3 Message from the President

4 Message from the Director

5 Overview of the Tohoku Forum for Creativity
   Mission
   Organization
   International Advisory Board
   Support for the Tohoku Forum for Creativity
   A Message from our Sponsor

8 Activity Report 2015
   Thematic Programs
   · Fundamental Problems in Quantum Physics: Strings, Black Holes and Quantum Information
   · Frontiers of Brain Science
   · Spintronics: from Mathematics to Devices
   · The Effects of Technological Changes on Social Mobility and Income Distribution

   Other Activities
   · Falling Walls Lab Sendai 2015
   · Quattro Seminars

   Support for Young Researchers
   · Leading Young Researcher Overseas Visit Program

30 Information 2015
   Thematic Programs
   · Invited Researchers List
   · Fundamental Problems in Quantum Physics: Strings, Black Holes and Quantum Information
   · Frontiers of Brain Science
   · Spintronics: from Mathematics to Devices
   · The Effects of Technological Changes on Social Mobility and Income Distribution

   Other Activities

   Leading Young Researcher Overseas Visit Program

50 Access and Contact
Message from the President

In issuing the Annual Report

For more than a century, Tohoku University’s tradition of "Research First", philosophy of "Open Doors", and ethos of "Practice-Oriented Research and Education" have produced excellent graduates, generated numerous research achievements, and contributed to the development of a peaceful and just society.

In August of 2013, I compiled the Satomi Vision which reaffirms the modern significance of the fundamental ideals and mission that Tohoku University has retained though its history. This document outlines the direction that our university will take over the next five years, and the policies and schedule that will lead us there.

This vision aims to develop Tohoku University as a fellowship of knowledge, open to the world, where people can gather, learn, and create. In doing so, this will allow us to achieve our two goals of achieving World-Class Status and Leaping Ahead, and Leading the Post-earthquake Restoration and Regeneration. In order to realize one part of the Satomi Vision, we have established Thematic Programs organized by the Tohoku Forum for Creativity (TFC). These programs will act as an international brain circulation initiative which will allow us to strengthen our research interests, and are being carried out with support from the program for promoting the enhancement of research universities from the Ministry of Education, Culture, Sports, Science and Technology (MEXT).

The TFC hold’s Thematic Program’s, which are research programs in which world leading scientists, including Nobel Laureates, are invited to Tohoku University for a specified period of time in order to engage in joint research with junior researchers, and to participate in daily debates with students. The aim of these programs is to contribute to the solution of the important problems which humanity faces through the creation of new interdisciplinary research fields. Therefore, the TFC’s activities are positioned at the core of the university’s strategic international brain circulation initiative.

To promote the Thematic Programs, in October 2013 we established the TFC, which is the first International Visitor Research Institute in Japan, while in February 2015 we completed the construction of the TOKYO ELECTRON House of Creativity. The TFC hosted four outstanding Thematic Programs, and about 1,900 researchers from home and abroad attended those programs, in 2015. As such, the TFC hold’s an extremely important position within the research activities of Tohoku University, and we have great expectations for what we can achieve in the near future.

This Annual Report has been created to provide all stakeholders in the program with an overview of the activities of the TFC. Accordingly, we ask for your continued understanding and cooperation with the Tohoku Forum for Creativity in the future.

Tohoku University President
Susumu Satomi
Message from the Director

For promoting the Thematic Programs

The Tohoku Forum for Creativity’s Thematic Programs play a central role in the framework for international brain circulation outlined in the Satomi Vision.

The research focuses of these Thematic Programs were selected based on global trends and the current challenges facing humanity. At each thematic program, world leading researchers, including Nobel Laureates, are invited to the TOKYO ELECTRON House of Creativity for a period of between one and three months to carry out groundbreaking research. As such, the Tohoku Forum for Creativity is Japan’s first International Visitor Research Institute. The TFC’s activities also aim to develop the next generation of global research leaders by creating a wide array of opportunities for talented junior researchers to interact and discuss their ideas with eminent scholars.

In 2015, the TFC hosted four Thematic Programs, entitled: “Fundamental Problems in Quantum Physics: Strings, Black Holes and Quantum Information,” a program covering a wide range of subjects in quantum physics; “Frontiers of Brain Science,” a program in which the participants discussed the future directions of neuroscience research; “Spintronics: from Mathematics to Devices”, a program for fusion research between spintronics, material science and mathematics; and; “The Effects of Technological Changes on Social Mobility and Income Distribution,” a program connecting the issues of income disparity and social inequality.

The TFC also carries out outreach activities with the aim of promoting recent advances in science to the general public. These include hosting, in collaboration with the Falling Walls Foundation of Germany, the Falling Walls Lab Sendai 2015. In addition, we also hosted a public lecture by the Nobel Laureate Susumu Tonegawa, in cooperation with the Yomiuri Shimbun Newspaper, as a part of the “Frontiers of Brain Science” program. The TFC also organizes the Quattro Seminar program, which allows junior researchers to find the seeds for new research by providing a platform for interdisciplinary research discussions across the humanities and social sciences.

I would like to take this opportunity to express my gratitude, not only for the great efforts of those involved in the promotion of these programs, but also for the immeasurable support and cooperation that we have been given since the very beginning of this project by Tokyo Electron Ltd.

In the future, Tohoku University aims to contribute even more to facilitate international research and education. The TFC is expected to play a central role in this endeavor, and we will continue to work towards achieving that goal while receiving the opinions and advice from all of our stakeholders. Accordingly, I ask for your continued cooperation and support.

Tohoku Forum for Creativity Director
Tohoku University Executive Vice President (for Research)
Sadayoshi Ito
Overview of the Tohoku Forum for Creativity

Mission

The Tohoku Forum for Creativity (TFC) is an international visitor research institute which was established in 2013 at Tohoku University to facilitate collaborative research. In order to identify important problems across all of the sciences and humanities, the TFC brings together both junior and senior researchers in a stimulating environment that promotes creative approaches to new and interdisciplinary research areas.

The TFC especially encourages junior researchers, such as graduate students and postdoctoral fellows, to participate in the thematic programs. Through discussions and close contact with distinguished researchers, including Fields Medalists and Nobel Laureates, junior researchers will be stimulated to develop their own original ideas and to eventually become pioneers in new research areas.

A Fellowship of Knowledge which Contributes to the Solution of the Major Issues Faced by Humanity

The TFC calls for thematic programs from throughout the world covering all academic domains, from the humanities and social sciences to the natural sciences. The TFC then selects themes for concentrated discussions over a three-month period, for which leading international researchers are invited to Tohoku University to develop new areas of research and to contribute to the solution of the major problems facing humanity, through joint research and the hosting of international symposiums. Furthermore, the TFC provides an ideal location for the promotion of interdisciplinary cooperation across a diverse range of research areas in order to tackle the increasingly advanced and complex issues facing society.

Educating Global Leaders to Build the Future of Humanity

The TFC will establish itself as a center for the cultivation of international research leaders, by promoting the participation of junior researchers from throughout the world in our thematic programs. In this way, the TFC will foster an environment in which young researchers can interact closely with world class researchers.

Contributing to Society by Sharing Academic Advances

The TFC provides opportunities for intellectual exchange between participating researchers and the general public, including the children who will lead society in the future, through the planning and hosting of public events. This initiative aims to promote the sharing of knowledge, further internationalization, and the development of a prosperous society, by providing opportunities for the public to interact directly with world-leading researchers.

Organization

Tohoku Forum for Creativity

Director

Vice Director

Program Coordinators

Administrative Office

Administrative Office Manager

Administrative Office Staff

Tohoku Forum for Creativity

Thematic Program

Organizers

Invited Researchers

Junior Researchers

International Advisory Board
International Advisory Board

The International Advisory Board was established as an organization to evaluated the proposed thematic programs gathered from throughout the world, and to provide advice on the activities of the TFC.

Reiko Aoki  Executive Vice President, Professor  Kyushu University
Jean-Pierre Bourguignon  Former Director and Honorary Professor at IHES  Institut des Hautes Etudes Scientifiques
Arjen Doelman  Director of the Lorentz Center  Lorentz Center, International Center for workshops in the Sciences
Makoto Kobayashi  Nobel Laureate in Physics 2008  Director of Research Center for Science Systems  Research Center for Science Systems, Japan Society for the Promotion of Science
Kiyoshi Kurokawa  Adjunct Professor  National Graduate Institute for Policy Studies
Oliver Smithies  Nobel Laureate in Physiology or Medicine 2007  Weatherspoon Eminent Distinguished Professor  Department of Pathology and Laboratory Medicine, University of North Carolina at Chapel Hill

Observer of the Tohoku Forum for Creativity

Yuko Harayama  Executive Member of the Council for Science, Technology and Innovation  Council for Science, Technology and Innovation

Support for the Tohoku Forum for Creativity

This project hosts approximately three thematic programs per year, with support from the program for promoting the enhancement of research universities from the Ministry of Education, Culture, Sports, Science and Technology (MEXT). In order for this program to continue to aggressively tackle the challenges faced by society, we must create opportunities to communicate with society and our supporters in the private sector in order to gain their assistance in promoting our activities.

The TFC will continue to publish information widely throughout the world, and work to gain the understanding and support of numerous individuals and organizations.

Support was provided by the following corporations in FY2015

FY2015

- Comprehensive support for the TFC
- Tokyo Electron Limited
A Message from our Sponsor

The continuation of a successful beginning

Since our foundation in 1963, Tokyo Electron Limited has been providing semiconductor production equipment and flat panel display production equipment, and growing together with the times as a leading company in the leading-edge tech industry.

Based upon our corporate philosophy: “We strive to contribute to the development of a dream-inspiring society through our leading-edge technologies and reliable service and support,” we promote various initiatives in support of education for generations of the future.

Tohoku University and our company have been exchanging people and technology by industry-university collaboration in the semiconductor sector. Through this cooperative activity, we became aware of the Satomi Vision, which establishes the future framework for Tohoku University to build a community of wisdom where people gather together, learn, and create, with an open doors to the world, and to achieve the two goals of leaping ahead to become a world class university while taking the lead in recovery and building a new life, and these initiatives have our full support. Further, we feel that the Tohoku Forum for Creativity (TFC), as the first significant international visitor research institute for a Japanese university, is a meaningful endeavor with a long term view to the future. With a desire to contribute to the realization of the initiative, we have supported not only the program itself, beginning with the pilot program of the TFC in 2013, but also the construction of the TOKYO ELECTRON House of Creativity to serve as the center for the program.

Hearing that the students and participating researchers, including the Nobel Laureate Gerard’t Hooft, have already begun their studies at the TOKYO ELECTRON House of Creativity since the official opening in April 2015, it fills me with great pleasure to imagine the motivated and energetic researchers, who hope to change the future of society, gather and debate.

I really hope that the TFC program will serve as a symbol for recovery and a new life for the Tohoku region, and as a leading example as an open world forum with great momentum. Further, relating to educating the next generation promoted by our company, my great expectation is that participants of the Tohoku Forum for Creativity will be some of the front running leaders of the world in the next 20 or 30 years.

I would like to express my hope for the continued development and prosperity for the Tohoku Forum for Creativity at Tohoku University.

Tokyo Electron Limited
Corporate Director
Corporate Advisor
Terry Higashi

TOKYO ELECTRON House of Creativity

Construction was completed on the TOKYO ELECTRON House of Creativity in March 2015 at the Tohoku University Katahira Campus, to serve as the center for the TFC. The TFC aims to use this center as the principle location for the realization of “building a community of wisdom where people gather together, learn, and create, with an open doors to the world.”

*Tokyo Electron Limited provided immeasurable support for the construction of this facility.
Thematic Programs

9  Fundamental Problems in Quantum Physics: Strings, Black Holes and Quantum Information
13  Frontiers of Brain Science
17  Spintronics: from Mathematics to Devices
21  The Effects of Technological Changes on Social Mobility and Income Distribution

Other Activities

25  Falling Walls Lab Sendai 2015
26  Quattro Seminars

Support for Young Researchers

27  Leading Young Researcher Overseas Visit Program
Fundamental Problems in Quantum Physics: Strings, Black Holes and Quantum Information

The discovery of the Higgs particle was a cornerstone in the development of the theory of elementary particle physics and has opened the door to a new era. It is now time to discuss new frontiers of the fundamental problems in quantum physics. With this in mind, we initiated a program focusing on the theories of strings, black holes and quantum information as well as their interrelation, and future prospects. We also discussed the issues of particle physics and cosmology in light of the discovery of the Higgs particle. A feature of this program was to create an opportunity for the exchange of new ideas, not limited merely to the fields of particle physics and applied mathematics, which are the center of this research area, but also included researchers from the fields of information science, engineering and pure mathematics.
Important Goals and Degree of Achievement

The aim of our project was the promotion of international exchange, and the building of an international network of institutions abroad to cooperate with Japanese institutions, in addition to the education of young researchers.

As the first event in the program, we organized a spring school to prepare the graduate students and young researchers who wanted to join our academic events. There were several attendants from other universities in Japan, and thus the aim of the project, that is, the preparation for research in our field and the promotion of young researchers to join our field, was achieved.

The two international workshops held in September, which were the main events of this program, were also very successful. During the workshop, we arranged special lectures by the Nobel Laureate Professor François Englert (Free University of Brussels) and the Nobel Laureate Professor Makoto Kobayashi (High Energy Accelerator Research Organization). This stimulated the discussions among the participants coming from various institutions, and made the workshops very fruitful.

Program Organizers

Tohru Eguchi (Professor, Graduate School of Science, Rikkyo University)

Prof. Eguchi completed his doctorate course at the School of Science, University of Tokyo. He took his current position after working as a postdoctoral fellow at Stanford University, and the University of Chicago, and as a professor at the University of Tokyo. Subsequently he served as the director of the Yukawa Institute for Theoretical Physics, Kyoto University. Dr. Eguchi was awarded the Imperial Prize of the Japan Academy in 2009.

Tadashi Takayanagi (Professor, Yukawa Institute for Theoretical Physics (YITP), Kyoto University)

Prof. Takayanagi completed his doctorate course at the Department of Physics, University of Tokyo. He took his current position after working as a postdoctoral fellow at the Jefferson Physical Laboratory and Harvard University, at the Department of Physics, Kyoto University, as an assistant professor, and at the Institute for the Physics and Mathematics of the Universe (IPMU), University of Tokyo, as an associate professor. Dr. Takayanagi was awarded the New Horizons in Physics Prize in 2014.

Masahiro Yamaguchi (Professor, Graduate School of Science, Tohoku University)

Prof. Yamaguchi completed his doctorate course at the Department of Physics, University of Tokyo. He took his current position after working at the Graduate School of Science, Tohoku University, as an assistant professor and an associate professor. He has also served as a Special Advisor to the President (for International Educational Exchange).

Satoshi Watamura (Associate Professor, Graduate School of Science, Tohoku University)

Dr. Watamura completed his doctorate course at the Department of Physics, University of Tokyo. He took his current position after serving at the European Organization for Nuclear Research (CERN) as a postdoctoral fellow, and the Graduate School of Science, Tohoku University, as an assistant professor and an associate professor. His primary publications include "Analytical mechanics and theory of relativity" published by Asakura Publishing Co., Ltd.
Program Highlights

The highlight of the program was a series of special lectures delivered by the Nobel Laureate Professor Gerard ’t Hooft (Utrecht University) in April, and by the Nobel Laureates Professor François Englert and Professor Makoto Kobayashi, in September. These three professors are very famous physicists, and their special lectures were the main events in this program.

Professor Gerard ’t Hooft gave three lectures during the period of the spring school. One of the lectures was a public lecture. The other two lectures were mainly for graduate students and young researchers, and thus they were very informative and useful for the aspiring academics. In addition, Professor Gerard ’t Hooft’s attendance at the spring school discussion time made those sessions very interactive.

The special lectures by Professor François Englert and Professor Makoto Kobayashi were given during the workshop in September. This event was also open to the public, thus the hall with a capacity of 120 seats became full. Professor François Englert, who was awarded the Nobel Prize for the prediction of the existence of the Higgs particle, gave a lecture about the relationship between the Higgs particle and the mass of the elementary particles. Professor Makoto Kobayashi, who was awarded the Nobel Prize for the discovery of a new mechanism of CP violation under the existence of the Higgs particle, gave a lecture on CP violation and flavor mixing. The audience included researchers from foreign institutions, and also many researchers and students working in other research fields, which, coupled with the fact that the event was open to the public, led to exciting discussions.

