

Director Murayama Elected to the American Academy of Arts and Sciences

On April 24th, 2013, the American Academy of Arts and Sciences announced 198 newly elected members including Hitoshi Murayama, Director of the Kavli IPMU. It was founded in 1780 to cultivate every art and science, and from the latter half of the 20th century, it has been an independent policy research center that conducts multidisciplinary studies of complex and emerging problems. Past members include George Washington, the first President of the United States, Albert Einstein, Nobel Laureate in Physics, as well as leaders in a broad range of areas including politics, business, science, and art at all times. The newly elected members include David Weinland, 2012 Nobel Laureate in Physics, Robert De Niro, a renowned actor, and many other distinguished scientists, artists, and politicians.

The Academy has selected as members the finest minds and most influential leaders from each generation, and selection by the Academy has always been one of the highest honors in the United States. Director Murayama said, "I never imagined that I would be among such a distinguished list of scientists. This will be a great opportunity for

me to advance science in this area of research, as well as to promote the contribution of those with Japanese ancestry."

The induction of new members will take place on October 12, 2013, in Cambridge, Massachusetts, where the Academy's headquarters is located.

Fred Kavli's Portrait Hung on the Wall of Interaction Area at Kavli IPMU

A portrait of Fred Kavli, founder and Chairman of The Kavli Foundation, arrived at Kavli IPMU in May, 2013. The portrait was drawn by New York-based noted portrait painter, Everett Kinstler and dedicated to Fred Kavli for his support to the 16th Kavli Institute, Kavli IPMU. The portrait is hung on the wall of the Kavli IPMU's interaction area, Piazza Fujiwara, as if Fred Kavli is watching researchers gathering and discussing there.



Portrait of Fred Kavli

The 4th Yoji Totsuka Prize to Kunio Inoue

The Fourth Yoji Totsuka Memorial Prize (2012) has been awarded to Kunio Inoue, Director of the Research Center for Neutrino

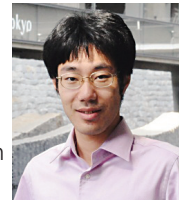


Kunio Inoue

Science (RCNS), Tohoku University, and Principal Investigator at the Kavli IPMU, and Atsuto Suzuki, Director General of High Energy Accelerator Research Organization (KEK), for their neutrino research using liquid scintillator. In particular, the first observation of terrestrial antineutrinos (geoneutrinos) in the KamLAND experiment in 2001, which showed evidence that Earth's primordial heat supply has not yet been exhausted and established the foundation of "neutrino geophysics," has been recognized. This prize is awarded annually aiming at recognizing outstanding achievements in neutrino physics experiments, non-accelerator particle physics experiments, or related theoretical studies. The award ceremony was held on March 20 at the Koshiba Hall at the University of Tokyo.

Tomoyuki Abe Received 2013 MEXT's Young Scientists' Prize

On April 8, 2013, the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT) announced that the 2013 Young



Tomoyuki Abe

Scientists' Prize went to Kavli IPMU Assistant Professor Tomoyuki Abe for his, "Fundamental work on theory of arithmetic D-module and research on the Langlands correspondence." This award is given to young scientists under 40 years old in recognition of their outstanding original, or, challenging exploratory, research accomplishments, which show their ability for high-level research. In 2013, 89 young scientists, including Abe, won the award. The award ceremony was held on April 16, 2013 in Tokyo, JAPAN.

Yoichiro Suzuki Receives Giuseppe and Vanna Cocconi Prize

The European Physical Society announced to award the Giuseppe and Vanna Cocconi Prize to Yoichiro Suzuki, Director of Kamioka Observatory at the Institute for Cosmic Ray Research, the University of Tokyo and Deputy Director of the Kavli IPMU, and Professor Art McDonald “for their outstanding contributions to the solution of the solar neutrino puzzle by measuring the flux of all neutrino flavors from the Sun with the SNO and Super-Kamiokande experiments.” The Giuseppe and Vanna Cocconi Prize has been awarded every two years since 2011 by the High Energy and Particle Physics Division of European Physical Society. The Prize is awarded to an individual or individuals who have made outstanding contributions to Particle Astrophysics and Cosmology in the past fifteen years. The prize ceremony will be held on Monday July 22, at the 2013 EPS-HEP Conference in Stockholm.



