

## Third Meeting of the IPMU External Advisory Committee

The third meeting of the IPMU External Advisory Committee was held on April 18, 2009, with eight of the nine committee members, Roberto Peccei (UCLA, chair), John Ellis (CERN), Steve Kahn (Stanford/SLAC), Norio Kaifu (The Open Univ. of Japan), Young-Kee Kim (Fermilab), Sadayoshi Kojima (Tokyo Inst. of Technology), David Morrison (UC Santa Barbara), Nicolai Reshetikhin (UC Berkeley & Amsterdam), in attendance. The committee will soon report to the President of the University of Tokyo with advice for improving and further developing IPMU.



## IPMU Annual Report 2008 Published

IPMU has published the *IPMU ANNUAL REPORT 2008*, highlighting its World Premier International Research Center Initiative project implementation and research activities during the 18-month period from IPMU's foundation in October 2007 to March 2009. The PDF version can be downloaded from the IPMU web site, <http://www.ipmu.jp/research-activities/annual-reports>.

## Shigeki Sugimoto Receives the Yukawa-Tomonaga Memorial Prize

On July 8, 2009, Kyoto University announced that the Yukawa-Tomonaga Memorial Prize had been awarded to Shigeki Sugimoto of IPMU and Tadakatsu Sakai of Nagoya University for their contribution to the development of the "holographic quantum chromodynamics model based on gauge superstring theory/gravity correspondence" analysis technique of strong interactions between hadrons (such as protons, neutrons, and mesons) using superstring theory.

Their work has attracted significant attention due to its pioneering approach and, as a result, their two papers have been cited almost 600 times. The award ceremony will take place on September 11, 2009.

## Conference Report –IPMU International Conference Dark Energy: "Lighting up the Darkness!"

This Conference was held for five days, June 22-26, 2009, in the Media Hall of the Kashiwa Library on the University of Tokyo Kashiwa campus. Details are reported on pp. 18-19.

## Special Public Lecture "The Dark Side of the Universe"

A special public lecture entitled "The Dark Side of the Universe" was held in the evening of June 24, 2009, in the Media Hall of the Kashiwa Library. The event was associated with the aforementioned International Conference. The speaker, Michael S. Turner, is a theoretical astrophysicist who is known as the godfather of dark energy. Although the lecture was given in English, it was attended by more than 160 people. An IPMU Principle Investigator, Naoshi Sugiyama, emceed

the lecture and summarized Michael's talk in Japanese at several stages throughout it. Because the lecture was given in this style, comments such as "it was easy to understand" and "it was quite a unique style that made it more enjoyable than the usual lectures" were found in the questionnaires that were collected afterwards.

Some pictures from the lecture are shown on pp. 15-17.

## "Tanabata" Star Festival Lecture "The Story of the Milky Way Galaxy"

It has been 400 years since Galileo Galilei made the first observation of the sky using a telescope, and this year has been designated the International Year of Astronomy. In an attempt to publicize this special year, the Astronomical Society of Japan took the initiative and held nationwide public lectures on astronomy on July 7, the day of the "Tanabata" Star Festival. IPMU took part, and a public lecture entitled "The Story of the Milky Way Galaxy" was held on July 7, 2009 at the planetarium in the Kashiwa City Library. After the Kashiwa Planetarium Association projected images of stars in the night sky as viewed from Kashiwa onto a screen so that people could locate the constellations, as well as the images from the Tanabata story, IPMU Associate Professor Naoki Yoshida lectured on the past, present and future of the Milky Way Galaxy. Although this was the first lecture of its type at the Kashiwa City



Library, the participants enjoyed the Star Festival and its cozy atmosphere, and many expressed the wish that this type of event would be repeated.