Specific Strategies for International Research Exchange

We could successfully invite three Nobel laureate physicists to actively participate in our program. Each professor stayed for approximately one month at Tohoku University, during which we could exchange ideas and had very fruitful discussions. Thus, we can conclude that our aim was achieved. Furthermore, we also invited another researcher for a month with whom we also had very useful discussions. At every workshop there were active discussions and a vivid exchange of ideas from a wide range of research fields.
Principle Invited Researchers

Gerard ’t Hooft
(Utrecht University, Netherlands)
Distinguished Professor at the Institute for Theoretical Physics, Utrecht University.

François Englert
(Free University of Brussels, Belgium)
Professor at the Free University of Brussels and a Special Invited Professor at Chapman University’s Institute for Quantum Studies. A specialist in theoretical physics. Recipient of the Nobel Prize in Physics in 2013.

Makoto Kobayashi
(High Energy Accelerator Research Organization, Japan)
Professor Emeritus at the High Energy Accelerator Research Organization (KEK).

Viacheslav Mukhanov
(Ludwig Maximilian University of Munich, Germany)
Professor at the Arnold Sommerfeld Center for Theoretical Physics at the Ludwig Maximilian University of Munich. A specialist in cosmology and theoretical physics. Recipient of the Gruber Prize in Cosmology in 2013.

Robert Mann
(University of Waterloo, Canada)
Professor at the University of Waterloo, and affiliate at the Perimeter Institute for Theoretical Physics. A specialist in black holes and quantum information. An author of “Black holes: thermodynamics, information, and firewalls” published by Springer.

Robert Myers
(Perimeter Institute for Theoretical Physics, Canada)
Director of the Perimeter Institute for Theoretical Physics, and lecturer at the University of Waterloo. A specialist in string theory. Recipient of the 2012 Yogi Medal from the Canadian Association of Physicists.

International Training for Young Personnel

In this program, we organized a spring school so that graduate students and young researchers could attend lectures by famous researchers while at the early stage of their research careers. We also gave young researchers the opportunity to discuss their ideas with specialists. As we saw from the successful discussion time at the spring school, we conclude that this aim was achieved successfully.

Strategies Following the Completion of the Program

The fields of string theory and black holes together with quantum information is a very new research area which is developing rapidly. Therefore, the researchers in this field have to continuously present their new results to each other and exchange new ideas by gathering together. Our next target is to create additional opportunities for discussions about these cutting edge topics by organizing additional workshops and conferences. We will publish the lecture notes and survey articles based on our program, in order to give substantial materials to the researchers and to construct the organization for the next workshops. Consistent with this idea, we have already held a follow-up workshop, and we are now organizing the next activities to further develop this research field.
Frontiers of Brain Science

How can the brain, just an organ, create the mind and thoughts? That is the ultimate question in neuroscience. Cutting-edge techniques and sophisticated technologies enable researchers to draw a comprehensive map of the brain, and manipulate cellular activities and gene expression. By using these advanced technologies, the frontiers of brain science have almost reached a point at which we can unravel how the mind comes to be.

From July to November in 2015, a series of international symposia were held on four different research themes: “Tools and Technologies”, “Development and Disease”, “Memory and Mind” and the “Joy of Brain Science”. At these events world-class researchers gathered and discussed the frontiers of brain science. In total, more than 40 researchers, including two Nobel Prize winners in Physiology or Medicine, Prof. Susumu Tonegawa and Prof. Edvard Moser, were invited to participate in the program.

In the “Tools & Technologies” symposium, we invited manufacturers and/or agents of experimental equipment to show the performance of their latest devices, which enabled the researchers to try the new products and evaluate their capacities by testing their own samples. In addition to this unique activity, we also held seminars on research ethics and scientific writing.
**Important Goals and Degree of Achievement**

The program aimed at providing opportunities to facilitate communication between world-class researchers and the young researchers and students of Tohoku University, in order to enhance the University’s neuroscience research capability. We invited Dr. Susumu Tonegawa, the 1987 Nobel Laureate for Physiology or Medicine, Dr. Valentín Nágerl, who worked with Dr. Stefan W. Hell (Nobel Laureate for Chemistry in 2014) at Bordeaux University, and Dr. Edvard Moser, Professor at the Norwegian University of Science and Technology, who won Nobel Prize in Physiology or Medicine in 2014 for his discovery of grid cells in a part of the brain. The cutting-edge techniques and technologies such as gene editing, connectomics and optogenetics are expected to contribute to produce high-impact results in neuroscience in the near future. In addition to the big name invitees, we also endeavored to find young and mid-career researchers who are actively engaged in studies, and invited them to the symposia. This was one of the unique aspects of this program. Through practical workshops and an excursion to the suburbs of Sendai, the participants had valuable opportunities to communicate and exchange opinions with world-class researchers. Furthermore, we held a public talk by Dr. Tonegawa, which provided an opportunity for local people and high school and university students in the Tohoku area to meet and communicate with a Nobel Laureate. Through such a rare and precious opportunity, the local community was able to gain a better understanding of advanced science.

---

**Program Organizers**

**Toshio Iijima**  (Professor, Graduate School of Life Sciences, Tohoku University)
Graduated from Tohoku University Graduate School of Science, became a Professor at the Tohoku University Graduate School of Life Science after working as an Assistant Professor at the University of California, Los Angeles School of Medicine, the Research Head at the National Institute of Advanced Industrial Science and Technology, and as a Professor at the University of Tohoku Graduate School of Medicine. He has served as Dean of the Tohoku University Graduate School of Life Sciences, and an Executive Vice-President of Tohoku University.

**Noriko Osumi**  (Professor, Graduate School of Medicine, Tohoku University)
Graduated from Tokyo Medical & Dental University, and became a Professor at the Tohoku University Graduate School of Medicine, after working as an Associate Professor at the National Institute of Neuroscience, National Center of Neurology & Psychiatry. Served as Special Advisor for Gender Equality at Tohoku University, and chosen as a Distinguished Professor. Now working as Executive Director at the United Centers for Advanced Research and Translational Medicine (ART).
Program Highlights

In "Tools and Technologies", we discussed the techniques and technologies at the forefront of neuroscience research. The most noteworthy technologies include:
1) Genetic Engineering, with which the genetic makeup of cells is modified,
2) Optogenetics, a biological technique which involves the use of light to control activities of living neurons and glial cells,
3) Super-resolution microscopy, allowing images to be taken with a higher resolution beyond the diffraction limit,
4) Connectomics, drawing a comprehensive map of complicated neural connections using electron microscopy.

We invited 19 outstanding researchers who are engaged in delivering remarkable outcomes using these cutting-edge techniques and technologies. We aimed to discuss how "the mind" is formed in "the brain".

In "Development and Disease", researchers working on brain development and evolution, as well as on neurodevelopmental diseases, gathered for deep and interdisciplinary discussions about the molecular and cellular mechanisms of brain development. We also featured research on autism spectrum disorders covering basic science to clinical applications.

In "Memory and Mind", we discussed the fundamental question of "how does memory affect consciousness?" Excellent researchers were invited from various fields, including neuroscience, cognitive science, psychophysics and comparative psychology, for deep discussion. During these discussions, the difference between memory science and consciousness science turned out to be obvious. It was recognized that proactive communication among researchers in these two fields is necessary to reach an integrated understanding of memory and consciousness.

Specific Strategies for International Research Exchange

In these symposia, more than half of the researchers came from overseas. Most of them were from the U.S. and Europe, but researchers from Korea and India also participated in our events. All lectures and discussions were conducted in English (except for the public talk). International students and postdoctoral researchers who came from overseas and study/work at Tohoku University attended the workshops and lectures. We are confident that we have successfully achieved the objectives to make this program a bridge connecting young researchers all over Japan with established researchers.

At each symposium, a frontier of study in brain science was presented and discussed. In particular, the presentation by Dr. Susumu Tonegawa, the Nobel Prize winner, was stimulating and gave a strong motivation to young researchers, which hopefully will provide a key to reveal new paths to them in the near future.

Researchers at Tohoku University exchanged opinions with the invited researchers on future collaborations throughout the program. We reached agreements with some Universities and Institutes on researcher exchange programs. One researcher who worked in the Osumi Laboratory was assigned to join the laboratory of Dr. Wieland Huttner at the Max Planck Institute in Dresden. Producing such seeds for future collaborative study was one of objectives of the program, and therefore from this point of view, we can say that one of our goals was achieved.
Principle Invited Researchers

Valentin Nägerl  
(University of Bordeaux, France)  
Working on superresolution imaging, and an editor of “Neurophotonics” and the “Biophysical Journal”.

Jeff Lichtman  
(Harvard University, USA)  
He studies synaptic competition by visualizing synaptic rearrangements directly in living animals using modern optical imaging techniques such as connectomics.

Michael Häusser  
(University College London, UK)  
He develops biological techniques to control cells in living tissue, typically neurons, by the use of light.

Edvard Moser  
(Norwegian University of Science and Technology, Norway)  
Director of the Kavli Institute for Systems Neuroscience/Center for Neural Computation. Winner of the Nobel Prize in Physiology or Medicine in 2014 for the discovery of cells that constitute a positioning system in the brain.

Francois Guillemot  
(The Francis Crick Institute, UK)  
He studies how the different types of neural cells are generated at appropriate times and locations to form functional neural circuits.

Susumu Tonegawa  
(Massachusetts Institute of Technologies, USA)  
Winner of the Nobel Prize in Physiology or Medicine in 1987 for his discovery of the genetic mechanism that produces antibody diversity. He now studies neuroscience, examining the molecular, cellular and neuronal basis of memory formation and retrieval.

Richard Morris  
(University of Edinburgh, UK)  
He discovered the way synaptic connections in the hippocampus brain region are strengthened by stimulation. The process, known as long-term potentiation (LTP), forms the basis of the ability to learn and to remember.

Wieland Huttner  
(Max Planck Institute of Cell Biology & Genetics, Germany)  
He studies neural stem and progenitor cells and neocortex expansion in development and evolution at the molecular and cellular levels.

International Training for Young Personnel

Presentations, discussions and exchanging ideas were all conducted in English, which we believe was a precious opportunity and effective training for the young participants. On an excursion to the suburbs of Sendai, one young researcher accompanied one invited world-class researcher. Under such circumstances, young researchers were provided with a valuable opportunity to discuss and exchange ideas in person with the experts in their fields.

As a result of the collaborations with the world-class universities or institutes which the invited researchers belong to, the Neuro Global Collaborative Graduate School is scheduled to be established as part of the Super Global Graduate School Plan in 2018. The purpose of this graduate school is to provide a high level of education and to improve the study environment for our students in order to foster the next generation of global talent. This approach will include building a stream of regular exchanges of researchers between universities and institutes around the world in a framework of short/medium-term internship programs.

Strategies Following the Completion of the Program

For more than 100 years, Tohoku University has been leading studies in neuroscience. The TFC program on Brain Science followed this tradition at Tohoku University. In order to enhance Tohoku University’s name as a leading player in neuroscience, we will be constantly engaged in organizing multidisciplinary and international symposia as we did during this program. We will endeavor to promote globalization and boost the level of neuroscience study at Tohoku University by strengthening the new network established during this Tohoku Forum for Creativity program, and by making use of the framework of Neuro Global International Collaborative Graduate School, which is scheduled to be launched in 2018.
Spintronics: from Mathematics to Devices

Since the work by Pauli and Dirac, we know that the electron comes in four flavors, which in the non-relativistic limit reduce to two components of intrinsic angular momentum, the “up” and “down” spin. Although we rarely experience electron spin in everyday life, it governs the very structure of matter and lies at the root of phenomena such as ferromagnetism, the state in which spins are ordered and generate a macroscopic magnetic moment, as well as superconductivity.

Spintronics is the science and technology aiming to understand and control the electron spin in nanoscale structures and devices, and to apply the newly found functionalities to sensor, information, and communication technologies. The full spectrum of spintronics spans many disciplines, from pure mathematics, theoretical physics, and materials science, to the design of integrated circuits and nanomedical therapies.

This program was designed in such a way that the long-term invited participants could work together, give special lectures, and interact with Tohoku University scientists over a sustained period of time. They also lectured at the Spintronics school which was organized in parallel to the academic program. The international workshops functioned as special events covering the whole program period.
Important Goals and Degree of Achievement

In this thematic program, we intended to generate new insights in spintronics by providing a forum that stimulates frank discussions between international leading scientists from abroad and Japan with the Tohoku University community. We planned a high level of activities with peaks represented by the special events. Key objectives were (1) to increase the general level of fundamental knowledge and application potential of spintronics, (2) to emphasize that spintronics is not a narrowly specialized field but an interdisciplinary endeavor that reaches far into perceived unrelated fields such as mathematics, integrated circuit design and engineering, (3) to promote the leading role of Tohoku University as a major international player in spintronics, and (4) to decrease the threshold for young researchers to enter the field.

In order to achieve these goals, we configured the program into two pillars, consisting of a spintronics school, for the development of young researchers, and several international workshops, to conduct advanced discussions. At the spintronics school, both invited researchers and Tohoku University staff researchers gave lectures about the fundamentals of spintronics. The international workshops were held on a wide range of themes, including device applications and pure mathematics, while the participants included academics from a wide range of research fields, in addition to experts in spintronics. Through these events, and the collaborative research with the long-term stay researchers, we were able to promote new research themes and the development of young researchers in spintronics, and therefore we were able to fully achieve the goals of the program.

Program Organizers

**Gerrit Bauer** *(Professor, Institute for Materials Research, Tohoku University)*

Prof. Bauer completed his doctorate course at the Technical University of Berlin. He took his current position after serving at the Hahn Meitner Institute for Nuclear Research as a research assistant, the Philips Naturkundig Laboratorium as a staff scientist, and Delft University of Technology as a professor. He also serves as a professor at the WPI-AIMR, and a researcher at the Kavli Institute of Nanoscience.

**Yoshihiro Hiyayama** *(Professor, Graduate School of Science, Tohoku University)*

Prof. Hiyayama completed his doctorate course at the School of Engineering, University of Tokyo. He took his current position after serving at the NTT Basic Research Laboratories as a group leader, distinguished technical member, and executive manager. He also serves as a coordinator of the Graduate Program in Spintronics, and a coordinator of the Interdepartmental Doctoral Degree Program for Multi-dimensional Materials Science Leaders at Tohoku University.
Program Highlights

The highlight of this program consisted of the six international workshops and the spintronics school. At the spintronics school, basic lectures were given by invited speakers from outside the university, in addition to lecturers from Tohoku University, which provided a valuable opportunity for students and postdoctoral fellows to learn the fundamental principles of spintronics. The six international workshops had the themes of topology, theoretical physics, anti-ferromagnetic materials, integrated circuits, materials science, and cutting edge spintronics research, respectively. In particular, at October’s, “Quantum Nanostructures and Electron-Nuclear Spin Interactions” workshop, the lecture by Nobel Laureate Professor Klaus von Klitzing attracted a lot of attention, and had a packed auditorium. In addition, we anticipated about 40 participants for the workshop on “Spintronics with Antiferromagnets”, but finally three times that number attended, stretching the capacity of the TOKYO ELECTRON House of Creativity and the local organizers. This was caused by good timing to have a meeting on a hot topic, as well as the success of the TFC program set-up that allowed coordinating multiple workshops.

Specific Strategies for International Research Exchange

The field of spintronics is a global activity, which means that any research group has to gauge its work continuously with those abroad. For many years, long term programs like the present one have been the method of choice to meet, discuss, compare, and compete with international colleagues. Traditionally, the Kavli Institute of Theoretical Physics, Santa Barbara, has been leading, with extended programs in 2006 and 2013, in addition to programs being held at the Yukawa Institute in 2008, and the Kavli Institute of Theoretical Physics China in 2010. By creating the TFC, Tohoku University has entered this illustrious stage with a bang, adding new aspects to the program concept. Previous programs were much more focused on theoretical physics. We intentionally expanded the scope to include experimental approaches and practical applications, as well as by emphasizing interdisciplinarity.

