

Kavli IPMU Naming Ceremony and Public Lecture Held on May 10

On April 1, 2012, the IPMU was renamed as the Kavli Institute for the Physics and Mathematics of the Universe (the Kavli IPMU) following a generous endowment from the Kavli Foundation. In commemoration of this, the Kavli IPMU naming ceremony took place on May 10, 2012, at 10 a.m. at the Kavli IPMU building on the University of Tokyo's Kashiwa campus. More about the ceremony can be found in the Director's Corner, pp. 3–5. Also, the speeches by the Kavli IPMU Director, Murayama, President of the University of Tokyo, Hamada, and the guests can be found on pp. 6–17.

In the afternoon of the same day, a commemorative public lecture "Mysteries of Black Holes and Neutrinos" was held at the Ito Hall on the University of Tokyo's Hongo campus, with a bidirectional simultaneous interpretation service between Japanese and English provided. The public lecture was opened with two short remarks by Mr. Fred Kavli, Founder and Chairman of The Kavli Foundation and by Dr. Robert Conn, President of The Kavli Foundation. Then, Kavli IPMU Director Hitoshi Murayama gave a lecture entitled "Are We Born from Neutrinos?" and Roger Blandford, Director of the Kavli Institute for Particle Astrophysics and Cosmology,



Hitoshi Murayama, giving a lecture.



Roger Blandford, giving a lecture.

Stanford University, spoke on "Black Holes: End of Time or a New Beginning?" The lecture was well attended, with about 350 participants.

Director Murayama and Mr. Fred Kavli Made a Courtesy Call on Prime Minister Yoshihiko Noda

The day before the Kavli IPMU Naming Ceremony, May 9, 2012, Kavli IPMU Director Hitoshi Murayama and Mr. Fred Kavli, Chairman of The Kavli Foundation, made a courtesy call on Prime Minister Yoshihiko Noda, accompanied by Dr. Robert Conn, President of The Kavli Foundation, Professor Sadanori Okamura, President of the Astronomical Society of Japan, and Dr. Naotaka Suzuki, Staff Scientist at the Lawrence Berkeley National Laboratory. Together with the Prime Minister, Minister Hirofumi Hirano of the Ministry of Education, Culture, Sports, Science, and Technology (MEXT) attended from the government. To see how it went, please visit the Internet TV run by the government <http://nettv.gov-online.go.jp/prg/prg6156.html> as well as the Director's Corner, pp. 3–5.

Conceptual Design of the Prime Focus Spectrograph (PFS) Successfully Passed the Review

On March 19 and 20, 2012, the conceptual design review of the PFS, one of the two subprojects of SuMIRe (Subaru Measurement of Images and Redshifts) was held at the Hawaii Observatory of the National Astronomical Observatory of Japan (NAOJ). The PFS, having successfully passed this review, by an international review committee, moves ahead to the next phase of preliminary design and construction.

SuMIRe is a project led by Kavli IPMU Director Hitoshi Murayama as a core researcher, aiming at uncovering the origin and future of the universe. It is one of the research projects selected by CSTP (the Council for S&T Policy, Cabinet Office of Japanese Government) and supported by FIRST (the Funding Program for World-Leading Innovative R&D on Science and Technology). As the construction of a wide-field imaging camera Hyper Suprime-Cam (HSC), another subproject of SuMIRe, has already been approaching completion, further progress in the SuMIRe research plan is expected with the PFS proceeding to the preliminary design and construction stage.

The PFS will be mounted on the NAOJ's Subaru Telescope which is located on the summit of Mauna Kea in Hawaii, and it will be used to investigate the nature of dark energy, the evolution of galaxies, the mysteries of the Milky Way and Andromeda galaxies, and so on. The efforts to promote the PFS project are conducted by an international consortium lead by the Kavli IPMU. This consortium includes the Academia Sinica Institute for Astronomy and Astrophysics (ASIAA, Taiwan), Jet Propulsion Laboratory of NASA, California Institute for Technology, Princeton University, Johns Hopkins

University, Laboratoire d'Astrophysique Marseille, Universidad Sao Paulo, and the Laboratorio Nacional de Astrofisica (LNA, Brazil).

6th ICRR-Kavli IPMU Joint Public Lecture "Decoding the Mystery of the Universe"

On April 14, 2012, the ICRR (Institute for Cosmic Ray Research, The University of Tokyo)-Kavli IPMU joint public lecture entitled "Decoding the Mystery of the Universe" was held at the Crystal Hall of Amuser Kashiwa, which is located near the JR Kashiwa station. This was the sixth in this series of joint public lectures held in the spring and fall each year.