Yoichiro Suzuki

Gravitational Lensing Observation of Galaxy Clusters Shed New Light on Dark Matter

Professor Masahiro Takada is a member of an international team of astronomers from Academia Sinica, Taiwan, University of Birmingham, England, Kavli IPMU, and Tohoku University, which has used the Subaru Telescope to measure the distribution of dark matter in fifty galaxy clusters by means of gravitational lensing and found that its density gradually decreases from the center of these cosmic giants to their diffuse outskirts. This new evidence about

the mysterious dark matter that pervades our Universe conforms to the predictions of cold dark matter theory, known as “CDM.”

Past research based on a small number of clusters did not conform to CDM theory. In contrast, the fact that this research sampled as many as 50 clusters led to a successful measurement of the average shape of the dark matter density distribution.

In future, further progress is expected from the measurement of the distribution of dark matter in many more galaxy clusters using the Subaru Telescope’s new Hyper Suprime-Cam (HSC) for gravitational lensing studies.

This result has been published online in *The Astrophysical Journal Letters*, vol. 769, on June 1, 2013.

“Standard Candle” Supernova Extraordinarily Magnified by Gravitational Lensing

A team of researchers at the Kavli IPMU including Robert Quimby, Marcus Werner, Masamune Oguri, Ken’ichi Nomoto, and others has identified PS1-10afx, a “superluminous” supernova observed at a distance of about 9 billion light years is actually a Type Ia supernova (SNIa) 30 times magnified by a strong gravitational lens.

The supernova PS1-10afx, discovered by the Panoramic Survey Telescope & Rapid Response System 1 (Pan-STARRS1), was very luminous (about 100 billion times greater than our Sun), and the Pan-STARRS1 team concluded that PS1-10afx was intrinsically very luminous, namely, a “superluminous” supernova. Soon after the findings were announced, Robert Quimby, a Kavli IPMU postdoctoral fellow, independently analyzed the data and found that the features seen in the spectra and the light curve of PS1-10afx are almost identical to those of normal

SNIa, which is known as the “standard candle” to measure cosmological distances. As Marcus Werner specializes in mathematical theory of gravitational lensing, the Kavli IPMU team found an explanation that the anomalously high brightness could indicate that PS1-10afx was a SNIa gravitationally lensed by an object between us and the supernova.

Gravitational lensing is one of a few means to “observe” invisible astronomical objects such as dark matter, dark energy, and black holes. As the “standard candle” property of SNIa is successfully used to directly measure the magnification due to gravitational lensing in this work, it is expected this method can be used to study the nature of dark matter, test theories of gravity, and help reveal what our universe is made of.

This result appeared in *The Astrophysical Journal Letters*, vol. 768, on May 1, 2013.

Students of Leiden University Visited Kavli IPMU

On May 1, 2013, graduate and undergraduate students from Leiden University in the Netherlands visited Kavli IPMU as a part of their study abroad program in Japan. Following the Associate Director Nobu Katayama’s introduction of Kavli IPMU, they heard academic lectures by Kavli IPMU postdoctoral fellows, Rene Meyer, Cornelius Schmidt-Colinet, Surhud More, and Robert Quimby. They also enjoyed a guided tour of the Kavli IPMU building and a Q&A session



surrounding Kavli IPMU Professor Masahiro Takada. Students who major in physics and astrophysics asked questions about gravitational lensing, superstring theory, and the like. Some students said that they wish to stay at Kavli IPMU for research in future.