The concrete results are difficult to quantify since the seeds that have been sown during the intensive discussions of new results, and the new ideas that followed, will take time to grow and ripen before leading to research papers. We are convinced that the Program will have a direct effect on the research output and citation index of the participating Tohoku University scholars and students.
Principle Invited Researchers

Klaus von Klitzing
(Max Planck Institute for Solid State Research, Germany)

Andrei Slavin
(Oakland University, USA)
Distinguished Professor at the Department of Physics, Oakland University. A specialist in magneto-dynamics. Served as a fellow of the Institute of Electrical and Electronic Engineers (IEEE) and the American Physical Society (APS).

Burkard Hillebrands
(Kaiserslautern University of Technology, Germany)
Professor at Kaiserslautern University of Technology. A specialist in magnonics. Serves as a fellow of the Institute of Electrical and Electronic Engineers (IEEE), the American Physical Society (APS), and a member of the Academy of Sciences and Literature, Mainz.

Claudia Felser
(Max Planck Institute for Chemical Physics of Solids, Germany)
Director of the Max Planck Institute for Chemical Physics of Solids. A specialist in spintronics and material science. Serves as the chair of the DFG research group "New Materials with High Spin Polarization".

David Awschalom
(University of Chicago, USA)
Professor at the Physics Department, University of California. A specialist in spintronics in semiconductors. Recipient of the Oliver E. Buckley Prize, and the Agilent Europhysics Prize in 2005.

Julie Grollier
(French National Center for Scientific Research, France)

Stuart Parkin
(Max Planck Institute of Microstructure Physics, Germany)
Director of the Max Planck Institute of Microstructure Physics in Halle, and professor at the Institute of Physics at the Martin Luther University Halle-Wittenberg. A specialist in material science-spintronics. Served as an IBM Fellow, IBM's highest technical honor. Recipient of the Millennium Technology Prize in 2014.

Masashi Kawasaki
(University of Tokyo, Japan)
Professor, "Quantum Phase Engineering Project" at the Quantum-Phase Electronics Center, University of Tokyo, and team leader of the Strong Correlation Interface Research Group, RIKEN Advanced Science Institute. Serves as an international advisory committee member of the Oude Electronics Workshop since 1995, and a MRS symposium organizer in 1999, 2001, 2007, and 2008.

Seigo Tarucha
(University of Tokyo, Japan)

International Training for Young Personnel

Most spintronics research programs focus on career researchers in their primes, i.e., on the assistant and associate professor level. In contrast, we kept all of the activities of our TFC program open for Masters and Ph.D. students. However, as the high scientific level of the presentations and discussions provide a high threshold for young researchers, we introduced the Elementary Spintronics School which gave students easy access to the important issues in spintronics, as well as a chance to interact closely with the visiting international scholars.

Strategies Following the Completion of the Program

In our opinion, the main issue for the TFC is to provide continuity and create a tradition to become a world center for programs and focused workshops, such as the KITPs and Aspen Center. In order to create a tradition of the TFC in spintronics, another program should be organized in about 3-5 years. The TFC and Graduate School GP-Spin will organize a joint international school and student-organized workshop on spintronics-related topics in 2016.
The Effects of Technological Changes on Social Mobility and Income Distribution

This program focused on cutting-edge research on income disparity and inequality. The program facilitated joint research on the effects of technological change on social mobility and income distribution from both theoretical and empirical perspectives, with the aim of establishing a forum for international research in the relevant fields. Traditionally, social mobility research has been the preserve of sociology, and income distribution research the preserve of economics. However, recent research suggests that these two areas are closely linked. Therefore, in this program, sociologists and economists worked synergistically to, first, conduct detailed analyses on the direct effects of technological change on income distribution, and also the indirect effects mediated by changes in social mobility. Second, given that these effects manifest in different ways depending on the particular systems of each society, we focused the theoretical investigation on the concept of path dependence, and focused the empirical investigation on international comparative analysis. Third, given that it is impossible to separate the issue of social inequality from normative judgments, we developed theoretical analysis based on social choice theory. Drawing on this theoretical development, we highlighted specific objectives such as policy proposals for rectifying disparity/inequality in contemporary society.

With a view to achieving these objectives, we invited fourteen researchers (nine of whom were from overseas) to stay in Japan throughout the duration of the program to carry out joint research. We also held eight academic events.
Important Goals and Degree of Achievement

By inviting leading economists and sociologists and engaging in discussions on various topics, we succeeded in gaining a deeper understanding of the effects of technological change on social mobility and income distribution. The greatest outcome of all was the fact that we could incorporate into the project the importance of the effects of the decreasing birthrate and aging population on inequality, a theme that was not initially targeted in the project.

The first goal of this program was to hold a follow-up seminar concerning the path dependent dynamics of technological changes and the structural disparities in wage rates and profit rates. This seminar was a follow-up to the previous year’s workshop. The invited researcher lectured on research trends at the cutting edge of the field, and also provided highly intensive instruction to young researchers.

The second goal was to hold a seminar series on social inequality and political economy entitled “Economic Inequalities and Economic Crises – History and Theory” with a view to improving the basic research abilities of young researchers studying the humanities. This seminar series was very popular with students, not only from the Graduate School of Economics and Management, but also from other graduate schools and with undergraduate students. Fifteen seminars (each lasting 90 minutes) were held, and research guidance was provided to 330 participants.

The third goal was to hold a workshop focusing on the effects of technological progress on the accumulation of capital and the evolution of social institutions, in order to facilitate exchanges between Japanese and Western researchers in the relevant research areas. Two-day intensive discussions achieved this goal.

Program Organizers

Yoshimichi Sato (Professor, Graduate School of Arts and Letters, Tohoku University)
Professor at Tohoku University. He received his Ph.D from Tohoku University. He took his present position after working as an associate professor at Yokohama City University, and as a visiting scholar at the University of Chicago and Cornell University. His research topics includes social stratification and inequality, rational choice theory, trust, and social change.

Kenji Mori (Professor, Graduate School of Economics and Management, Tohoku University)
Professor at Tohoku University. He received his Ph.D from Tohoku University. He took his present position after working as a lecturer and associate professor at Oita University. His research interests are political economy and the history of economic theories.
Program Highlights

At the “Follow-up Seminar on Technological Change and Income Distribution,” Professor Antonio D’Agata (University of Catania) held a seminar series to expand upon the research themes discussed at the TFC’s pre-program conducted over four days in 2014.

At the “Seminar Series on Economic Inequalities and Economic Crises – History and Theory,” Professor Michael Krätke (Lancaster University) provided fifteen serial seminars and instructed 330 young researchers.

At the “Workshop on Analytical Political Economy,” distinguished researchers, such as Professor Amitava Dutt (University of Notre Dame), Professor Simon Mohun (Queen Mary University of London), Associate Professor Soon Ryoo (Adelphi University), Professor Gill Skillman (Wesleyan University), Professor Peter Skott (University of Massachusetts Amherst), Assistant Professor Soh Kaneko (Keio University), Professor Takashi Ohno (Doshisha University), Professor Hiroaki Sasaki (Kyoto University), Professor Hiroyuki Yoshida (Nihon University), Professor Naoki Yoshihara (Hitotsubashi University), assembled together and discussed the effect of technological change on the accumulation of capital and evolution of social institutions.

At the “Workshop on International Comparison of Gender, Fertility and Happiness,” Professor Hiroshi Yoshida (Tohoku University), one of the project members of this program, held a presentation about the relationship between fertility rate and happiness. Professor Mary Brinton (Harvard University), Associate Professor Hyunjoon Park (University of Pennsylvania), and Professor Michael Krätke made comments in terms of their research expertise.

Moreover, Professor Mary Brinton and Associate Professor Hyunjoon Park gave presentations on issues of gender, youth labor market, and educational inequality at the 10th Quattro Seminar.

Specific Strategies for International Research Exchange

This program achieved numerous important results as a result of strategic international research collaborations. For example, Professor Antonio D’Agata and Professor Kenji Mori, who was one of the organizers of the program, revealed for the first time how an equilibrium in profit rate discrepancy can be proven using the Knaster-Kuratowski-Mazurkiewicz Lemma, and succeeded in pinpointing the range of the discrepancy. This result was reported at the International Conference on Economic Theory and Policy held at Meiji University in September 2015, and will be published in “Metroeconomica,” a leading journal in this research area.

Professor Michael Krätke discovered unreleased material of Karl Marx, and during his stay at the Tohoku Forum for Creativity he composed the first paper in the world on this material. Drawing on this paper, Professor Kenji Mori engaged in discussions with Dr. Krätke, and planned to publish the paper in Japanese.

Professor Krätke and Professor Mori organized an international research network consisting of eighteen researchers from Japan, the USA, the UK, Germany, France, Austria, Italy, Finland, Brazil, and Korea. This research network will study theories about economic crisis and inequalities. Together they are preparing to publish an English academic book based on their discussions.

In addition, the “Workshop on International Comparison of Gender, Fertility and Happiness” produced valuable findings which were derived not only from particular countries, but also from a crossover of research approaches. For example, European researchers provided insights beyond absolute comparative analysis based on simple statistical values, such as the necessity of interpreting data in the cultural contexts of the countries concerned.
Principle Invited Researchers

Antonio D’Agata  
(University of Catania, Italy)  
Professor at the University of Catania. His major is mathematical economics. He also participated in the TFC’s pre-program held in 2014, and gave a seminar on the relationship between technological change and income distribution.

Amitava Dutt  
(University of Notre Dame, USA)  
Professor at the University of Notre Dame. He majors in macroeconomic theories, development economics, international economics, and political economics. He has broad research topics such as globalization and developmental inequality between nations, consumption and happiness, and war and peace.

Mary Brinton  
(Harvard University, USA)  
Professor at Harvard University. She is a sociologist researching education, work, and youth employment in Japan and the USA. Her book “Lost in Transition: Youth, Education, and Work in Postindustrial Japan” has a Japanese translated version.

Michael Kräcke  
(Lancaster University, UK)  
Professor at Lancaster University. He engages in research on the theory and history of economic crisis and Marxism. He provided seminars relating to Thomas Piketty, the author of “Capital in the Twenty-First Century.”

Simon Mohun  
(Queen Mary University of London, UK)  
Emeritus Professor at Queen Mary University of London. As a political economist based on Marxism, he researches contemporary capitalist economy in terms of social class, income distribution, and measuring affluence.

Hyunjoon Park  
(University of Pennsylvania, USA)  
Associate Professor at the University of Pennsylvania. He is conducting sociological research about the effects of family and school as institutions on educational attainment, with international comparisons considering the social background of each country.

International Training for Young Personnel

The organizers held workshops for graduate students to report their own research. At these workshops, the visiting researchers acted as discussants and provided useful advice. In addition, graduate students could readily meet with these researchers during office hours and obtain advice on how to advance their research, and build their careers.

The discussions were all conducted in English, which brought home the importance of English as the common language in research. The participants were also made aware of the important role that empirical data plays in discussions that take place in settings of joint research, not only in their own research fields, but also in the setting shared among researchers from different research areas.

As concrete outcomes, a graduate student who received individual guidance from Professor Kräcke got a teaching position at an overseas university, and a post-doctoral student who received guidance from Professor D’Agata was hired as an assistant professor in the economics department of a national university. In addition, a student who received guidance from Professor Brinton has been admitted to graduate school at the Pennsylvania State University.

Strategies Following the Completion of the Program

We will build a base for synergistic research and education in economics and sociology, so that we may promote research and education using this program as a base, and advance international joint research on an ongoing basis. To achieve these objectives, we must facilitate discussions and joint research by inviting and dispatching academics on an ongoing basis. Therefore, we must proactively raise funds for research in order to enable such visits and dispatches.

In addition, we will build an international network that includes the overseas researchers invited to the TFC, and build a system that enables researchers and graduate students to come and go freely. The relationships between researchers that were forged in the project must be strengthened, broadened, and deepened.
Falling Walls Lab Sendai 2015

A presentation competition was held jointly with the Falling Walls Foundation of Germany for junior researchers aged 35 or younger on September 4, 2015. It was the first preliminary competition held in the Asian region, and featured participation by 40 individuals from this university and others.

The top three contestants were dispatched to Berlin on November 8 to enter the final round.

The TFC, in cooperation with the URA center, conducted the coaching sessions for the applicants and the training sessions for the three winners in order to improve their presentation skills.

Quattro Seminars

The TFC has regularly held a series of seminars, commonly known as the “Quattro Seminars,” on the humanities and social sciences as part of the URA and Tohoku Forum for Creativity Collaboration Project, Tohoku University. The Quattro Seminars aim to deepen collaborations between the four schools of the humanities, Graduate School of International Cultural Studies and Center for Northeast Asian Studies at Tohoku University, to explore interdisciplinary research themes, and are opened widely to outsiders. The seminars were held 6 times in 2015. Each seminar saw the participation of 30 researchers who were able to use the seminars as an opportunity to engage in vigorous discussion and strengthen their interpersonal connections.

*The term Quattro in the common name of the series stands for “4,” representing the four faculties including the Faculty of Arts and Letters, the Faculty of Education, the School of Law, and the Faculty of Economics. The series is hosted through cooperation by the TFC and the URA center.
Leading Young Researcher Overseas Visit Program

This program is one of the central pillars in transforming the research environment at this university, with support from the program for promoting the enhancement of research universities from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in 2013, implemented by the Tohoku Forum for Creativity in cooperation with the University Research Administration Center, Tohoku University. The program deploys junior researchers (researchers and faculty under the age of 40, as well as graduate students in the second semester of their doctoral programs and postdoctoral fellows at our graduate schools) overseas to cultivate leadership and an international viewpoint. The strategic deployment of highly motivated, outstanding junior researchers to excellent universities and research organizations overseas helps those researchers develop into leaders in the international academic world, and helps create new currents of academic research. Through the program, we expect to strengthen the presence of our junior researchers, and of the university, by taking the opportunity to participate in new elite academic research communities and leveraging the research results and interpersonal networks thereof to achieve future leadership in the relevant domains. For this reason, we prioritize selection of submissions from junior researchers that clearly state the positioning of this program in the formation of their careers and as strategy for improving this university’s research capabilities. Normally, we support mid-term overseas studies of periods from six months to one year. The program of 2015 sent 5 junior researchers to overseas research organizations. Furthermore, presentations were held upon their return, and further follow up is provided to help cultivate those individuals as superb global leaders.
Project Outcome

I stayed as a visiting researcher at Stanford University in California from July 2014 to March 2015, in order to conduct research on social networks and computational social science. In the social network study conducted with Prof. P. Parigi, we are developing a methodology to extract the network structure of the entire society. I regularly joined Prof. Parigi’s laboratory meetings, enabling us to advance the study by obtaining feedback and comments. In addition, I made effort to acquire knowledge about computational social science by taking some academic courses. Computational social science is a discipline to analyze the structure of human behavior and social networks using large-scale data about human behavior on the web (so-called big data). The courses were extremely useful in terms of giving me state-of-the-art knowledge and an opportunity to learn programming techniques.

Further Development and Networking

After returning to Japan, I kept close contact with Prof. Parigi. In 2015, during a three week stay at Stanford, we further advanced the joint research. These achievements were reported at the European Sociological Association meeting in 2015, International Sociological Association Forum in 2016 and American Sociological Association meeting in 2016. We are now writing the paper and intend to submit it to a prestigious international journal, such as the American Journal of Sociology.
Project Outcome

The main goal of this visit was extending on-going research collaborations with Dr. Ehud Sharlin on designing and forming dynamic workspaces using robotic digital displays. From this collaboration, I achieved two conference full-papers; the first paper is on design and study of MovemenTable, moving robotic digital tables for efficient workspace switching ranging from individual and group activities, which was presented at IFIP INTERACT 2015 conference. The second is on Shape-Shifting Wall Display project where I led all research steps, planning, inviting researchers, prototyping a system and writing a paper in the lab. This paper has been recently published on June 8, 2016 at ACM SIGCHI Conference on Designing Interactive Systems and successfully won a Honourable Mention Award, identified in the top 5% of all submissions. Those two papers are my main outcomes of this visit but also demonstrate my major research interests, activities and future directions.

Besides my own research, I co-supervised several Masters and Ph.D students with Dr. Ehud. This educational challenges provided three conference full-papers and allowed me to experience a examiner for their Ph.D candidacy or Masters thesis defenses via a video conference system.