The opening address was given by Professor Takaaki Kajita, ICRR Director and a Kavli IPMU Principal Investigator. Then, ICRR Professor Masahiro Teshima gave the first lecture on "Probing the Extreme Universe with High Energy Gamma Rays." Next, Kavli IPMU Professor Hiroshi Karoji spoke on the SuMIRe Project entitled "When Sumire (Violet) Flowers Come Out." After the lectures, a number of questions were asked by the audience, and they seemed very much satisfied.



Hiroshi Karoji, giving a lecture.

Subaru Telescope Pioneers the Use of Adaptive Optics for Optical Observations

A research team from the University of Tokyo, Ehime University, and the National Astronomical Observatory of Japan (NAOJ)—with a central role taken by Kavli IPMU Associate Professor Hajime Sugai—has succeeded in conducting the first, full-

scale scientific observations with an adaptive optics (AO) system at optical wavelengths. The team connected the Kyoto Tridimensional Spectrograph II (Kyoto3DII), which had been developed by this team when Professor Sugai was with Kyoto University, with the Subaru Telescope's 188-element Adaptive Optics system (AO 188), and improved the spatial resolution of images by a factor of 2.5 over images taken without AO. It is expected that observations using Kyoto3DII coupled with AO 188 will reveal the detailed structures and the formation processes of distant galaxies.

Long-Standing Puzzle in the Nambu Theory on Spontaneous Symmetry Breaking Solved

In nature, there are phenomena caused by a *spontaneous breakdown* of symmetry, such as magnets and crystals. Yoichiro Nambu applied this idea to elementary particle physics, and pointed out for the first time what occurs when symmetry is broken spontaneously. He was awarded the 2008 Nobel Prize in Physics for this achievement. The Nambu theory cannot be directly applied to the phenomena at finite temperature or density, however, such as those that occurred in the early universe or those found in our daily life. There are a number of known *exceptions*.

Recently, Kavli IPMU Director Hitoshi Murayama and UC Berkeley graduate student Haruki Watanabe discovered a new theorem that expands on Nambu's ideas to a more general case with no exceptions. In this way, they solved the puzzle that had persisted for as long as 50 years. This paper has been published in the June 21 print edition of *Physical Review Letters*, and it has been spotlighted as one of the "Editor's Suggestions" which, according to the editorial announcement, are selected based on the potential interest in the results presented and,

importantly, on the success of the paper in communicating its message, in particular to readers from other fields. It has also been highlighted as one of the papers featured with brief summaries written by the editors (Synopsis) in *Physics* (<http://physics.aps.org/>); the editors choose these papers for their importance and/or intrinsic interest in consultation with expert scientist. On June 8, Hitoshi Murayama and Haruki Watanabe held a press conference on the University of Tokyo's Hongo campus, where they explained their discovery.



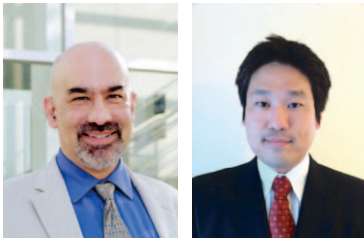
Hitoshi Murayama and Haruki Watanabe at their press conference.

WMAP Team Won the 2012 Gruber Cosmology Prize, David Spergel and Eiichiro Komatsu Are among the Members

The Gruber Foundation announced on June 20, 2012 that Johns Hopkins University Professor Charles L. Benett and WMAP (Wilkinson Microwave Anisotropy Probe) team won the 2012 Gruber Cosmology Prize. Two Kavli IPMU scientists are among the twenty six members of the WMAP team. They are David Spergel of Princeton University and Kavli IPMU Principal Investigator, and Eiichiro Komatsu of the University of Texas at Austin and Kavli IPMU Visiting Senior Scientist.

The Gruber prizes were established by The Gruber Foundation to recognize excellence in science and the humanities by highlighting five fields: Cosmology, Genetics, Neuroscience, Justice, and Women's Rights. Each prize is given annually. WMAP brought precise and accurate understanding

of the age, content, geometry, and origin of the universe, and led to the firm foundation of the Standard Cosmological Model. According to the announcement, the citation further recognizes that the exquisite specificity of these results has helped transform cosmology itself from an “appealing scenario into precise science.” The award ceremony will take place on August 21, 2012.



Left: David Spergel, Right: Eiichiro Komatsu.