#### **Program to Encourage Female Students to Study Science: "Look into the Future!"**

Three graduate schools and four institutions of the University of Tokyo, including IPMU, have been undertaking a Japan Science and Technology Agency (JST) supported project, which is an initiative to encourage female students to choose a career path in scientific fields. As the first among other forthcoming events, a visit to KEK at Tsukuba was organized for August 12 under the title of "Look into the Future! Celebrating the Nobel Prize! Let's Visit an Antimatter Laboratory and Have Tea with some Female Researchers." Around 20 female junior high school and high school students participated, some with their parents. They visited the KEKB Accelerator and the BELLE Experimental Hall, where the theory of Nobel laureates Makoto Kobayashi and Toshihide Maskawa was tested and confirmed. They then had a friendly discussion with some female researchers, including IPMU's Jiayu Tang and Susanne Reffert and KEK's Professor Haruyo Koiso. Various questions such as "Can you keep a good balance between work and home life?" and "Have you had any problems because there are not many female researchers in your workplace?" were asked by the students, who were concerned about their future



path for studying science. The female researchers answered their questions comprehensively. The participants enjoyed the friendly conversations with the researchers throughout the talk.

#### **The 3rd Science Show Performed by Students of Today, "Soramiru (Looking into the Universe)"**

On July 13, 2009, the 3rd Science Show by University of Tokyo (Today) students called "Soramiru (Looking into the Universe)" was jointly performed by Komaba Educational Development and IPMU in the Graduate School of Mathematical Science Hall on the Komaba Campus. Students of the College of Arts and Sciences at the University of Tokyo and the Science Communication Circle had developed a dramatic version of Fundamental Cosmology and Particle Physics for the public. Late in the show, Director of IPMU Hitoshi Murayama took part in the play and explained dark matter. Around 100 participants enjoyed the elaborate staging.



#### **Future Conference –Focus Week: Statistical Frontiers of Astrophysics**

The IPMU focus week "Statistical Frontiers of Astrophysics" will be held for five days from September 28 to October 2 in the Media Hall of the Kashiwa Library.

At the frontier of astrophysics, where major surveys are being carried out and/or planned, it is increasingly imperative to use statistical methods to extract

scientific constraints from the massive data sets. For example, it was only recently (around seven years ago) that the Markov Chain Monte Carlo method, a well-known method in the statistical field, was introduced to the cosmology community. Nowadays, the MCMC method is a very powerful tool for constraining parameters such as the age of the Universe, dark energy, and dark matter from cosmological data sets. There may be other methods that are also useful for addressing astronomical problems. This workshop will gather together the leading researchers working in the usually unconnected fields of statistics and astrophysics. The purpose is for them to get to know each other, learn about/discuss the methods of their own approaches, and explore the possibility of working together in the cross-disciplinary fields.

#### **Future Conference –Focus Week: QCD in Connection with BSM Study at LHC**

The focus week "QCD in Connection with BSM (Beyond the Standard Model) Study at LHC" will be held between November 9 and 13, 2009 in the Media Hall at the Kashiwa Library, co-sponsored by IPMU and the KEK Theory Center. It is already the fourth focus week on LHC. This time, we want to focus on the connection with new physics studies at LHC.

In recent years, there has been increasing interest in the QCD processes at LHC. This is because strong interaction, multi-particle emissions from signals and background processes make it difficult to measure the fundamental parameters of physics beyond the standard model without accurate understanding of these QCD processes. Top experts in this field will participate. We will arrange seminars and discussions in addition to lectures for graduate students and postdocs on

the above issues. We will also organize a one-day workshop so that those participants who wish to give a talk can be accommodated.

### Future Conference – Focus Week: The Epoch of Reionization

IPMU will host a Focus Week on the Epoch of Reionization from November 30 to December 2 in the Media Hall, Kashiwa Library. We are inviting researchers working on high redshift galaxies using the Subaru telescope and those working on 21cm observations using LOFAR to attend. The combined data from these observations will enable us to study in detail how the cosmic Dark Ages ended at the epoch of reionization. We are also inviting theorists and observers to discuss possible synergies between galaxy surveys and 21cm observations.

### IPMU Seminars

IPMU hosts regular seminars on every Wednesday at 3:30 and invite speakers from around the world. Information is posted on IPMU website ([http://db.ipmu.jp/seminar/?mode=seminar\\_recent](http://db.ipmu.jp/seminar/?mode=seminar_recent)). You will find detailed information and request form (when needed) there. One of the purposes for these regular seminars is to encourage researchers from different fields to understand each other's specialties.