The lab I visited is a pioneer and one of the most famous research hubs in the domain of Human-computer Interaction in the world, having many powerful students and postdoctoral fellows led by four eminent professors. I met many senior and young researchers, and established academic and friendship networks which will be helpful in my future academic activities, including organizing and managing international conferences and workshops.

Further Development and Networking

I could continue with many research activities based on my work in Calgary after returning to Japan, including paper writing, conference presentations, supervising and defense examinations. I am still collaborating with Dr. Ehud and his students. The academic network that I established is already quite helpful in my current activities regarding organizing international conferences. I would like to extend the network for further collaborations, joint funding applications and so on.
31  Thematic Programs

Invited Researchers List

Fundamental Problems in Quantum Physics: Strings, Black Holes and Quantum Information

Frontiers of Brain Science

Spintronics: from Mathematics to Devices

The Effects of Technological Changes on Social Mobility and Income Distribution

46  Other Activities

49  Leading Young Researcher Overseas Visit Program
Thematic Program 2015

Invited Researchers List

Program Code : 2015TPH
Fundamental Problems in Quantum Physics: Strings, Black Holes and Quantum Information

Chong-Sun Chu (National Tsing Hua University)
Norikazu Ikeda (Ritsumeikan University)
 Jae-Suk Park (IBS Center for Geometry and Physics)
Jeehoon Park (Pohang University of Science and Technology)
Siye Wu (National Tsing-Hua University)
Akitumi Sako (Tokyo University of Science)
Hisayoshi Maruki (Tohoku University)
Gerard ’t Hooft (Spinoza Institute, Utrecht University)
Masahiro Hotta (Tohoku University)
Andreas Karch (Washington University)
Sung-Sik Lee (Perimeter)
Robert Mann (University of Waterloo)
Eduardo Martin-Martinez (Perimeter)
Hiroyuki Matsueda (SNU)
Robert Myers (Perimeter)
Yasurada Nambu (Nagoya University)
Tatsuya Nishioka (University of Tokyo)
Masahiro Nozaki (YITP)
Kyrilakos Papadodimas (CERN)
Masaki Shigemori (YITP)
Tadashi Takayanagi (YITP)
François Englert (ULB)
Makoto Kobayashi (KEK)
Viatcheslav Mukhanov (LHU)
Jin-Ouk Gong (APCTP)
Kwang Sik Jeong (Pusan National University)
Yuichiro Kiyon (Juntendo University)
Takeo Moro (University of Tokyo)
Ryo Namba (RIKEN)
Marco Peloso (University of Minnesota)
Antonio Pineda (IFAE)
Philippe Spindel (Université de Mons)
Tomo Takahashi (Saga University)
Masahide Yamaguchi (Tokyo Institute of Technology)
Shuichiro Yokoyama (Rikkyo University)
M. A. Heller (Tohoku University)
Yuki Kaneko (Tohoku University)
Yoshiaki Maeda (Tohoku University)
Yutaka Matsuo (University of Tokyo)
Hisayoshi Muraki (University of Tsukuba)
Patricia Ritter (University of Bologna)
Thomas Strobl (University of Lyon)
Guo Chuan Thiang (University of Adelaide)

Program Code : 2015FB5
Frontiers of Brain Science

Haruo Mizutani (Harvard University)
Valentin Nägeri (University of Bordeaux)
Shu Kondo (National Institute of Genetics)
Katrin Vogt (Max Planck Institute of Neurobiology)
Kolchi Hashimoto (Tohoku University)
Masao Tachibana (University of Tokyo)
Oliver Giesebeck (Max Planck Institute of Neurobiology)
Ken Berglund (Emergy Medicine)
Tomomi Tsunematsu (University of Strathclyde)
Ko Matsu (Tohoku University)
C Justin Lee (Korea Institute of Science and Technology)
Amir Agarwal (Johns Hopkins University)
Jason M. Christie (Max Planck Florida Institute)
Ryuki Shigemori (JST Austria)
Sabina Irabotova (SUNY Downstate Medical Center)
Jeff Lichtman (Harvard University)
Gáspár Jékely (Max Planck Institute for Developmental Biology)
Michael Häusser (University College London)
Hiroki Tanimoto (Tohoku University)
Ryuta Kawashima (IDAC, Tohoku University)
Francesco Rangel (The Francis Crick Institute)
Shubha Tole ( Tata Institute of Fundamental Research)
Tomomi Shimogori (RIKEN BSI)
Goichi Miyoshi (New York University)
Yusuke Hirabayashi (Columbia University)
Wieland Huttner (Max Planck Institute, Dresden)
Erich Jarvis (Duke University Medical Center)
Nozunori Hiroi (Albert Einstein College of Medicine)
Stephan Sanders (UCSF)
Hidenori Yamase (University of Tokyo)
Yasuyuki Taki (Tohoku University)
Kenji Tsuchiya (Hamamatsu University School of Medicine)
Atsushi Senju (Birkbeck College of London)
Yoko Kamio (National Center of Neurology and Psychiatry)
Masahiro Hirai (Jichi Medical University)
Paul Matthews (Imperial College London)
Susumu Tonegawa (MIT / RIKEN BSI)
Richard Morris (University of Edinburgh)
Shinsuke Shimojo (Caltech)
Georg Northoff (University of Ottawa)
Mitsuo Kawata (ATR)
Kazuyuki Alhara (University of Tokyo)
Koaru Inokuchi (University of Toyama)
Toshiyuki Hirabayashi (National Institute of Radiological Sciences)
Satoshi Kida (Tokyo University of Agriculture)
Tom McHugh (RIKEN BSI)
Joshua Johansen (RIKEN BSI)
Hideo Takeuchi (Okayama University)
Junjiro Hirose (Tokyo Metropolitan Institute of Technology)
Masatoshi Yoshida (National Institute of Physical Sciences)
Takanori Uda (University of Tokyo)
Takuya Hayashi (RIKEN Cent. for Life Sci. Tech.)
Akira Murata (Kinki University)
Ken-Ichiro Tsutsui (Tohoku University)
Steven Laureys (University of Liège and University Hospital of Liège)
Edward Moser (Norwegian University of Science and Technology, Norway)

Program Code : 2015SSP
Spintronics: From Mathematics to Devices

Anton Akhmerov (Delft University of Technology)
Christopher Bourne (Australian National University)
Peter Bouwknegt (Australian National University)
Alan Carey (Australian National University)
Rembert Duine (Utrecht University)
Mikio Furuta (University of Tokyo)
Thematic Program 2015 | Program Code: 2015TPH

Fundamental Problems in Quantum Physics: Strings, Black Holes and Quantum Information

[Pre-Event] Workshop on Strings, Membranes and Topological Field Theory

- Date: Thursday, March 5, 2015 - Saturday, March 7, 2015
- Venue: Science complex C 2F Room N204, Faculty of Science, Kita-Aoyama Campus, Tohoku University
- Invited Researchers:
  - Chong-Sun Chu (National Tsing-Hua University)
  - Noriaki Ikeda (Ritsumeikan University)
  - Jae-Suk Park (IBS Center for Geometry and Physics)
  - Jehee Park (Pohang University of Science and Technology)
  - Siye Wu (National Tsing-Hua University)
  - Akifumi Sako (Tokyo University of Science)
  - Hisayoshi Muraki (Tokyo University)
- Participants: 35
- Time Schedule
  Thursday, March 5, 2015
  13:30 - 14:30 Noriaki Ikeda (Ritsumeikan University)
  Supergeometry of Topological Sigma Models, Higher Structures and Physical Applications [1]
  14:45 - 14:45 Chong-Sun Chu (National Tsing-Hua University)
  The theory of non-abelian tensor of multiple 5-branes [1]
  16:00 - 17:00 Hisayoshi Muraki (Tokyo University)
  A Construction of Gravity Theory based on Poisson Generalized Geometry

Friday, March 6, 2015
  10:00 - 11:00 Noriaki Ikeda (Ritsumeikan University)
  Supergeometry of Topological Sigma Models, Higher Structures and Physical Applications [2]

[Special Event] Public Lecture by Professor Gerard ‘t Hooft

- Date and time: Friday, April 24, 2015 17:30 - 18:30
- Venue: TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
- Speaker: Gerard ‘t Hooft (Spinoza Institute, Utrecht University)
- Title: The Higgs Particle, Pivot of the Standard Model of the Subatomic Particles
- Participants: 93

[Special Event] Conference by Professor François Englert 2013 Nobel Prize Laureate in Physics

- Date and time: Thursday, September 3, 2015 17:30 - 18:30
- Venue: The Embassy of Belgium in Tokyo
- Title: On the origin of elementary particle masses: The history and scope of a discovery
- Hosted by:
  - The Embassy of Belgium
  - The Tohoku Forum for Creativity
  - The BNP Paribas Group
- Support from The Physical Society of Japan

[Special Event] Special Lectures by Professor François Englert and Professor Makoto Kobayashi

- Date and time: Tuesday, September 15, 2015 14:00 - 16:30
- Venue: Science complex C 3F, Aoba Science Hall (Room C201), Kita-Aoyama Campus, Tohoku University
- Speakers:
  - François Englert (ULB)
  - Makoto Kobayashi (KEK)
- Participants: 110
- Time Schedule
  14:00 - 15:00 François Englert (ULB)
  The origin of elementary particle masses
  15:30 - 16:30 Makoto Kobayashi (KEK)
  CP Violation and Flavor Mixing

[Special Event] Public Lectures for the 100th Anniversary of General Relativity

- Date: Saturday, November 14, 2015
- Venue: TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
- Hosted by: The Tohoku Forum for Creativity
- Planned and Coordinated by Celebrating 100 Years of Einstein’s General Relativity committee
- Corporate with NPO natural science
- Speakers:
  - Keiichi Maeda (Waseda University)
  - Toshifumi Futamase (Tohoku University)
- Participants: 110
- Time Schedule
  13:30 - 13:35 Opening remarks
  13:35 - 14:35 Keiichi Maeda (Waseda University)
  General Relativity and Cosmology
  14:35 - 15:00 Break
  15:00 - 16:00 Toshifumi Futamase (Tohoku University)
  General Relativity and Astrophysics
  16:00 - 16:20 Question and answer session
### Event: Special Lectures on Fundamental Problems in Quantum Physics by Gerard 't Hooft

- **Date:** Monday, April 20, 2015, Wednesday, April 22, 2015
- **Venue:** TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
- **Invited Researcher:** Gerard 't Hooft (Spinosa Institute, Utrecht University)
- **Participants:** 93
- **Time Schedule**
  - **Monday, April 20, 2015**
    - 17:00 - 17:40: Lecture 1: The role of Black Holes and Conformal Symmetry in Quantum Gravity
  - **Wednesday, April 22, 2015**
    - 17:00 - 17:40: Lecture 2: The Cellular automaton interpretation of quantum mechanics

### Event: Spring School on Particles, Strings and Quantum Information

- **Date:** Monday, April 20, 2015 - Friday, April 24, 2015
- **Venue:** TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
- **Participants:** 57
- **Time Schedule**
  - **Monday, April 20, 2015**
    - 13:15 - 14:45: Satoshi Watamura (Tohoku University) String and D-brane, I
    - 15:00 - 16:30: Ryuichiro Kitano (KEK Theory Center) Physics beyond Standard Model, I
  - **Tuesday, April 21, 2015**
    - 10:30 - 12:00: Keisuke Fuji (Kyoto University) Basics of Quantum Information/Calculus, I
    - 13:15 - 14:45: Satoshi Watamura (Tohoku University) String and D-brane, II
    - 15:00 - 16:30: Ryuichiro Kitano (KEK Theory Center) Physics beyond Standard Model, II
  - **Wednesday, April 22, 2015**
    - 10:30 - 12:00: Keisuke Fuji (Kyoto University) Basics of Quantum Information/Calculus, II

### Event: International Workshop on Strings, Black Holes and Quantum Information

- **Date:** Monday, September 7, 2015 - Friday, September 11, 2015
- **Venue:** TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
- **Invited Researchers**
  - Masahiro Hotta (Tohoku University)
  - Andreas Karch (Washington University)
  - Sung-Sik Lee (Perimeter)
  - Robert Mann (University of Waterloo)
  - Eduardo Martin-Martinez (Perimeter)
  - Hiroaki Matsueda (SNCT)
  - Robert Myers (Perimeter)
  - Yasuasa Nambu (Nagoya University)
  - Tatsuma Nishioka (University of Tokyo)
  - Masahiro Nozaki (YITP)
  - Kyriakos Papadodimas (CERN)
  - Masahiro Shigemori (YITP)
  - Tadashi Takayanagi (YITP)
- **Participants:** 53
- **Time Schedule**
  - **Monday, September 7, 2015**
    - 12:30 - 13:30: Kyriakos Papadodimas (CERN) The black hole information paradox and the smoothness of the horizon (Review)
    - 14:00 - 15:00: Tadashi Takayanagi (YITP) Tensor Network and Holography (Review)
    - 15:30 - 16:30: Andreas Karch (Washington University) Entanglement Entropies for Probe Branes
    - 17:00 - 17:30: Short talk: Yasuaki Hikida (Ryukyu University) Higgs phenomenon and N=3 higher spin holography
    - 17:30 - 18:00: Short talk: Shotaro Shiba (Kyoto Sangyo University) Thermodynamics of intersecting black branes from interacting elementary branes
  - **Tuesday, September 8, 2015**
    - 09:30 - 10:30: Robert Mann (University of Waterloo) Black Hole Information: From Thermodynamics to Firewalls (Review)
    - 11:00 - 12:00: Kyriakos Papadodimas (CERN) A holographic reconstruction of the black hole interior
    - 14:00 - 15:00: Tadashi Takayanagi (YITP) Gravity Dual of Information Metric
    - 15:30 - 16:30: Eduardo Martin-Martinez (Perimeter) Are firewalls really cataclysmic events?

- **Thursday, September 10, 2015**
  - 09:30 - 10:30: Sung-Sik Lee (Perimeter) Entanglement Holography
  - 11:00 - 12:00: Robert Myers (Perimeter) The puzzles and microstructures of black holes
  - 14:00 - 15:00: Masahiro Shigemori (YITP) Anomalies and Entanglement Entropy
  - 17:00 - 17:30: Short talk: Koichiro Numasawa (YITP) Entanglement Entropy in String Theory
  - 17:30 - 18:00: Short talk: Noburo Shiba (YITP) Entanglement Entropy of Disjoint Regions in Excited States: An Operator Method

- **Friday, September 11, 2015**
  - 09:30 - 10:30: Hiroaki Matsueda (SNCT) Geometry and Dynamics of Information Spacetime Derived from Entanglement Spectrum
  - 11:00 - 12:00: Masahiro Hotta (Tohoku University) The fall of black hole firewall
[Event] International Workshop on Particle Physics and Cosmology

- Date: Monday, September 14, 2015 - Friday, September 18, 2015
- Venue: Science complex C 2F, Aoba Science Hall (Room C201), Kita-Aoba Campus, Tohoku University
- Invited Researchers:
  - François Englert (ULB)
  - Makoto Kobayashi (KEK)
  - Viatcheslav Mukhanov (LMU)
  - Jinn-Ouk Gong (APCTP)
  - Kwang Sik Jeong (Pusan National University)
  - Yuichiro Kkyo (Juntendo University)
  - Takeo Moroi (University of Tokyo)
  - Ryo Namba (RIKEN)
  - Marco Peloso (University of Minnesota)
  - Antonio Pineda (IPF)
  - Philippe Spindel (Université de Mons)
  - Tomo Takahashi (Saga University)
  - Masahide Yamaguchi (Tokyo Institute of Technology)
  - Shuichiro Yokoyama (Rikkyo University)
- Participants: 48

**Time Schedule**

**Monday, September 14, 2015**

10:00 - 11:00 Viatcheslav Mukhanov (LMU)
Quantum Universe

11:30 - 12:30 Ryo Namba (RIKEN)
Post-inflationary magnetogenesis

14:00 - 15:00 Masahide Yamaguchi (Tokyo Institute of Technology)
Beyond Inflation and Beyond Horndeski theory

15:30 - 16:30 Shuichiro Yokoyama (Rikkyo University)
Excavating primordial non-Gaussianities in large scale structure

**Tuesday, September 15, 2015**

10:00 - 11:00 Viatcheslav Mukhanov (LMU)
Quantum Universe

11:30 - 12:30 Kwang Sik Jeong (Pusan National University)
Cosmological Constraints on Axion Dark Matter