Kavli IPMU Seminars

1. “Measuring the Particle Spectrum During Inflation”
Speaker: Daniel Green (Institute for Advanced Study)
Date: Apr 04, 2012
2. “Membrane Theory and Discrete Differential Geometry”
Speaker: Jens Hoppe (KTH Royal Institute of Technology)
Date: Apr 05, 2012
3. “Conifold-Period Expansions”
Speaker: Duco van-Straten (Mainz University)
Date: Apr 06, 2012
4. “Parity Breaking Hydrodynamics in 2+1 Dimensions and Axions in AdS”
Speaker: Rene Meyer (Crete)
Date: Apr 10, 2012
5. “Mapping the Dark Matter with recent redshift surveys”
Speaker: Jeremy Mould (Swinburne University)
Date: Apr 11, 2012
6. “Spacetimes beyond Einstein”
Speaker: Frederic P. Schuller (Max Planck Institute for Gravitational Physics)
Date: Apr 11, 2012
7. “Introduction to area metric geometry and its emergence in physics”
Speaker: Frederic P. Schuller (Max Planck Institute for Gravitational Physics)
Date: Apr 12, 2012
8. “Probing Gravity with Large-Scale Structure”
Speaker: Fabian Schmidt (Caltech)
Date: Apr 12, 2012
9. “Growth functions for cancellative monoids”
Speaker: Kyoji Saito (Kavli IPMU)
Date: Apr 12, 2012
10. “Hyperbolic 3-manifolds and Cluster Algebras”
Speaker: Kentaro Nagao (Nagoya University)
Date: Apr 16, 2012
11. “An introduction to Seiberg-Witten Theory for mathematicians”
Speaker: Yuji Tachikawa (U Tokyo)
Date: Apr 17, 2012
12. “Cosmological Aspects of Inflation in a Supersymmetric Axion Model”
Speaker: Kazunori Nakayama (U. Tokyo)
Date: Apr 18, 2012
13. “The Program in Interdisciplinary Studies at IAS, Princeton”
Speaker: Piet Hut (IAS)
Date: Apr 19, 2012
14. “2d Gauge/Bethe correspondence from String Theory”
Speaker: Susanne Reffert (CERN)
Date: Apr 24, 2012
15. “An introduction to Seiberg-Witten Theory for mathematicians”
Speaker: Yuji Tachikawa (U Tokyo)
Date: Apr 24, 2012
16. “Dark Vector Boson from E₆/SU(2)_N Extension of Standard Model”
Speaker: Ernest Ma (UC Riverside)
Date: Apr 25, 2012
17. “Optical Geometry”
Speaker: Marcus Werner (Kavli IPMU)
Date: Apr 26, 2012
18. “The Omega Deformation from String and M-Theory”
Speaker: Domenico Orlando (CERN)
Date: May 01, 2012
19. “An introduction to Seiberg-Witten Theory for mathematicians”
Speaker: Yuji Tachikawa (U Tokyo)
Date: May 01, 2012
20. “Bridgeland’s stabilities on abelian surfaces”
Speaker: Shintaro Yanagida (RIMS)
Date: May 07, 2012
21. “General Argyres-Douglas theory”
Speaker: Dan Xie (IAS)
Date: May 08, 2012
22. “An introduction to Seiberg-Witten Theory for mathematicians”
Speaker: Yuji Tachikawa (U Tokyo)
Date: May 10, 2012
23. “Early Results from Planck”
Speaker: George Efstathiou (Cambridge)
Date: May 10, 2012
24. “A mirror symmetric construction of quantum cohomology of flag varieties”
Speaker: Changzheng Li (Kavli IPMU)
Date: May 10, 2012
25. “Looking for a worldsheet description of the Nekrasov partition function”
Speaker: Andrea Prudenziati (YITP)
Date: May 15, 2012
26. “Gravitational-wave backgrounds from ground and space-based interferometers”
Speaker: Atsushi Taruya (U Tokyo)
Date: May 15, 2012
27. “Dark Matter and Light.”
Speaker: Douglas Spolyar (Fermilab)
Date: May 16, 2012
28. “An introduction to Seiberg-Witten Theory for mathematicians”
Speaker: Yuji Tachikawa (U Tokyo)
Date: May 17, 2012
29. “Massive black holes in galaxy mergers: accretion and dynamics”
Speaker: Marta Volonteri (IAP)
Date: May 17, 2012