Separate seminars are also held for each research fields. At present, seminars for particle physics and astrophysics are held on every Thursday at 1:30pm, mathematics and mathematical physics on every Tuesday at 1:15pm. All seminars use English.

Mathematics seminars are also held at the University of Tokyo Komaba Campus.

1. "Quantum Curves and D-Modules"  
Speaker: Lotte Hollands (University of Amsterdam)  
Date: May 28, 2009
2. "The ANTARES Deep-Sea Neutrino Telescope"  
Speaker: Paschal Coyle (Centre de Physique des Particules de Marseille)  
Date: June 01, 2009
3. "21 cm cosmology"  
Speaker: Ue-LiPen (CITA)  
Date: June 02, 2009
4. "Apery and Gamma"  
Speaker: Sergey Galkin (IPMU)  
Date: June 4, 2009
5. "Rare Opportunities: Seeking New Physics with Rare Decays of Light Particles"  
Speaker: Douglas Bryman (University of British Columbia)  
Date: June 04, 2009
6. "Generic elements of the mapping class group"  
Speaker: Joseph Maher (visiting Tokyo Institute of Technology)  
Date: June 04, 2009
7. "Cosmological Simulations of Early Structure Formation"  
Speaker: Darren Reed (LANL)  
Date: June 05, 2009
8. "Multiplication in differential cohomology and cohomology operation"  
Speaker: Kiyonori Gomi (Kyoto University)  
Date: June 08, 2009
9. "Massive Stars: Key Players in the Early Universe"  
Speaker: Raphael Hirschi  
Date: June 10, 2009
10. "Axions in Particle Physics and Cosmology"  
Speaker: Georg Raffelt (Max-Planck-Institut für Physik)  
Date: June 10, 2009
11. "Viable inflationary models ending with a first-order phase transition"  
Speaker: Marina Cortes  
Date: June 11, 2009
12. "On three-dimensional chiral gravity"  
Speaker: Gaston Giribet (University of Buenos Aires and CONICET)  
Date: June 11, 2009
13. "Aspects of Horava-Lifshitz cosmology"  
Speaker: Shinji Mukohyama (IPMU)  
Date: June 12, 2009
14. "Holographic Lifshitz-like Fixed Point in String Theory"  
Speaker: Tadashi Takayanagi (IPMU)  
Date: June 12, 2009
15. "Horava-Lifshitz Holography"  
Speaker: Tatzuma Nishioka  
Date: June 12, 2009
16. "Primordial non-Gaussianity and constraints from WMAP"  
Speaker: Kendrick Smith (University of Cambridge)  
Date: June 16, 2009
17. "Lecture on B-mode polarization and Primordial non-Gaussianity: Two big things to expect from the Planck data"  
Speaker: Eiichiro Komatsu (University of Texas)  
Date: June 17, 2009
18. "Novel reconstruction technique for New Physics processes with initial state radiation"  
Speaker: Mihoko M. Nojiri (IPMU/KEK)  
Date: June 18, 2009
19. "K3 surfaces with involution, equivariant analytic torsion and automorphic forms"  
Speaker: Ken-Ichi Yoshizawa (University of Tokyo)  
Date: June 19, 2009
20. "Two Topics in Cluster Cosmology: Studying Dark Energy and Sigma8"  
Speaker: Subhabrata Majumdar (Tata Institute)  
Date: June 29, 2009
21. "Some thoughts on the large-scale CMB anomalies"  
Speaker: Kin-Wang Ng (Institute of Physics, Academia Sinica)