14:00 - 16:30 Special Lecture by Prof. Englert and Prof. Kobayashi

**Wednesday, September 16, 2015**

10:00 - 11:00 Marco Peloso (University of Minnesota)
Axion inflation beyond the minimal model of Natural Inflation

11:15 - 11:40 Yuki Watanabe (National Institute of Technology, Gunma College)
Multi-disformal Invariance of non-linear primordial perturbations

11:40 - 12:05 Kazunari Ramba (Fukushima University)
Large-scale magnetic fields, non-Gaussianity, and tensor-to-scalar ratio in the inflationary universe

12:05 - 12:30 Naoya Kitsujima
Disappearing Inflaton Potential via Heavy Field Dynamics

14:00 - 15:00 Jinn-Ouk Gong (APCTP)
Features in the primordial spectra

15:30 - 16:30 Tomo Takahashi (Saga University)
Multi-field models of inflation and isocurvature fluctuations

**Thursday, September 17, 2015**

10:00 - 11:00 Yuichiro Kkyo (Juntendo University)
top quark mass determination at ILC and NNLO cross section

11:15 - 11:40 Kazunari Shima (Shizuoka Institute of Technology)
New SUSY paradigm beyond SMs and unity of nature

11:40 - 12:05 Wen Yin
A new natural split SUSY mechanism

14:00 - 15:00 Antonio Pineda (IPF)
Renormalons in heavy quark physics and lattice: the pole mass and the gluon condensate

15:15 - 15:40 Go Mizima (University of Tokyo)
Bottom quark mass from bottomonium spectrum

15:40 - 16:05 Takashi Kaneko (KEK)
Kaon semileptonic decays on the lattice

16:05 - 16:30 Hitroasa Takaura
Power dependence on $A_{QCD}$ hidden in perturbative series of Adler function

**Friday, September 18, 2015**

10:00 - 11:00 Takeo Moroi (University of Tokyo)
Looking for New Physics at the ILC

11:30 - 12:30 Philippe Spindel (Université de Mons)
Mininusperspace Quantum Supersymmetric Cosmology and Its Hidden Hyperbolic Kac-Moody Structures

---

**[Seminar] Special Seminars by Giuseppe Dito**

- Date and time:
  - Tuesday, April 14, 2015 14:00 - 15:00
  - Wednesday, April 15, 2015 10:30 - 11:30
  - Thursday, April 16, 2015 15:00 - 16:00

- Venue: Science complex B 10F, Room 1023, Faculty of Science, Kita-Aoba Campus, Tohoku University

- Speaker: Giuseppe Dito (Université de Bourgogne)

- Title: Elementary deformation quantization

- Participants: 50

---

**[Seminar] Special Seminar by Daniel Sternheimer**

- Date and time: Tuesday, April 21, 2015 17:00 - 18:00

- Venue: TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University

- Speaker: Daniel. Sternheimer (RIKKYO University, Universite de Bourgogne)

- Title: The unreasonable effectiveness of mathematical deformation theory in physics, especially quantum mechanics and maybe elementary particles symmetries

- Participants: 50

---

**[Seminar] Special Seminar by Beni Yoshida**

- Date and time: Thursday, April 23, 2015 17:00 - 18:00

- Venue: TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University

- Speaker: Beni Yoshida (Institute for Quantum Information and Matter, California Institute of Technology)

- Title: Holographic quantum error-correcting codes: Toy models for the AdS/CFT correspondence

- Participants: 50
Seminar Special Seminar by Branislav Jurco

- Date and time: Thursday, October 29, 2015 13:30 - 14:30
- Venue: Science complex B 10F, Room 1023, Kita-Aobayama Campus, Tohoku University
- Speaker: Branislav Jurco (Charles University of Prague)
- Title: Generalized geometry, Noncommutativity and Dirac-Born-Infeld action
- Participants: 15

Seminar Special Seminar by Yuho Sakatani

- Date and time: Friday, November 27, 2015 13:00 - 14:00
- Venue: Science complex B 10F, Room 1023, Kita-Aobayama Campus, Tohoku University
- Speaker: Yuho Sakatani (Seoul National University / Institute for Basic Sciences)
- Title: Finite Transformations in Doubled and Exceptional Space
- Participants: 20

Follow up Workshop Higher Structures in String Theory and M-Theory

- Date: Monday, March 7, 2016 - Friday, March 11, 2016
- Venue: Science complex C 2F Room N204, Faculty of Science, Kita-Aobayama Campus, Tohoku University
- Survey Lectures
  - Mathai Varghese (University of Adelaide)
  - Yuji Okawa (University of Tokyo)
  - Jeong-Hyuck Park (Sogang University)
  - Christian Saemann (Heriot-Watt University)
  - Tamaki Yoneya (University of Tokyo & Open University of Japan)
  - Maxim Zabzine (Uppsala University)
- Invited Speakers
  - M. A. Heller (Tohoku University)
  - Noraki Ikeda (Ritsumeikan University)
  - Yuko Kaneko (Tohoku University)
  - Yoshiki Maeda (Tohoku University)
  - Yutaka Matsuo (University of Tokyo)
  - Hideshi Muraki (University of Tsukuba)
  - Patrick Ritter (University of Bologna)
  - Thomas Strobl (University of Lyon)
  - Guo Chuan Thiang (University of Adelaide)
- Event Organizers
  - Tsuguhiko Asakawa (Maebashi Institute of Technology)
  - Yutaka Matsuo (University of Tokyo)
  - Satoshi Watamura (Tohoku University)
- Participants: 50
- Time Schedule
  
  **Monday, March 7, 2016**
  13:00 Maxim Zabzine (Uppsala University)
  Localization of supersymmetric gauge theory I
  14:15 Tamaki Yoneya (University of Tokyo & Open University of Japan)
  Covariantized M (axtix) Theory I
  15:30 Jeong-Hyuck Park (Sogang University)
  Introduction to the semi-covariant formulation of bosonic DFT
  16:45 Guo Chuan Thiang (University of Adelaide)
  T-duality and real K-theory: a view from condensed matter physics

  **Tuesday, March 8, 2016**
  09:30 Maxim Zabzine (Uppsala University)
  Localization of supersymmetric gauge theory II
  10:45 Christian Saemann (Heriot-Watt University)
  Higher Structures arising in M-theory
  12:00 Hideshi Muraki (University of Tsukuba)
  Gravity on Poisson Manifold
  14:15 Tamaki Yoneya (University of Tokyo & Open University of Japan)
  Covariantized M (axtix) Theory II
  15:30 Jeong-Hyuck Park (Sogang University)
  Supersymmetric extension including R R sector
  16:45 Patricia Ritter (University of Bologna)
  Generalized Higher Gauge Theory

  **Wednesday, March 9, 2016**
  09:30 Maxim Zabzine (Uppsala University)
  Localization of supersymmetric gauge theory III
  10:45 Christian Saemann (Heriot-Watt University)
  Categorification: Gerbes, Loop Spaces, Higher Gauge Theory
  12:00 M. A. Heller (Tohoku University)
  Poisson courant algebroid and Double Field Theory
  14:15 Yuji Okawa (University of Tokyo)
  Complete formulation of superstring field theory I

  **Thursday, March 10, 2016**
  15:30 Jeong-Hyuck Park (Sogang University)
  Worldsheet action with doubled-yet gauged coordinates: U-gravity for U-duality
  16:45 Mathai Varghese (University of Adelaide)
  Exotic twisted equivariant cohomology of loop spaces, & the twisted Bismut-Chern character

  **Friday, March 11, 2016**
  09:30 Maxim Zabzine (Uppsala University)
  Localization of supersymmetric gauge theory IV
  10:45 Christian Saemann (Heriot-Watt University)
  The (2,0)-theory and Multiple MS-branes
  12:00 Yuko Kaneko (Tohoku University)
  Off-shell covariantization of higher gauge theories based on QP manifold
  14:15 Yuji Okawa (University of Tokyo)
  Complete formulation of superstring field theory II
  15:30 Noraki Ikeda (Ritsumeikan University)
  Higher structure and current algebra
  16:45 Yutaka Matsuo (University of Tokyo)
  Holomorphic field realization of $SHC$ and quantum geometry of quiver gauge theories
Thematic Program 2015 | Program Code: 2015FBS

Frontiers of Brain Science

[International Symposium] Tools and Technologies

- Event Organizers
  - Hiromu Tanimoto (Tohoku University)
  - Ko Matsui (Tohoku University)
- [Workshop]
  - Date: Tuesday, July 21, 2015 - Friday, July 24, 2015
  - Venue: Tohoku Medical Megabank Building
  - Department of Medicine at Seiyo Campus, Tohoku University
  - Participants: 66
- Workshop Lectures
  - Tuesday, July 21, 2015
    13:40 - 14:20 Haruo Mizutani (Harvard University)
    The suite of connectomic technologies
  - Friday, July 24, 2015
    15:00 - 15:40 Valentin Nagerl (University of Bordeaux)
    Imaging neurons and synapses at the nanoscale by STED microscopy

[Symposium]

- Date: Saturday, July 25, 2015 - Monday, July 27, 2015
- Venue: TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
- Participants: 120
- Symposium Speakers
  - Shu Kondo (National Institute of Genetics)
  - Frontiers of genome engineering in animal genetics: how CRISPR/Cas9 is changing Drosophila research
  - Katrin Vogt (Max Planck Institute of Neurobiology)
  - Dissecting a visual learning circuit in the Drosophila mushroom body
  - Koichi Hashimoto (Tohoku University)
  - Machine vision and robotics in biology
  - Masao Tachibana (University of Tokyo)
  - Processing of dynamic visual images in the retina

[International Symposium] Development and Disease

- Date: Monday, August 24, 2015 - Wednesday, August 26, 2015
- Venue: Auditorium of the International Center for Smart Aging Research, Seiyo Campus, Tohoku University
- Event Organizers
  - Yasuyuki Taki (Tohoku University)
- [Workshop]
  - Date: Monday, August 24, 2015
  - Participants: 100
- Time Schedule
  - Monday, August 24, 2015
    [All: Lab Tour/discussion]
    12:00 Registration
    13:00 Ryuta Kawashima (Dean, IDAC, Tohoku University)
    Welcome
    [Session 1: Brain Development]
    13:10 Francois Guillenet (The Francis Crick Institute)
    Signals and factors controlling stem cell activity in the adult brain
    14:10 Shubha Tole (Tata Institute of Fundamental Research)
    Early patterning of the cortical primordium
    14:50 Short talk 1
      (1) Takakuo Kikawa (15 min.)
      Dmrt1 genes differentially participate in Cajal-Reidtzius cell development of the cerebral cortex
      (2) Dan Dinh Wang (15 min.)
      Imaging RNA in Living Neuronal Circuits with Hybridization-sensitive Fluorescent Probes
    15:20 Break
    15:40 Tomomi Shimogori (RIKEN BS)
    Input from the thalamus creates diversity of the cortical neurons
    16:20 Goichi Miyoshi (RISE Lab, New York University)
    Assembly of neocortical circuitry by FoxG1, a gene associated with neurocognitive disorders
    16:50 Yusuke Hiyabashy (Columbia University)
    Exploring the role of the mitochondria/endoplasmic reticulum (ER) interface in axonal development
    18:00 Get together @ Lobby of the same building

Tuesday, August 25, 2015

[Session 2: Brain Evolution]
  09:10 Wieland Rüttner (Max Planck Institute, Dresden)
  Neural stem and progenitor cells and neocortex expansion in development and evolution
  10:10 Short talk 2
    (1) Takuji Imamura (15 min.)
    Gene-activation-associated long non-coding RNAs for species-dependent epigenome formation
    (2) Kouta Kanno (15 min.)
    Individual differences of courtship ultrasonic vocalizations and its neuronal correlates in male mice
  10:40 Break
  11:00 Erich Jarvis (Duke University Medical Center)
  Brain evolution of complex behavioral traits: vocal learning and spoken language
  11:40 Short talk 3
    (1) Asuka Matsui (15 min.)
    Neural activity dependent BTBD3 translocation to the cytoskeleton is essential for proper dendrite development
    (2) Carina Hanashima (15 min.)
    Neuronal subtype specification in establishing the cerebral cortex
  12:10 Lunch & Poster session

[Session 3: Models for Neurodevelopmental Disease]
  14:00 Noboru Hirai (Albert Einstein College of Medicine)
  Postnatal neurogenesis and dimensional features of autism in a genetic mouse model of 22q11.2 copy number variants
  14:40 Noriko Osumi (Tohoku University)
  Crosstalk between Pa6X haploinsufficiency and paternal aging in modulating offspring behavior: a possible role for epigenetic modification
  15:20 Break

[Session 4: Clinical Studies of Neurodevelopmental Disease]
  15:40 Short talk 4
    Mikio Hirosho (30 min.)
    Analysis of autism susceptibility candidate 2 gene during development
16:10 Stephan Sanders (UCSF)
Genomic architecture and gene discovery in autism spectrum disorder

16:50 Hitoden Yamasue (University of Tokyo)
Crosstalk between neuroscience and clinical psychiatry with oxytocin in a neurodevelopmental disorder

17:30 Reception @Lobby of the same building

Wednesday, August 26, 2015
09:30 Yasuyuki Taki (Tohoku University)
Brain development using magnetic resonance imaging in healthy children

10:10 Kenji Tsuchiya (Hamamatsu University School of Medicine)
Neurodevelopmental Trajectories of Children with Autism Spectrum Disorder

10:50 Break

[International Symposium] Memory and Mind

- Event Organizers
  - Kaoru Inokuchi (University of Toyama)
  - Ken-Ichiro Tsutsui (Tohoku University)

- Special Seminar
  - Date: Sunday, September 27, 2015
  - Venue: TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
  - Speaker: Shin'网友们take Shimojo (Caltech)

- Symposium
  - Date: Monday, September 28, 2015 - Tuesday, September 29, 2015
  - Venue: Sakura Hall, Katahira Campus, Tohoku University
  - Participants: 200

- Speakers List
  - Monday, September 28, 2015
    - Susumu Tonegawa (MIT / RIKEN BSI) (Plenary Lecture)
    - Richard Morris (University of Edinburgh)
    - Shin'网友们take Shimojo (Caltech)
    - Georg Nortoft (University of Ottawa)
    - Mitsuo Kawato (ATR)
    - Kazuyuki Aihara (University of Tokyo)
    - Kaoru Inokuchi (University of Toyama)
  - Tuesday, September 29, 2015
    - Toshiyuki Hiraibayashi (Natl. Inst. Radiol. Sci.)
    - Satoshi Kida (Tokyo University of Agriculture)
    - Tom McHugh (RIKEN BSI)
    - Joshua Johansen (RIKEN BSI)
    - Hideaki Takeuchi (Okayama University)
    - Masatoshi Yoshida (Natl. Inst. Physiol. Sci.)
    - Takakori Uka (Univ. of Tokyo)
    - Takuya Hayashi (RIKEN Cent. for Life Sci. Tech.)
    - Akira Murata (Kinki University)
    - Ken-Ichiro Tsutsui (Tohoku University)

- Time Schedule
  - Monday, September 28, 2015
    - 09:30 - 09:45 Opening Remarks
    - 10:00 - 11:20 Kaoru Inokuchi (University of Toyama)
    - 11:20 - 12:00 Kazuyuki Aihara (University of Tokyo)
  - Tuesday, September 29, 2015
    - 10:40 - 11:20 Kaoru Inokuchi (University of Toyama)
    - 11:20 - 12:00 Kazuyuki Aihara (University of Tokyo)
    - 13:00 - 14:10 Plenary Lecture
      - Susumu Tonegawa (MIT / RIKEN BSI) (Coffee break 10min)
      - Mitsuo Kawato (ATR) (Coffee break 10min)
    - 14:20 - 15:10 Shin'网友们take Shimojo (Caltech)
    - 15:10 - 15:50 Mitsuo Kawato (ATR) (Coffee break 10min)
    - 16:00 - 16:50 Tom McHugh (RIKEN BSI) (Coffee break 10min)
    - 16:50 - 17:30 Closing Remarks
    - 18:00 Reception at Westin Hotel Sendai