Kavli IPMU Seminars

1. "On semi-continuity problems for minimal log discrepancies"
Speaker: Yusuke Nakamura (U Tokyo)
Date: Apr 02, 2013
2. "Logarithmic conformal field theory and the Verlinde formula"
Speaker: Thomas Creutzig (TU Darmstadt)
Date: Apr 03, 2013
3. "Complementarity or Firewalls: the Emergence of Classical Worlds"
Speaker: Yasunori Nomura (UC Berkeley)
Date: Apr 05, 2013
4. "A (Working) Verlinde Formula for Fractional Level WZW Models"
Speaker: David Ridout (Australian National U)
Date: Apr 09, 2013
5. "The Gamma Ray Line and Some Tests"
Speaker: Xiaoyuan Huang (NAOC)
Date: Apr 10, 2013
6. "The First billion years of History – Star-forming galaxies at the end of the dark ages"
Speaker: Andrew Bunker (U Oxford)
Date: Apr 10, 2013
7. "Ideas for lab tests of dark energy"
Speaker: Robert Caldwell (Dartmouth College)
Date: Apr 11, 2013
8. "Tidal disruption flares from stars on eccentric orbits"
Speaker: Kimitake Hayasaki (Korea Astronomy & Space Science Inst.)
Date: Apr 11, 2013
9. "Symplectic cohomology and mirror symmetry"
Speaker: Daniel Michael Pomerleano (Kavli IPMU)
Date: Apr 11, 2013
10. "Renyi entropy and Entanglement spectrum"
Speaker: Shunji Matsuura (McGill U)
Date: Apr 16, 2013
11. "Search for New Physics at Belle II by Global Fit"
Speaker: Ryosuke Itoh (KEK)
Date: Apr 17, 2013
12. "Horizon instability of an extreme Reissner-Nordstrom black hole"
Speaker: Norihiro Tanahashi (Kavli IPMU)
Date: Apr 17, 2013
13. "Supersymmetric Boundary Conditions in Three Dimensional N=2 Theories"
Speaker: Satoshi Yamaguchi (Osaka)
Date: Apr 19, 2013
14. "Possible Effects of Galactic Cosmic Rays on Climate and Weather"
Speaker: Hiroko Miyahara (ICRR)
Date: Apr 22, 2013
15. "Dualities through the orbifold equivalence in Chern-Simons-matter theories"
Speaker: Mitsutoshi Fujita (Kavli IPMU/Washington U)
Date: Apr 23, 2013
16. "An Introduction of the Higgs Particle to Astrophysicist and Mathematician"
Speaker: Tsutomu Yanagida (Kavli IPMU)
Date: Apr 24, 2013
17. "Novikov homology and its geometric applications"
Speaker: Andrei Pajitnov (U Nantes)
Date: Apr 25, 2013
18. "Topological-antitopological fusion and gauged linear sigma models"
Speaker: Mauricio Andres Romo Jorquera (Kavli IPMU)
Date: Apr 25, 2013
19. "An introduction to the theory of primitive forms (Part 1)"
Speaker: Todor Milanov (Kavli IPMU)
Date: Apr 26, 2013
20. "An introduction to the theory of primitive forms (Part 2)"
Speaker: Todor Milanov (Kavli IPMU)
Date: Apr 26, 2013
21. "SUSY (with explaining the muon g-2 anomaly) at the LHC"
Speaker: Sho Iwamoto (Kavli IPMU)
Date: May 01, 2013
22. "Possible existence of viable models of bi-gravity with detectable graviton oscillations by gravitational wave detectors"
Speaker: Takahiro Tanaka (YITP, Kyoto U)
Date: May 02, 2013
23. "Parity violation in QCD process via SUSY"
Speaker: Kunio Kaneta (Kavli IPMU)
Date: May 08, 2013
24. "Quantum tunneling in the inflationary era and its observational consequences"
Speaker: Kazuyuki Sugimura (YITP, Kyoto U)
Date: May 09, 2013
25. "Finite-dimensional representations over a quantum loop algebra and their classical limits"
Speaker: Katsuyuki Naoi (Kavli IPMU)
Date: May 09, 2013
26. "The singularity theorems in general relativity. I"
Speaker: Amir Aazami (Kavli IPMU)
Date: May 10, 2013
27. "Quantum quench in matrix models: Dynamical phase transitions, equilibration and the Generalized Gibbs Ensemble"
Speaker: Takeshi Morita (KEK)
Date: May 10, 2013
28. "The SFR-M* relation from low to high redshift"
Speaker: Alvio Renzini (INAF)
Date: May 13, 2013