30. "The Secret Life of Scattering Amplitudes"
Speaker: David Skinner (Perimeter Institute)
Date: May 21, 2012
31. "Anticyclotomic p-adic L-functions for modular forms"
Speaker: Masataka Chida (Kyoto University)
Date: May 22, 2012
32. "125 GeV Higgs in Gauge Mediation Models"
Speaker: Norimi Yokozaki (Kavli IPMU)
Date: May 23, 2012
33. "An introduction to Seiberg-Witten Theory for mathematicians"
Speaker: Yuji Tachikawa (U Tokyo)
Date: May 24, 2012
34. "Monstrous moonshine and generalized moonshine"
Speaker: Scott Carnahan (Kavli IPMU)
Date: May 24, 2012
35. "Conformal Field Theory Associated to C2-cofinite Vertex Operator Algebras (joint with Professor Akihiro Tsuchiya)"
Speaker: Yoshitake Hashimoto (Tokyo City Univ.)
Date: May 26, 2012
36. "Extended W algebra of type A.D.E. at positive rational level"
Speaker: Akihiro Tsuchiya
Date: May 26, 2012
37. "Blowing a Standard Candle: the Disappearing Mass of delta Cephei"
Speaker: Massimo Marengo (Iowa State University)
Date: May 28, 2012
38. "Supernovae discoveries in the early Universe"
Speaker: Jeff Cooke (Swinburne)
Date: May 29, 2012
39. "The X=M conjecture for a quantum affine algebra"
Speaker: Katsuyuki Naoi (Kavli IPMU)
Date: May 29, 2012
40. "Beyond dark matter detection with neutrino telescopes"
Speaker: Sergio Palomares Ruiz (CFTP)
Date: May 30, 2012
41. "Low Energy Signatures of TeV scale See-Saw Mechanism"
Speaker: Emiliano Molinaro (CFTP)
Date: May 30, 2012
42. "Stellar Archaeology: New Science with Old Stars"
Speaker: Anna Frebel (MIT)
Date: May 30, 2012
43. "Quivers of sections on toric orbifolds"
Speaker: Tarig Abdelgadir (KIAS)
Date: Jun 04, 2012
44. "Eternal Inflation and the Measure Problem"
Speaker: Raphael Bousso (UC Berkeley)
Date: Jun 05, 2012
45. "An introduction to Seiberg-Witten Theory for mathematicians"
Speaker: Yuji Tachikawa (U Tokyo)
Date: Jun 05, 2012
46. "Composite Weak Bosons at the LHC"
Speaker: Harald Fritzsch (LMU Munich)
Date: Jun 06, 2012
47. "Open GW invariants of toric manifolds"
Speaker: Siu-Cheong Lau (Kavli IPMU)
Date: Jun 07, 2012
48. "High redshift 21 cm signal as a dark matter probe"
Speaker: Marco Valdes (Pisa)
Date: Jun 07, 2012
49. "Recent developments in galaxy-dark matter clustering connection"
Speaker: Uros Seljak (Berkeley/Zurich/IEU)
Date: Jun 08, 2012
50. "Indirect Dark Matter Detection in the Light of Sterile Neutrinos"
Speaker: Arman Esmaili Taklimi (Unicamp)
Date: Jun 13, 2012
51. "Gromov-Witten theory of Calabi-Yau spaces I"
Speaker: Yongbin Ruan (University of Michigan)
Date: Jun 15, 2012
52. "Introduction to Gromov Witten and Fan-Jarvis-Ruan-Witten theory"
Speaker: Huai-Liang Chang (HKUST)
Date: Jun 18, 2012

Kavli IPMU Komaba Seminars

1. "Topological Strings on Elliptic Fibrations"
Speaker: Emanuel Scheidegger (The University of Freiburg)
Date: May 21, 2012
2. "Period Integrals and Tautological Systems"
Speaker: Bong Lian (Brandeis University)
Date: Jun 08, 2012
3. "Quantum cohomology of flag varieties"
Speaker: Changzheng Li (Kavli IPMU)
Date: Jun 11, 2012

Personnel Change

Kavli IPMU postdoctoral fellow Serguey Galkin moved to Department of Discrete Mathematics, Faculty of Innovations and High Technology, Moscow Institute of Physics and Technology (MIPT) as an Associate Professor. He was at IPMU from May 1, 2009 to April 30, 2012.

From the Editor

In the previous issue of *IPMU News*, a FEATURE article by Toshiyuki Kobayashi was announced to appear in this issue. Publication of the feature article has been further postponed, however, because of the author's tight schedule.