[Other Related Event] Neuroimaging and its impact on our lives

- Date: Monday, July 28, 2015
- Venue: Kobe International Conference Center, Room 501 + Lounge
- Invited Speaker
  - Steven Laureys (University and University Hospital of Liège)
- Event Organizer
  - Manabu Tashiro (Tohoku University)
- Participants: 80
- Time Schedule
  - 10:00 - 12:00 Nobuyuki Okamura (Tohoku University)
  - 13:00 - 15:00 Steven Laureys (University and University Hospital of Liège)
  - 16:00 - 17:30 Tatsuya Hatsumi (RIKEN BSI) (Coffee break 15min)

[Other Related Event] Ethics Seminar by Prof. Shubha Tole

- Date and time: Thursday, August 27, 2015 10:00 - 12:00
- Venue: TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
- Speaker: Shubha Tole (Tata Institute of Fundamental Research)
- Title: Dealing with difficult scientific situations ethically
- Participants: 6
[Other Related Event] Public Talk by Nobel Laureate Prof. Susumu Tonegawa

- Date: Sunday, September 27, 2015
- Venue: Kawauchi Hagii Hall, Tohoku University
- Hosted by:
  - Tohoku University
  - The Yomiuri Shimbun
- Participants: 800
- Time Schedule
  13:00 - 14:00 Toshio Eijima (Brain Science Center, Tohoku University)
  Why happy memories remain in our mind/brain through our life?
  Noriko Osumi (Graduate School of Medicine, Tohoku University)
  New neurons are generated in the hippocampus for lifetime
  Hiroaki Tomita (Department of Disaster Psychiatry, International Research Institute of Disaster Science, Tohoku University)
  How to cope with bitter memories
  14:15 - 15:20 Susumu Tonegawa (MIT / RIKEN BSI)
  Mechanism of the memory and scheme of the mind
  15:30 - 16:30 Discussion

[Other Related Event] Research Publications Seminar by Prof. Charles Yokoyama

- Date and time: Wednesday, September 30, 2015 10:00 - 11:30
- Venue: 2nd Lecture Room, School of Medicine Building 1, Tohoku University Graduate School of Medicine, Seiryo Campus, Tohoku University
- Speaker: Charles Yokoyama (RIKEN Brain Science Institute)
- Title: Essential Skills for Publishing High Impact Research Papers


- Date: Wednesday, November 25, 2015 - Friday, November 27, 2015
- Venue: Life Science Project Research Building, Katahira Campus, Tohoku University
- Event Organizers
  - Toshio Eijima (Tohoku University)
  - Menno P Witter (Norwegian University of Science and Technology (NTNU))
- Participants: 100
- Opening Lecture: Wednesday, November 25, 2015 17:45 - 19:00
  Edward Ingold Maxer (Laureate of 2014 Nobel Prize in Physiology or Medicine)
  The discovery of grid cells, spatial navigation and cognitive neuroscience
- Oral and Poster Presentations: Thursday, November 26, 2015 - Friday, November 27, 2015 9:00 - 18:00

[Other Related Event] Intensive Course: Academic English for Researchers

- Date and time: Monday, March 7, 2016 - Friday, March 18, 2016 9:30 - 16:00
- Venue: Life Science Project Research Building, Katahira Campus, Tohoku University
- Instructor: Russell Mayne and Dan Jones (English Language Teaching Unit, University of Leicester)

Thematic Program 2015 | Program Code:2015SPN

Spintronics: from Mathematics to Devices

[Event] Elementary Spintronics School

- Date and time: Monday, September 14, 2015 - Friday, December 11, 2015 16:20 - 17:50
- Venue: TOKYO ELECRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
- Event Organizers
  - Fumihito Matsuura (Tohoku University)
  - Kentaro Nomura (Tohoku University)
- Participants: 40
- Time Schedule
  Tuesday, September 29, 2015
  Guril E. W. Bauer (IMR Tohoku University)
  Introduction to spintronics
  Friday, October 2, 2015
  Wolfgang Belzig (University of Konstanz)
  Circuit methods in spintronics and quantum transport
  Tuesday, October 13, 2015
  Yaroslav Blanter (Delft University of Technology)
  Cavity QED
  Friday, October 16, 2015
  Anton Akhmerov (Delft University of Technology)
  Topological Insulators and Majorana fermions
  Friday, October 23, 2015
  Ke Xia (Beijing Normal University)
  Computational spin transport in nanostructure
- Friday, October 30, 2015
  So Takei (Queens College of the City University of New York)
  Spin superfluidity
  Friday, November 6, 2015
  Tomasz Dietl (Polish Academy of Sciences)
  Electric-field effects on magnetism
  Tuesday, November 10, 2015
  Oleg Tretiakov (MR Tohoku University)
  Magnetization dynamics and motion of topological spin textures
  Tuesday, November 24, 2015
  Tomasz Dietl (Polish Academy of Sciences)
  Electric-current effects on magnetism
- Friday, November 27, 2015
  Fumihito Matsuura (IMR Tohoku University)
  Ferromagnetic semiconductors
  Monday, December 7, 2015
  Kentaro Nomura (IMR Tohoku University)
  Topological Insulators and Weyl semimetals
  Friday, December 11, 2015
  Junzaku Nitta (Tohoku University)
  Spin-orbitronics
### Mathematical Approach to Topological Phases in Spintronics

**Date:** Monday, October 5, 2015 - Friday, October 9, 2015  
**Venue:** TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Kajahira Campus, Tohoku University  
**Event Organizers:**  
- Motoko Kotani (Tohoku University, Chair)  
- Jean Bellissard (Georgia Tech.)  
- Pavel Exner (Czech Tech. University)  
- Peter Kuchment (Texas A&M)  
- Graeme Milton (University of Utah)  
- Zagrebnov Valentin (Université d’Aix-Marseille)  
**Participants:** 60  
**Invited speakers:**  
- Anton Akhmerov (Delft University of Technology)  
- Christopher Bourne (Australian National University)  
- Peter Bouwknegt (Australian National University)  
- Alan Carey (Australian National University)  
- Rembert Duine (Utrecht University)  
- Mikio Furuta (University of Tokyo)  
- Gian-Michele Graf (ETH)  
- Koji Hashimoto (Osaka University)  
- Johannes Kellendonk (Université Lyon I)  
- Liang Kong (University of New Hampshire, Harvard University)  
- Yosuke Kubota (University of Tokyo)  
- Max Lein (Tohoku University)  
- Spyridon Michalakis (Caltech)  
- Graeme Milton (University of Utah)  
- Shulich Murakami (Tokyo Institute of Technology)  
- Bruno Nachtergaele (University of California Davis)  
- Giuseppe Nittis (Pontificia Universidad Católica de Chile)  
- Kentaro Nomura (Tohoku University)  
- Franco Nori (RIKEN and University of Michigan)  
- Emil V. Prodan (Yeshiva University)  
- Shinsei Ryu (University of Illinois)  
- Koji Sato (Tohoku University)  
- Akinori Tanaka (RIKEN)  
**Time Schedule:**  
- **Monday, October 5, 2015**  
  - 10:00 - 10:50 Bruno Nachtergaele (University of California Davis)  
  - 11:00 - 11:50 Gian-Michele Graf (ETH)  
  - Lunch Break  
  - 14:00 - 14:50 Mikio Furuta (University of Tokyo)  
  - 15:00 - 15:40 Yosuke Kubota (University of Tokyo)  
- **Wednesday, October 7, 2015**  
  - 10:00 - 10:50 Spyridon Michalakis (Caltech)  
  - 11:00 - 11:50 Liang Kong (University of New Hampshire, Harvard University)  
  - Lunch Break  
  - 14:00 - 14:50 Alan Carey (Australian National University)  
  - 15:00 - 15:40 Christopher Bourne (Australian National University)  
  - 16:10 - 16:50 Giuseppe Nittis (Pontificia Universidad Católica de Chile)  
- **Thursday, October 8, 2015**  
  - 10:00 - 10:50 Bruno Nachtergaele (University of California Davis)  
  - 11:00 - 11:30 Shulich Murakami (Tokyo Institute of Technology)  
  - Lunch Break  
  - 14:00 - 14:50 Kentaro Nomura (Tohoku University)  
  - 15:00 - 15:40 Alan Carey (Australian National University)  
  - 15:50 - 16:30 Koji Sato (Tohoku University)  
  - 16:40 - 17:20 Rembert Duine (University of Utrecht)  
- **Friday, October 9, 2015**  
  - 10:00 - 10:50 Shinsei Ryu (University of Illinois at Urbana-Champaign)  
  - 11:00 - 11:50 France Nori (RIKEN and University of Michigan)  

#### Hyperfine coupling and spin polarization in the bulk of the topological insulator Bi2Se3  
- Dominik Zumbühl (University of Basel)  
- Helical nuclear spin order in GaAs quantum wires  

### Quantum Nanostructures and Electron-Nuclear Spin Interactions

**Date:** Monday, October 19, 2015 - Wednesday, October 21, 2015  
**Venue:** TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Kajahira Campus, Tohoku University  
**Event Organizers:**  
- Yoshio Hirayama (Tohoku University)  
- Koji Muraki (NTT)  
**Participants:** 79  
**Invited speakers:**  
- Klaus von Klitzing (Max Planck Institute)  
- Masashi Kawasaki (University of Tokyo)  
- Toshiyuki Tsuchiya (National Institute of Advanced Industrial Science and Technology)  
- Koji Muraki (NTT)  
- Tohru Ishikawa (Osaka University)  
- Yutaka Tanaka (Tohoku University)  
- Yukihiro Tsuchiya (NTT)  
- Toshihiko Akiyama (University of Tokyo)  
- Takashi Nakajima (RIKEN)  
- Kentaro Nomura (Tohoku University)  
- BrunoNachtergaele (University of California Davis)  
- Luigi Pati (University of Rome)  
- Stefan Riedel (Karlsruhe Institute of Technology)  
- portable_topological_insulator  
- Mineo Hasegawa (Osaka University)  
- Daichi Fujita (University of Tokyo)  
- Yukio Murakami (RIKEN)  
- Noriaki Tanaka (Tohoku University)  
- Takayoshi Tanaka (RIKEN)  
- Takeshi Kouda (Tohoku University)  
- Yutaka Tanaka (NTT)  
- Tomoki Matsuoka (Okayama University)  
- Tomoki Matsuoka (University of Tokyo)  
- Quantum transport in van der Waals junctions of graphene and 2D materials  
- Takashi Nakajima (RIKEN)  
- Generation of locally and non-locally entangled electron spin pairs in a triple quantum dot  
- Yasuhiro Nishitani (Osaka University)  
- Spin transport in mesoscopic superconductors with strong spin-orbit interactions  
- Benjamin Piot (LCM) Grenoble  
- Hyperfine coupling and spin polarization in the bulk of the topological insulator Bi2Se3  
- Dominik Zumbühl (University of Basel)  
- Helical nuclear spin order in GaAs quantum wires  
**Time Schedule:**  
- **Monday, October 19, 2015**  
  - 10:00 - 10:45 Klaus von Klitzing (Keynote speaker)  
  - 10:45 - 11:00 Coffee Break  
  - 11:00 - 11:45 Masashi Kawasaki (Keynote speaker)  
  - 11:45 - 12:00 Takayoshi Tanaka (Keynote speaker)  
  - 12:30 - 14:00 Lunch (90min)  
- **Tuesday, October 20, 2015**  
  - 14:00 - 14:30 Benjam Piot (Invited speaker)  
  - 14:30 - 14:50 Nguyen Han Tu  
  - 14:50 - 15:10 F. Coudreau  
  - 15:10 - 15:40 Coffee Break
[Session 3: Graphene]
15:40 - 16:10 Tomoki Machida (Invited speaker)
16:10 - 16:40 GihHo Lee (Invited speaker)
16:40 - 17:00 N. Kumada
17:00 - 20:00 Poster Session & Discussions

Tuesday, October 20, 2015

[Session 4: Superconductor and hybrid systems]
09:30 - 10:00 Yasunori Nilimi (Invited speaker)
10:00 - 10:30 Russell Deacon (Invited speaker)
10:30 - 10:50 Hiroaki Toida
10:50 - 11:25 Coffee Break

[Session 5: Quantum wires and point contacts]
11:25 - 11:55 Dominik Zubzubi (Invited speaker)
11:55 - 12:15 Minoru Kawamura
12:15 - 12:45 Lunch (Komin)

[Session 6: Quantum dots]
13:45 - 14:15 Toshimasa Fujisawa (Invited speaker)
14:15 - 14:45 Takashi Nakajima (Invited speaker)
14:45 - 15:05 Tomohiro Yamaguchi
15:05 - 15:25 Wataru Iwamida
15:25 - 15:50 Coffee Break

[Event: International Workshop: Spintronics with Antiferromagnets (32nd Reimei Workshop on Frontiers of Condensed Matter Physics)]
- Date: Monday, November 16, 2015 - Tuesday, November 17, 2015
- Venue: TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katsuhira Campus, Tohoku University
- Event Organizers:
  - Oleg Treilakav (Tohoku University)
  - Gerrit Bauer (Tohoku University)
- Participants: 117
- Invited Researchers:
  - Helen Gomoney (National Technical University, Ukraine and JGU)
  - Axel Hoffmann (Argonne National Laboratory)
  - Tomas Jungwirth (Academy of Sciences, Czech Republic)
  - Mathias Klaeui (University of Mainz)
  - Dazhi Hou (Tohoku University)
  - Allan MacDonald (University of Texas at Austin)
  - Sadamichi Maekawa (JAEA)
  - Takahiro Moriyama (Kyoto University)
  - Naoto Nagaosa (RIKEN and University of Tokyo)
  - Qian Niu (University of Texas at Austin)
  - Stuart Parkin (Max Planck Institute - Halle/Saale)
  - Takuya Satoh (Kyushu University)
  - Jairo Sinova (University of Mainz)
  - Gen Tatara (RIKEN)
  - Oleg Tchernyshyov (JHU)
  - Yaroslav Tserkovnyak (UCLA)
  - Maxim Tsol (University of Texas at Austin)
  - Xavier Waintal (CEA Grenoble)
- Time Schedule:
  - Monday, November 16, 2015: all talks 25 mins + 5 mins for questions
    09:20: Opening remarks (Oleg Treilakav)
    09:30: Axel Hoffmann (Argonne National Laboratory) Spin Currents in Antiferromagnets
    10:00: Joseph Bariker (IBM, Tohoku University) Antiferromagnetic Skyrmions
    10:30 - 11:00: Coffee break
    11:00: Tomas Jungwirth (Academy of Sciences, Czech Republic) Antiferromagnetic spintronics
    11:30: Helen Gomoney (National Technical University, Ukraine and JGU) Spinning of spins: ferro-
    vs antiferromagnetic spintronics
    12:00: Sadamichi Maekawa (JAEA) Spin Hall Effects due to Critical Spin Fluctuations in Spin Glass and Other Magnetic States
    12:30 - 14:00: Lunch break
    14:00: Maxim Tsol (University of Texas at Austin) Interconnections between magnetic state and transport currents in antiferromagnetic SrIrO3
  - Tuesday, November 17, 2015
    09:00: Takuya Satoh (Kyushu University) Optical control of antiferromagnetism
    09:30: Jairo Sinova (University of Mainz) Relativistic spin-orbit torques in antiferromagnets and related effects
    10:00 - 10:30: Coffee break
    10:30: Naoto Nagaosa (RIKEN and University of Tokyo) Magnetism and transport in topological insulators
    11:00: Gen Tatara (RIKEN) Thermal vector potential theory of transport induced by temperature gradient
    11:30: Takahiro Moriyama (Kyoto University) Anti-damping spin transfer torque through antiferromagnet
    12:00 - 13:30: Lunch break
    13:30: Xavier Waintal (CEA Grenoble) Ultrafast pulses, spin torque and artificial antiferromagnets
    14:00: Yaroslav Tserkovnyak (UCLA) Collective spin transport through antiferromagnets
    14:30: Stuart Parkin (Max Planck Institute - Halle/Saale) Facet-dependent giant spin orbit torque in single crystalline antiferromagnetic Ir-Mn / ferromagnetic permalloy bilayers
    15:00 - 15:30: Coffee break
    15:30: Mathias Klaeui (University of Mainz) Spin Currents in Antiferromagnets and Ferrimagnets
    16:00: Dazhi Hou (Tohoku University) Electric probe for spin transition and fluctuation
    16:30 - 17:00: Closing remarks (Allan MacDonald)
    19:00: Banquet

