji Tachikawa (U Tokyo)
    Date: Jul 10, 2012
15. "Phenomenology of a pseudoscalar inflaton: naturally large non-gaussianity"
    Speaker: Marco Peloso (Minnesota)
    Date: Jul 11, 2012
16. "How to kill a giant molecular cloud (GMC)"
    Speaker: Elizabeth Tasker (Hokkaido University)
    Date: Jul 12, 2012
17. "Latest Results on the Standard Model Higgs Searches at the LHC"
    Speaker: Koji Nakamura (CERN)
    Date: Jul 13, 2012
18. "New probes of initial state of quantum fluctuations during inflation"
    Speaker: Eiichiro Komatsu (MPA/ Kavli-IPMU)
    Date: Jul 13, 2012
19. "Unified description of Nambu-Goldstone Bosons without Lorentz invariance and Presymplectic Geometry"
    Speaker: Hitoshi Murayama (Kavli IPMU)
    Date: Jul 17, 2012
20. "Fermions for mathematicians"
    Speaker: David Morrison (UCSB)
    Date: Jul 20, 2012
21. "F-theory on genus one fibrations"
    Speaker: David Morrison (UCSB)
    Date: Jul 23, 2012
22. "To Higgs or not to Higgs? That is one of the questions."
    Speaker: John Ellis (King's College London)
    Date: Jul 23, 2012
23. "Naturalness in SUSY models and LHC results"
    Speaker: Masaki Asano (Hamburg)
    Date: Jul 25, 2012
24. "Observational Cosmology: Evolution of the Universe over 13.7 billion years"
    Speaker: Naoki Yoshida (Department of Physics/Kavli IPMU, University of Tokyo)
    Date: Jul 25, 2012
25. "Conformal/supersymmetric interfaces for string theory"
    Speaker: Yuji Satoh (Tsukuba U)
    Date: Jul 31, 2012
26. "Drawing Photons from the Future – the LSST Photon Simulator and Shear Systematics Studies"
    Speaker: Chihway Chang (Stanford)
    Date: Jul 31, 2012
27. "Quantum K-Theory and the Geometry of Spaces of Curves"
    Speaker: Leonardo Mihalcea (Virginia Tech)
    Date: Jul 31, 2012
28. "Correlation functions in conformal field theory"
    Speaker: Juergen Fuchs (Karlstad)
    Date: Aug 07, 2012
29. "Mapping class group invariants from factorizable Hopf algebras"
    Speaker: Juergen Fuchs (Karlstad)
    Date: Aug 07, 2012
30. "WIMP dark matter and baryogenesis"
    Speaker: Lorenzo Ubaldi (Bonn)

Date: Aug 08, 2012

31. "From a finite projective plane to the monster via hyperbolic geometry"
Speaker: Tathagata Basak (Iowa State U)
Date: Aug 09, 2012
32. "Theory of weight in arithmetic geometry"
Speaker: Tomoyuki Abe (Kavli IPMU)
Date: Aug 09, 2012
33. "Quasi-crystals"
Speaker: Paul Steinhardt (Princeton)
Date: Aug 10, 2012
34. "What Next In Cosmology"
Speaker: Paul Steinhardt (Princeton)
Date: Aug 13, 2012
35. "Cubic relations in Hall algebras and roots of zeta functions."
Speaker: Mikhail Kapranov (Yale)
Date: Aug 15, 2012
36. "Is it a (Beyond the) Standard Model Higgs?"
Speaker: Tevong You (Imperial College London)
Date: Aug 22, 2012
37. "Motivic integration and the p-cyclic McKay correspondence"
Speaker: Takehiko Yasuda (Osaka U)
Date: Aug 27, 2012
38. "The Schottky problem in genus 5"
Speaker: Charles Siegel (Kavli IPMU)
Date: Aug 28, 2012
39. "Constraining low energy supersymmetry beyond CMSSM"
Speaker: Kazuki Sakurai (DESY)
Date: Aug 29, 2012
40. "Brane Tiling mutations and beyond"
Speaker: Rak-Kyeong Seong (Imperial College)
Date: Sep 04, 2012
41. "Long gamma-ray burst progenitors throughout cosmological time"
Speaker: Matteo Cantiello (KITP)
Date: Sep 05, 2012
42. "Characteristic signatures in non-gaussianity and statistical anisotropy from vector fields during inflation"
Speaker: Ryo Namba (Minnesota)
Date: Sep 06, 2012
43. "Quantum (sl_n,∧Vn) link invariant and matrix factorizations"
Speaker: Yasuyoshi Yonezawa (Nagoya U)
Date: Sep 10, 2012
44. "Molecular gas and star formation in early-type galaxies"
Speaker: Martin Bureau (Oxford)
Date: Sep 13, 2012
45. "W-constraints for the total descendant potential of a simple singularity"
Speaker: Todor Milanov (Kavli IPMU)
Date: Sep 13, 2012
46. "The accelerating Universe, and the cosmic mystery of Dark Energy"
Speaker: Grigoris Panotopoulos (OIST)
Date: Sep 19, 2012
47. "Black holes, Dark Energy, and other Dark Matters"
Speaker: Tommaso Treu (UC Santa Barbara)
Date: Sep 21, 2012
48. "Positive Representations of Split Real Quantum Groups"
Speaker: Ivan Ip (Kavli IPMU)
Date: Sep 21, 2012
49. "Lifshitz Solutions in String Theory"
Speaker: Ruth Gregory (Durham)
Date: Sep 26, 2012
50. "MMP via stability conditions"
Speaker: Yukinobu Toda (Kavli IPMU)
Date: Sep 27, 2012

Personnel Changes

Promotions



Masahiro Takada, previously Kavli IPMU Associate Professor, was promoted to Kavli IPMU Professor on October 1, 2012.

Alexandre Kozlov, previously a Kavli IPMU distinguished postdoctoral fellow, was appointed as Kavli IPMU Assistant Professor on July 1, 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 Tsz Yan Lam [June 1, 2009 – August 31, 2012] moved to the Max Planck Institute for Astrophysics as a Humboldt fellow.

Kavli IPMU postdoctoral fellow Alexander Getmanenko [September 1, 2009–August 31, 2012] moved to Institute de Mathématiques de Jussieu, Université Paris Diderot as a postdoctoral researcher.

Kavli IPMU postdoctoral fellow Minxin Huang [September 1, 2009–August 31, 2012] moved to the Interdisciplinary Center for Theoretical Study, University of Science and Technology of China in Hefei as an Assistant Professor.

Kavli IPMU postdoctoral fellow Matthew Carl Sudano [September 1, 2009–August 31, 2012] moved to the Niels Bohr Institute, Copenhagen University as a postdoctoral fellow.

Kavli IPMU postdoctoral fellow Jason Evans [September 16, 2009–September 15, 2012] moved to Minnesota University as a Ressearch Associate.

Kavli IPMU postdoctoral fellow Johanna Knapp [April 1, 2010–August 31, 2012] moved to Technische Universität Wien as an Assistant Professor.

Kavli IPMU postdoctoral fellow Christian Schnell [July 1, 2011–August 31, 2012] moved to Stony Brook University as an Assistant Professor.

Kavli IPMU postdoctoral fellow Siu-Cheong Lau [August 1, 2011–July 31, 2012] moved to Harvard University as a Benjamin Peirce fellow.

Kavli IPMU postdoctoral fellow Yu Nakayama [September 1, 2011–August 31, 2012] moved to Caltech as a Fairchild Senior Research fellow.