- Date: June 30, 2009
22. "Cosmological and astrophysical probes of dark matter annihilation"  
Speaker: Kazunori Nakayama (ICRR)  
Date: July 02, 2009
  23. "Collider phenomenology of split-UED"  
Speaker: Michihisa Takeuchi (ICRR)  
Date: July 09, 2009
  24. "Cosmic-Ray Positrons and Supernova/Pulsar/GRB Remnants"  
Speaker: Kunihito Ioka (KEK)  
Date: July 15, 2009
  25. "Dark Matter and PAMELA/Fermi Anomalies"  
Speaker: Tsutomu Yanagida (IPMU)  
Date: July 15, 2009
  26. "Escape fraction of ionizing photons in high-z galaxies"  
Speaker: Kentaro Nagamine (University of Nevada)  
Date: July 16, 2009
  27. "Extremal (super-) conformal field theories"  
Speaker: Matthias Gaberdiel (ETH)  
Date: July 16, 2009
  28. "Defects and symmetries"  
Speaker: Ingo Runkel (King's College London)  
Date: July 21, 2009
  29. "Modeling GRB Host Galaxies"  
Speaker: Yuu Niino (Kyoto University)  
Date: July 23, 2009
  30. "Entanglement in quantum chains"  
Speaker: Bernard Nienhuis (Amsterdam University)  
Date: July 23, 2009
  31. "Deep Surveys of  $z=7$  Ly-alpha Emitting Galaxies with Subaru Telescope: Implications for Galaxy Evolution and Reionization"  
Speaker: Kazuaki Ota (RIKEN)  
Date: Augst 05, 2009
  32. "Theoretical Constraints on the Higgs Effective Couplings"  
Speaker: Ian Low (ANL/Northwestern University)  
Date: August 05, 2009
  33. "Recent studies on supernova nucleosynthesis with X-ray observations of supernova remnants"  
Speaker: Hiroya Yamaguchi (RIKEN)  
Date: August 06, 2009
  34. "Spiky strings and spin chains"  
Speaker: Nick Dorey (DAMTP)  
Date: August 06, 2009
  35. "Last bets for Higgs and Supersymmetry before the LHC starts"  
Speaker: John Ellis (CERN)  
Date: August 11, 2009
  36. "Kazhdan-Lusztig Theory"  
Speaker: Nanhua Xi (Chinese Academy of Science)  
Date: August 12, 2009
  37. "Categorical approach for Weyl modules, after Chari-Fourie-Khandai"  
Speaker: Katsuyuki Naoi (University of Tokyo)  
Date: August 13, 2009
  38. "Lagrangian intersection Floer theory – the foundation and some calculations"  
Speaker: Hiroshi Ohta (Nagoya Unieiversity)  
Date: August 19, 2009
  39. "Fermilab Plan with an Intensity Frontier Accelerator"  
Speaker: Young-Kee Kim (Fermilab)  
Date: August 19, 2009
  40. "Twin Higgs and Lepton Number Violation at the LHC"  
Speaker: Goh Hock-seng (Berkeley)  
Date: August 20, 2009
  41. "Form Factor Dark Matter"  
Speaker: Brian Feldstein (Boston University)  
Date: August 20, 2009
  42. "Non-geometric heterotic compactifications"  
Speaker: David Morrison (UCSB)  
Date: August 25, 2009
  43. "Testing AGN feedback models and simulating environmental effects on AGN activities"  
Speaker: Min-Su Shin (Princeton University)  
Date: August 25, 2009
  44. "Exactly solvable models of tilings and Littlewood–Richardson coefficients"  
Speaker: Paul Zinn-Justin (Paris 6)  
Date: August 28, 2009
  45. "Global Torelli theorem for hyperkähler manifolds"  
Speaker: Misha Verbitsky (IPMU)  
Date: August 31, 2009

#### IPMU Komaba Seminar

1. "Mapping class group for hyperkähler manifolds"  
Speaker: Misha Verbitsky (ITEP Moscow/IPMU)  
Date: July 27, 2009

#### Personnel Change

##### New Principal Investigator

From July 13, 2009, Professor Alexey Bondal of the University of Aberdeen also holds the position of Principal Investigator of IPMU. To date, he has been a Senior Visiting Researcher at IPMU. He will lead research at IPMU in the area of Mathematics.

#### Next Issue of IPMU NEWS to Be Published in January, 2010

Usually, IPMU News No. 8 would be published in December 2009. However, the IPMU Building that is currently under construction is expected to be completed towards the end of this year. Accordingly, IPMU News No. 8 will be published in January, 2010 as a special issue celebrating the completion of the IPMU Building.