[Event: International Workshop: Spintronics (13th RIEC International Workshop on Spintronics)]
- Date: Wednesday, November 18, 2015 - Friday, November 20, 2015
- Venue: Conference Room, Laboratory for Nanoelectronics and Spintronics, Research Institute of Electrical Communication, Katsuhira Campus, Tohoku University
- Event Organizer: Hideo Ono (Tohoku University)
- Participants: 185
- Invited Researchers:
  - Johan Åkerman (University of Gothenburg)
<table>
<thead>
<tr>
<th>Time Schedule</th>
<th>Event: International Workshop: Spintronics VLSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wednesday, November 18, 2015</td>
<td>Date: Friday, November 20, 2015 - Saturday, November 21, 2015</td>
</tr>
<tr>
<td>08:15 - 09:00 Registration</td>
<td>Venue: Conference Room, Laboratory for Nanoelectronics and Spintronics, Kakahira Campus, Tohoku University</td>
</tr>
<tr>
<td>09:00 - 09:15 Hideo Ohno (Organizer, Tohoku University) Opening</td>
<td>Event Organizers: Tetsuo Endoh (Tohoku University), Hideo Ohno (Tohoku University)</td>
</tr>
<tr>
<td>09:15 - 10:00 Stuart Parkin (Max Planck Institute of Microstructure Physics, Martin Luther University Halle-Wittenberg) Racetrack Memory: ready for take-off!</td>
<td>Participants: 79</td>
</tr>
<tr>
<td>10:00 - 10:20 Gen Tatara (RIKEN Center for Emergent Matter Science) Spin electromagnetic field induced by Rashba interaction</td>
<td>Invited Researchers: Seung H. Kang (Qualcomm), Sechung Oh (Samsung Electronics), Yiming Hui (Avalanche), Kang L. Wang (UCLA), Hiroaki Yoda (Tohoku), Ricardo C. Sousa (SpinTC), Koji Nii (Nresasu Electronics), Takahiro Hanyu (Tohoku University), Hiroki Kolke (Tohoku University)</td>
</tr>
<tr>
<td>10:20 - 10:50 Break</td>
<td>Opening remarks: Chair: Tetsuo Endoh (Tohoku University)</td>
</tr>
<tr>
<td>10:50 - 11:20 Aurelien Manchon (King Abdullah University of Science and Technology) Spin-Orbit Torques in Novel Materials</td>
<td>14:20 - 15:00 Kang L. Wang (UCLA) Invited talk 1: Low Dissipation Spin-Orbitronics Systems</td>
</tr>
<tr>
<td>11:20 - 11:40 Mikiho Oogane (Tohoku University) Tunnel magneto resistance effect in MTJs with Mn-based isolated alloys</td>
<td>15:00 - 15:40 Hiroaki Yoda (Tohoku) Invited talk 2: The Progresses of MRAM, the Effect on Energy saving, and The Key to It</td>
</tr>
<tr>
<td>11:40 - 11:50 Photo</td>
<td>15:40 - 16:10 Group Photo &amp; Break</td>
</tr>
<tr>
<td>11:50 - 12:00 Lunch</td>
<td>Chair: Tetsuo Endoh (Tohoku University)</td>
</tr>
<tr>
<td>12:00 - 14:30 Burrkard Hillebrands (Technische Universität Kaiserslautern) Novel transport phenomena using magnonic Bose-Einstein condensates</td>
<td>16:10 - 16:50 Yiming Hui (Avalanche) Invited talk 3: Fully Functional 64Mb pMTJ STT-MRAM Chips on 300nm Wafers</td>
</tr>
<tr>
<td>14:00 - 14:30 Burrkard Hillebrands (Technische Universität Kaiserslautern) Novel transport phenomena using magnonic Bose-Einstein condensates</td>
<td>16:50 - 17:30 Sechung Oh (Samsung) Invited talk 4: Recent advances of STT-MRAM for emerging memory Devices</td>
</tr>
<tr>
<td>14:40 - 15:00 Photo</td>
<td>Opening remarks: Chair: Tetsuo Endoh (Tohoku University)</td>
</tr>
<tr>
<td>15:00 - 15:20 Johan Åkerman (University of Gothenburg, KTH Royal Institute of Technology) Topological and non-topological dynamical solitons in spin torque and spin hall effect driven nano-oscillators</td>
<td>14:20 - 15:00 Kang L. Wang (UCLA) Invited talk 1: Low Dissipation Spin-Orbitronics Systems</td>
</tr>
<tr>
<td>15:20 - 15:50 Break</td>
<td>15:00 - 15:40 Hiroaki Yoda (Tohoku) Invited talk 2: The Progresses of MRAM, the Effect on Energy saving, and The Key to It</td>
</tr>
<tr>
<td>15:50 - 16:20 Claudia Fesler (Max Planck Institute of Chemical Physics of Solids) Magnetism in Mn-rich Heusler compounds</td>
<td>15:40 - 16:10 Group Photo &amp; Break</td>
</tr>
<tr>
<td>16:20 - 16:40 Masatumi Yamamoto (Hokkaido University) Half-metallic Heusler alloys as spin sources of spintronic devices</td>
<td>Chair: Tetsuo Endoh (Tohoku University)</td>
</tr>
<tr>
<td>16:40 - 17:00 Masatumi Shirai (Tohoku University) Electronic Structure at Interfaces between Heusler alloys and MgO</td>
<td>14:20 - 15:00 Kang L. Wang (UCLA) Invited talk 1: Low Dissipation Spin-Orbitronics Systems</td>
</tr>
<tr>
<td>Thursday, November 19, 2015</td>
<td>15:00 - 15:40 Hiroaki Yoda (Tohoku) Invited talk 2: The Progresses of MRAM, the Effect on Energy saving, and The Key to It</td>
</tr>
<tr>
<td>09:00 - 09:45 David Awschalom (University of Chicago) Quantum Technologies Based on Spins in Semiconductors</td>
<td>15:40 - 16:10 Group Photo &amp; Break</td>
</tr>
<tr>
<td>09:45 - 10:15 Dieter Weiss (University of Regensburg) Transport and magnetocapacitance in HgTe-based topological insulators</td>
<td>Chair: Tetsuo Endoh (Tohoku University)</td>
</tr>
<tr>
<td>10:15 - 10:45 Break</td>
<td>14:20 - 15:00 Kang L. Wang (UCLA) Invited talk 1: Low Dissipation Spin-Orbitronics Systems</td>
</tr>
<tr>
<td>10:45 - 11:15 Kang L. Wang (University of California, Los Angeles) Topological Insulators: Quantum Anomalous Hall and Spintronics</td>
<td>15:00 - 15:30 Masahito Kawai (University of Tokyo) Quantum Anomalous Hall Effect in Topological Insulator Heterostructures</td>
</tr>
<tr>
<td>11:15 - 11:35 Shunsuke Fukami (Tohoku University) Spin-orbit torque switching for three-terminal spintronics devices</td>
<td>15:30 - 17:30 Poster Session</td>
</tr>
<tr>
<td>11:35 - 11:55 Teruo Oto (Kyoto University) Orbital Magnetism on the Dzyaloshinskii-Moriya Interaction</td>
<td>17:30 - 18:00 Transfer</td>
</tr>
<tr>
<td>11:55 - 14:00 Lunch</td>
<td>18:00 - 20:00 Banquet</td>
</tr>
<tr>
<td>14:00 - 14:30 Andrei Slavin (Oakland University) Mechanism of a spin current transformation in an antiferromagnetic insulator</td>
<td>Friday, November 20, 2015</td>
</tr>
<tr>
<td>14:30 - 15:00 Tomasz Dietl (Polish Academy of Sciences, University of Warsaw, Tohoku University) Spin-spin interactions in topological materials doped with transition metals</td>
<td>09:00 - 09:30 Geoffrey Beach (Massachusetts Institute of Technology) Spin orbit torques and chiral spin textures in ultrathin magnetic films</td>
</tr>
<tr>
<td>15:00 - 15:30 Masahito Kawai (University of Tokyo) Quantum Anomalous Hall Effect in Topological Insulator Heterostructures</td>
<td>09:30 - 09:50 Masahito Kawai (National Institute for Materials Science) Electrically and thermally generated spin current in heavy metals</td>
</tr>
<tr>
<td>15:30 - 17:30 Poster Session</td>
<td>09:50 - 10:20 Break</td>
</tr>
<tr>
<td>17:30 - 18:00 Transfer</td>
<td>10:20 - 10:50 Charles Lambert (Université de Lorraine) All-Optical Helicity-Dependent Switching in Spintronic Devices</td>
</tr>
<tr>
<td>18:00 - 20:00 Banquet</td>
<td>10:50 - 11:20 Julie Grollier (Université Paris Sud) Nanodevices for bio-inspired computing</td>
</tr>
</tbody>
</table>
Saturday, November 21, 2015
Chair: Takahiro Hanyu (Tohoku University)
10:00 - 11:10
Invited talk 5: Overview of embedded SRAM/DRAM, and prospect of STT-MRAM technology for advanced SoC solutions
Koji Nii (Renesas Electronics)
11:10 - 11:50
Invited talk 6: Emergence of STT-MRAM as a Unified Embedded Memory for Internet-of-Things
Seung H. Kang (Qualcomm)
11:50 - 12:40 Lunch
Chair: Takahiro Hanyu (Tohoku University)
13:00 - 14:00
Invited talk 7: High-Density and Low-Power Applications of Spintronics Circuits: High-Density 1T/MTJ-MRAM Array Design, and Low-Power 4T2MTJ-MRAM-based Pattern Recognition Processor
Hiroki Keke (Tohoku University)
14:00 - 15:20
Invited talk 8: MRAM for hybrid CMOS/Magnetic electronics: perpendicular anisotropy and integrated logic concepts
Ricardo C. Sousa (SpinTec)
15:20 - 17:00 Reception and Poster Session
Chair: Shuobu Endoh (Tohoku University)
17:00 - 18:00 Invited talk 9: Spintronics-Based Logic-in-Memory Architecture Towards Dark Silicon Era
Tetsuo Endoh (Tohoku University)
18:00 - 20:00 Dinner

International Workshop: Spin Energy Materials

Date: Thursday, December 3, 2015 - Friday, December 4, 2015
Venue: TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University

Event Organizers:
- Masaki Mizuguchi (Tohoku University)
- Ryo Itochi (Tohoku University)
- Gerrit Bauer (Tosoh University)
- Kenta Ito (Tohoku University)

Participants: 49
Invited Speakers:
- Felix Casanova (NanoGUNE)
- Oliver Klein (CAE-RAMS)
- Roberto Myers (Ohio State University)
- Ke Xia (Beijing Normal University)
- Joseph Barker (Tohoku University)

Time Schedule
Thursday, December 3, 2015
12:00 Reception open
13:00 Opening remark
13:10 Roberto Myers (Ohio State University)
Lateral spin diffusion in Yttrium Iron Garnet
14:00 Oliver Klein (SpinTec)
Influence of the inhomogeneous broadening on spin transfer effects
14:50 Break (30 min.)
15:20 Sadamichi Maekawa (JAEA)
Spin and Heat
16:00 Koji Usami (University of Tokyo)
Bidirectional conversion between microwave and light via ferromagnetic magnons
16:40 Gen Tatara (RIKEN)
Thermal vector potential theory of magnetization dynamics driven by a temperature gradient

Special Seminars by Prof. Mauro Ferreira and Prof. Wolfgang Belzig

Date and time: Thursday, September 24, 2015
Venue: TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University

Friedel oscillations in graphene: from flawed DFT calculations to sublattice segregation of dopants
Prof. Wolfgang Belzig, University of Konstanz
Cooling a nanomechanical resonator using spin-dependent and superconducting electron transport
Prof. Mauro Ferreira, Trinity College Dublin

Information 2015
### Seminar: Special Seminar by Prof. Bart van Wees
- **Date and time:** Thursday, October 29, 2015, 14:00 - 15:30
- **Venue:** TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
- **The lecture:** Bart van Wees (Groningen University)
  - Spintronics with the ferromagnetic insulator YIG and its sandwich with graphene

### Seminar: Special Seminars by Prof. Axel Hoffmann, Assistant Prof. Mikhail Titov and Prof. Xavier Waintal
- **Date and time:** Thursday, November 26, 2015, 14:00 - 16:30
- **Venue:** TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
- **Speakers:**
  - Axel Hoffmann (Argonne National Laboratory)
  - Mikhail Titov (Radboud University Nijmegen)
  - Xavier Waintal (CEA Grenoble)
- **Time Schedule:**
  - 14:00 - Thierry Valet (SPICE Center, Johannes Gutenberg University, Mainz)
  - 14:45 - Manipulating Room Temperature Magnetic Skyrmions
    - Mikhail Titov (Radboud University Nijmegen)
  - 15:30 - Anomalous Hall effect due to skew scattering on rare impurity configurations
    - Xavier Waintal (CEA Grenoble)

### Seminar: Special Seminars by Prof. Thierry Valet and Prof. Helen Gomonay
- **Date and time:** Tuesday, December 1, 2015, 14:00 - 15:30
- **Venue:** TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
- **Speakers:**
  - Thierry Valet (SPICE Center, Johannes Gutenberg University, Mainz)
  - Helen Gomonay (SPICE Center, Johannes Gutenberg University, Mainz)
- **Time Schedule:**
  - 14:00 - Thierry Valet (SPICE Center, Johannes Gutenberg University, Mainz)
  - 14:45 - Spectral Methods for Micro-magnetic Simulations
    - Helen Gomonay (SPICE Center, Johannes Gutenberg University, Mainz)
  - 15:30 - Berry-phase effects in noncollinear antiferromagnets

### Thematic Program 2015 | Program Code: 2015INE

**The Effects of Technological Changes on Social Mobility and Income Distribution**

#### Event: Follow-up Seminars on Technological Change and Income Distribution
- **Date:** Monday, September 28, 2015
- **Venue:** The 3rd Lecture Room, 1F, Graduate School of Economics and Management, Kawauchi South Campus, Tohoku University
- **Invited Researchers:**
  - Antonio D’Agata (University of Catania)
  - Jun Matsuyama (University of Toyama)
- **Participants:** 8
- **Time Schedule:**
  - Monday, September 28, 2015, 10:00 - 12:00
  - Antonio D’Agata (University of Catania)
  - Kenji Mori (Tohoku University)
- **An Analytical Foundation of the Classical View of Long-Period Prices with Differential Profit Rates**
  - 13:00 - Junsuke Iminami (University of Toyama)
  - Poverty Measurement from a Multidimensional Perspective
  - 14:30 - Takahiko Kan (Tohoku University)
  - A Game-Theoretic Reinterpretation of the Theory of Moral Sentiments

#### Event: Seminar series on Economic Inequalities and Economic Crises - History and Theory
- **Date:** Every Monday, October 19, 2015, to December 7, 2015, at 14:40 - 17:30
- **Venue:** The 3rd Small Lecture Room, Multidisciplinary Research Building, Kawauchi South Campus, Tohoku University
- **Instructor:** Michael R. Krätke (Lancaster University)
- **Invited Researchers:**
  - Amrita Dutt (University of Notre Dame)
  - Simon Mohun (Queen Mary University of London)
  - Soon Ryoo (Adelphi University)
  - Gilbert Sklansky (Westend University)
  - Peter Skott (University of Massachusetts Amherst)
  - Soh Kaneko (Keio University)
  - Takeshi Ohno (Doshisha University)
  - Hiroaki Sasaki (Kyoto University)
- **Participants:** 18
- **Time Schedule:**
  - November 16, 2015: 14:40 - 17:30
  - November 30, 2015: 14:40 - 17:30
- **Event Organizer:** Kazuhiro Kurose (Tohoku University)

#### Event: Workshop on Analytical Political Economy
- **Date:** Tuesday, November 24, 2015, to Wednesday, November 25, 2015
- **Venue:** TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University
- **Invited Researchers:**
  - Hiroyuki Yoshida (Nihon University)
  - Naoki Yoshinaga (Hitotsubashi University)
  - Kazuhiro Kurose (Tohoku University)
  - Event Organizer
- **Participants:** 18
- **Time Schedule:**
  - November 24, 2015, 08:30 - 09:00: Opening Address
  - 09:00 - 10:00: Technical Change, Capital Accumulation, and Distribution
### Workshop on Globalization and Youth Labour Market