29. "Minimal SUSY SU (5) GUT in the high-scale SUSY scenario"
Speaker: Natsumi Nagata (Nagoya)
Date: May 15, 2013
30. "Structure and kinematics of starforming galaxies at $z \sim 2$ "
Speaker: Alvio Renzini (INAF)
Date: May 15, 2013
31. "Superstring theory and integrations over moduli space"
Speaker: Kantaro Omori (U Tokyo)
Date: May, 2013
32. "Galaxy Formation and Evolution through Metals"
Speaker: Lisa Kewley (ANU)
Date: May 16, 2013
33. "The singularity theorems in general relativity. II"
Speaker: Amir Aazami (Kavli IPMU)
Date: May 17, 2013
34. "Twisted spacetime reduction in large N QCD with adjoint Wilson fermions"
Speaker: Masanori Okawa (Hiroshima U)
Date: May 20, 2013
35. "Witten deformation and Morse category"
Speaker: Ziming Nikolas Ma (CUHK)
Date: May 20, 2013
36. "Color Confinement and Emergent Higgs"
Speaker: Ryuichiro Kitano (KEK)
Date: May 22, 2013
37. "The Hobby-Eberly Telescope Dark Energy Experiment"
Speaker: Gary Hill (McDonald Observatory)
Date: May 22, 2013
38. "Search for C-odd partner of X (3872) at Belle"
Speaker: Tomoko Iwashita (Nara Women's U)
Date: May 23, 2013
39. "Khovanov-Lauda-Rouquier algebras and the symmetric groups (survey)"
Speaker: Shunsuke Tsuchioka (Kavli IPMU)
Date: May 23, 2013
40. "The singularity theorems in general relativity. III"
Speaker: Amir Aazami (Kavli IPMU)
Date: May 24, 2013
41. "Precision Event Generation for LHC Physics"
Speaker: Stefan Hoeche (SLAC)
Date: May 29, 2013
42. "Construction of Explicit de Sitter vacua in Type IIB Flux compactifications"
Speaker: Markus Rummel (DESY)
Date: Jun 04, 2013
43. "Usage of Mathematica Beyond a Calculator"
Speaker: Yi Wang (Kavli IPMU)
Date: Jun 04, 2013
44. "Global mirror symmetry for invertible simple elliptic singularities"
Speaker: Yefeng Shen (Kavli IPMU)
Date: Jun 06, 2013
45. "The Gamma class and perturbative sigma models"
Speaker: David R. Morrison (UCSB)
Date: Jun 07, 2013
46. "First cosmological results from the Planck satellite"
Speaker: Francois R. Bouchet (IAP)
Date: Jun 07, 2013
47. "Displaceability of Lagrangian submanifolds and Hamiltonian Floer theory"
Speaker: Morimichi Kawasaki (U Tokyo)
Date: Jun 11, 2013
48. "M-strings"
Speaker: Cumrun Vafa (Harvard U)
Date: Jun 11, 2013
49. "Study of top-quark anomalous couplings through polarization"
Speaker: Saurabh Rindani (INSA)
Date: Jun 12, 2013
50. "Lattice QCD —achievements and perspectives —"
Speaker: Akira Ukawa (U Tsukuba)
Date: Jun 12, 2013
51. "Computing the fundamental group of a Complex hyperbolic orbifold"
Speaker: Thatagata Basak (Iowa State U)
Date: Jun 13, 2013
52. "Neutron Star Thermal Evolution and Properties of Ultra-High Density Matter"
Speaker: Sachiko Tsuruta (Montana State U)
Date: Jun 13, 2013
53. "New applications of de-Sitter geometry in astrophysics I"
Speaker: Marcus Werner (Kavli IPMU)
Date: Jun 13, 2013
54. "The next-generation infrared space mission SPICA"
Speaker: Takao Nakagawa (JAXA)
Date: Jun 13, 2013
55. "3d dualities from 4d dualities"
Speaker: Shlomo S. Razamat (IAS)
Date: Jun 14, 2013
56. "Green function approach to self-force calculations"
Speaker: Barry Wardell (U College Dublin)
Date: Jun 18, 2013
57. "New 3d CFTs with 8 supersymmetries from topological gauging"
Speaker: Bengt Nilsson (Chalmers U of Technology)
Date: Jun 18, 2013

Kavli IPMU Komaba Seminars

1. "Calabi-Yau threefolds of Type K"
Speaker: Atsushi Kanazawa (U British Columbia)
Date: Apr 24, 2013

Personnel Change

Kavli IPMU postdoctoral fellow Sourav Mandal has taken a position as staff scientist at the Institute for Defense Analyses, USA. He was at Kavli IPMU from July 1, 2010 to June 30, 2013.