**Date:** Sunday, December 6, 2015 - Saturday, December 12, 2015  
**Invited Researcher:**  
- Mary Brinton (Harvard University)  
- Event Organizer:  
  - Yoshimichi Sato (Tohoku University)  
**Participants:** 15  
**Time Schedule:**  
- Workshop on Globalization and Youth Labour Market  
  
  **Date and time:** Tuesday, December 8, 2015 10:30 - 12:00  
  **Venue:** Seminar Room 605, Graduate School of Arts and Letters, Kawauchi South Campus, Tohoku University  
- Workshop on International Comparison of Gender, Fertility and Happiness  
  
  **Date and time:** Thursday, December 10, 2015 10:30 - 12:00  
  **Venue:** Main Meeting Room, 4F, Graduate School of Economy and Management, Kawauchi South Campus, Tohoku University  
- Quattro Seminars on Humanities and Social Sciences, URA and Tohoku Forum for Creativity Collaboration Project, Tohoku University — "The Effects of Globalization on Youth Labour Market and Educational Inequality"  
  
  **Date and time:** Friday, December 11, 2015 16:20 - 17:50  
  **Venue:** Middle Conference Room, 11F, New Humanities Building, Kawauchi South Campus, Tohoku University

### Workshop on Globalization and Educational Inequality

**Date:** Wednesday, December 9, 2015 - Wednesday, December 16, 2015  
**Invited Researcher:**  
- Hyunjoon Park (University of Pennsylvania)  
- Event Organizer:  
  - Yoshimichi Sato (Tohoku University)  
**Participants:** 15  
**Time Schedule:**  
- Workshop on International Comparison of Gender, Fertility and Happiness  
  
  **Date and time:** Thursday, December 10, 2015 10:30 - 12:00  
  **Venue:** Main Meeting Room, 4F, Graduate School of Economy and Management, Kawauchi South Campus, Tohoku University  
- Quattro Seminars on Humanities and Social Sciences, URA and Tohoku Forum for Creativity Collaboration Project, Tohoku University — "The Effects of Globalization on Youth Labour Market and Educational Inequality"  
  
  **Date and time:** Friday, December 11, 2015 16:20 - 17:50  
  **Venue:** Middle Conference Room, 11F, New Humanities Building, Kawauchi South Campus, Tohoku University  
- Workshop on Globalization and Educational Inequality  
  
  **Date and time:** Monday, December 14, 2015 13:00 - 14:00  
  **Venue:** Seminar Room 607, Graduate School of Arts and Letters, Kawauchi South Campus, Tohoku University

### Special Event: Workshop on International Comparison of Gender, Fertility and Happiness

**Date and time:** Thursday, December 10, 2015 10:30 - 12:00  
**Venue:** Main Meeting Room, 4F, Graduate School of Economics and Management, Kawauchi South Campus, Tohoku University  
**Speaker:**  
- Hiroshi Yoshida (Director of the Research Center for Aged Economics and Society, Graduate School of Economy and Management, Tohoku University)  
**Commentators:**  
- Mary Brinton (Harvard University)  
- Hyunjoon Park (University of Pennsylvania)  
- Michael Kratke (Lancaster University)  
**Event Organizer:**  
- Hiroshi Yoshida (Tohoku University)  
**Supported by:**  
- Graduate School of Economics and Management, Tohoku University  
- The Research Center for Aged Economy and Society  
- Special Seminar on Society and Economy  
- Special Seminar on Health and Welfare Policy
Other Activities

**TOKYO ELEKTRO House of Creativity Inauguration Ceremony**
- **Date:** Tuesday, May 12, 2015
- **Completion ceremony:** 15:00 - 17:00
- **Private viewing:** 17:00 - 17:10
- **Exchange meeting:** 17:20 - 19:00
- **Venue:** TOKYO ELEKTRO House of Creativity, Tohoku University
- **Program:** MC: Prof. Yoshiaki Maeda, Vice Director of Tohoku Forum for Creativity
- **Address:** from Prof. Susumu Satomi, President of Tohoku University
- **Address:** from Prof. Sadayoshi Ito, Director of Tohoku Forum for Creativity and Executive Vice President (for Research)
- **Address from special guests:**
  - Mr. Tetsuru Higash, Chairman, President & CEO of TOKYO ELECTRO
  - Mr. Toshiyuki Suzuki, Director of Scientific Research Aid Division, Research Promotion Bureau, MEXT
- **Keynote Lectures:**
  1) Prof. Nobuhiko Terui, Director of DSSR, Tohoku University
     "Challenges for Big Data in our Society: Statistical Analysis of Large Scale, High Dimensional Data for Socio-Economic Problems"
  2) Prof. Fumihiko Inamura, Director of IRDEs, Tohoku University
     "Recovery from the Great East Japan Earthquake and Tsunami: Future Strategies for Disaster Risk Reduction"
  3) Prof. Masayuki Yamamoto, Executive Director of TohWIo, Tohoku University
     "A Health Informatics Infrastructure for a New Era"

**German-Japanese bilateral research project, 2015: International Conference "Stochastic Analysis and Applications"**
- **Date:** Monday, August 31, 2015 - Friday, September 4, 2015
- **Venue:** Sakairi Hall, Katarina Campus, Tohoku University
- **Hosted by:** Mathematical Institute, Tohoku University
- **Supported by:** Japan Society for the Promotion of Science (JSPS Kakenhi)
- **Tohoku Forum for Creativity
- **Event Organizers:**
  - Shigeki Aida (Tohoku University)
  - Hiroshi Kawabi (Okayama University)
  - Seiichiro Kusuoka (Tohoku University)
  - Kazumasa Kudawada (Tokyo Institute of Technology)
  - Yukishio Shiozawa (Okayama University)
  - Masayoshi Takeda (Tohoku University)
- **Speakers:**
  - Sebastian Andres (University of Bonn)
  - Martin Grothaus (TU Kaiserslautern)
  - Martin Hairer (University of Warwick)
  - Fumio Hiroshima (Kyushu University)
  - Walter Hoh (University of Bielefeld)
  - Martin Huesmann (University of Bonn)
  - Yuzuru Inahama (Nagoya University)
  - Naotaka Kajino (Kobe University)
  - Hiroshi Kawabi (Okayama University)
  - Panki Kim (Seoul National University)
  - Seiichiro Kusuoka (Tohoku University)
  - Kazumasa Kudawada (Tokyo Institute of Technology)
  - Kazunori Kuwae (Fukuoka University)
  - Xiaodong Liu (Chinese Academy of Sciences)
  - Xiaoye Mei (University of Warwick)
  - Song Liang (University of Tsukuba)
  - Wolfgang Lühr (University of Duisburg-Essen)
  - Jun Masamune (Tohoku University)
  - Yukio Nagahata (Nagata University)
  - Nobuki Nagatama (Okayama University)
  - Makoto Nakashima (University of Tsukuba)
  - Stefan Neukamm (TU Dresden)
  - Max von Renesse (University of Leipzig)
  - Michael Röckner (University of Bielefeld)
  - Nikolai Sandr (TU Dresden)
  - Ichiro Shigekawa (Kyoto University)
  - Yukishio Shiozawa (Okayama University)
  - Karl-Theodor Sturm (University of Bonn)
  - Ryosuke Tanaka (Tohoku University)
  - Hideki Tanemura (Chiba University)
  - Gerald Trutnau (Seoul National University)
  - Masaki Wada (Tohoku University)
- **Time Schedule:**
  - **Monday, August 31, 2015**
    - **09:00 - 10:15** Registration
    - **10:15 - 10:50** Michael Röckner (University of Bielefeld)
      - Infinite dimensional continuity and Fokker-Planck-Kolmogorov equations
    - **11:00 - 11:35** Ichiro Shigekawa (Kyoto University)
      - The logarithmic Sobolev inequality and the convergence of a semigroup in the Zygmund space
    - **11:45 - 12:20** Panxi Kim (Seoul National University)
      - Minimal thickness for jump processes
    - **12:20 - 13:40** Lunch break
    - **13:40 - 14:15** Jun Masamune (Tohoku University)
      - Variational convergence on Riemannian manifolds
    - **14:25 - 15:00** Ryokichi Tanaka (Tohoku University)
      - Random walks on hypercubic groups: entropy and speed
    - **15:10 - 15:45** Xiaodong Liu (Chinese Academy of Sciences)
      - W-entropy formulas and rigidity theorems on Wasserstein space over Riemannian manifolds
    - **16:05 - 16:40** Kazumasa Kudawada (Tokyo Institute of Technology)
      - A dimensional Wasserstein contraction characterizing the curvature-dimension condition
    - **16:50 - 18:30** Poster session
    - **18:30 -** Banquet
  - **Tuesday, September 1, 2015**
    - **10:15 - 10:50** Kazunori Kuwae (Fukuoka University)
      - Analytic characterization of gaugeability for generalized Feynman-Kac functionals and its applications
    - **11:00 - 11:35** Nikola Sandric (Technical University of Dresden and University of Zagreb)
      - Long-time behavior of Levy-type processes: transience, recurrence and ergodicity
    - **11:45 - 12:20** Masaki Wada (Tohoku University)
      - Large time asymptotics of Feynman-Kac functionals for symmetric $\alpha$-stable processes
    - **12:20 - 13:40** Lunch break
    - **13:40 - 14:15** Yukishio Shiozawa (Okayama University)
      - Escape rate of symmetric Markov processes
    - **14:25 - 15:00** Walter Hoh (University of Bielefeld)
      - Markov processes with jumps and nonlocal generators
    - **15:10 - 15:45** Hideki Tanemura (Chiba University)
      - Systems of infinitely many Brownian motions with long ranged interaction
    - **16:05 - 16:40** Martin Grothaus (Technical University of Kaiserslautern)
      - On the stochastic heat equation with sticky reflected boundary condition
    - **16:50 - 17:25** Song Liang (University of Tsukuba)
      - Stochastic Newton equation with absorbing area
  - **Wednesday, September 2, 2015**
    - **09:30 - 10:05** Naotaka Kajino (Kobe University)
      - Localized upper bounds of heat kernels for diffusions via a multiple Dynkin Hunt formula
    - **10:15 - 10:50** Sebastian Andres (University of Bonn)
      - Heat kernel estimates for random walks with degenerate weights
    - **11:00 - 11:35** Makoto Nakashima (University of Tsukuba)
      - Phase transitions of random walk pinning model
    - **11:45 - 12:20** Stefan Neukamm (Technical University of Dresden)
      - A regularity theory for elliptic systems with random coefficients
    - **12:20 -** Lunch break
    - **18:30 -** Conference dinner
Thursday, September 3, 2015

10:15 - 10:50  
Free discussion

11:00 - 11:35  
Fumia Hiroshima (Kyushu University)  
Quantum field theory by Gibbs measures on cadiag path space

11:45 - 12:20  
Martin Huesmann (University of Bonn)  
The geometry of multi marginal Skorokhod embedding

12:20 - 13:40  
Lunch break

13:40 - 14:15  
Xue-Mei Li (University of Warwick)  
Stochastic homogenization in geometry

14:25 - 15:00  
Yukio Nagahata (Nagoya University)  
Spectral gap for surface diffusion

15:10 - 15:45  
Gerald Trutnau (Seoul National University)  
Recurrence criteria for diffusion processes generated by divergence free perturbations of non-symmetric energy forms

16:05 - 16:40  
Hiroshi Kawabe (Okayama University)  
Functional CLTs for non-symmetric random walks on crystal lattices

16:50 - 17:25  
Wolfgang Lohr (University of Duisburg-Essen)  
Invariance principle for variable speed random walks on trees

Friday, September 4, 2015

09:30 - 10:05  
Max von Renesse (University of Leipzig)  
Modified Arratia flow and Wasserstein diffusion

10:15 - 10:50  
Nobuaki Nagahata (Tokyo University)  
Error analysis for approximations to one-dimensional SDEs via perturbation method

11:00 - 11:35  
Yuzuru Inahama (Nagoya University)  
Large deviations for rough path lifts of Donsker-Watanabe's delta functions

11:45 - 12:20  
Martin Hairer (University of Warwick)  
Modelling a random rubber band

12:20 - 13:40  
Lunch break

13:40 - 14:15  
Selenium Kusuoka (Tokyo University)  
Continuity and bounds of the density functions of the solutions to path-dependent stochastic differential equations

14:25 - 15:00  
Karl-Theodor Sturm (University of Bonn)  
Optimal transport, Brownian motion, and super-Ricci flow for metric measure spaces

Poster Session

Monday, August 31, 2015  16:50 - 18:30

- Yoshihito Abe (Kyoto University)  
Maximum and minimum of local times for two-dimensional random walk

- Takahumi Amabe (Ritsumeikan University)  
Convergence implications via dual flow method

- Syota Esaki (Tokyo Institute of Technology)  
Infinite particle systems of long range jumps with long range interactions

- Torben Fattler (Technical University of Kaiserslautern)  
Disease spreading models within the framework of two-component configuration spaces in continuum

- Julian Hollander (Technical University of Dresden)  
Unbounded viscosity solutions of non-dominated HJ-equations

- Masato Hoshino (University of Tokyo)  
KPZ equation with fractional derivatives of white noise

- Yu Ita (Osaka University)  
Integration of controlled rough paths via fractional calculus

- Yuzuke Kawamoto (Kyushu University)  
Finite particle approximation of interacting Brownian motion

- Kyung-youn Kim (Seoul National University)  
Heat kernel estimates for symmetric Markov processes in C^0 open sets and its application

- Eva Kope (University of Bonn)  
Minimizing movement scheme for time dependent metrics on probability space

- Franziska Kühn (Technical University of Dresden)  
Existence and estimates of moments for Lévy-type processes

- Katharina von der Lühe (University of Bielefeld)  
Pathwise uniqueness for SDEs with non-regular drift and nonconstant diffusion

- Yusuke Miura (Tokyo University)  
The conservativeness of Girsanov transformed symmetric Markov processes

- Chikara Nakamura (Kyoto University)  
Lampighter random walks on fractals

- Izumi Okada (Tokyo Institute of Technology)  
Geometry structures of favorite sites of random walk range

- Kohei Suzuki (Kyoto University)  
Convergence of Brownian motions on RCD*(K,N) spaces

- Robert von Halle (Technical University of Kaiserslautern)  
Interacting particle systems with sticky boundary

- Melchior Wirth (Friedrich Schiller University Jena)  
Diffusion determines the recurrent graph

- Lu Xu (University of Tokyo)  
Central limit theorem for stochastic heat equations in random environments

Falling Walls Lab Sendai 2015

- Date and time: Friday, September 4, 2015  13:00 - 19:20
- Venue: TOYOK ELECTRON House of Creativity 3F, Lecture Theater, Katahari Campus, Tohoku University
- Hosted by: Tohoku University
- In association with: Tohoku Forum for Creativity
- Supported by: Tokyo Electron Limited
- Participants: about 70
- Time Schedule:
  13:00 - 13:15  
  Welcome and introductory remarks
  13:15 - 14:00  
  Presentations (scholar presentations 1-9)
  14:00 - 14:15  
  Networking break

Special Lecture from the Nobel Laureate Dr. Koichi Tanaka (Lecture at Graduate Schools of Engineering, Tohoku University)

- Date and time: Thursday, October 22, 2015  14:40 - 16:10
- Venue: 2nd floor, Center Hall, School of Engineering, Aoba Yamada Campus, Tohoku University
- Hosted by: Graduate School of Engineering, Tohoku University
- Speaker: Dr. Koichi Tanaka (Fellow, Shimadzu Corporation, Nobel Laureate in Chemistry in 2002)
- Title: An environment that enables interdisciplinary fusion research: An example from mass spectrometry

Sendai International Conference on Arithmetic Geometry in 2016

- Date: Thursday, January 28, 2016 - Saturday, January 30, 2016
- Venue: TOYOK ELECTRON House of Creativity 3F, Lecture Theater, Katahari Campus, Tohoku University
- Hosted by: Graduate School of Science, Tohoku University
- Supported by:
  - Graduate School of Information Sciences, Tohoku University
  - Japan Society for the Promotion of Science, Program for Advancing Strategic International Networks to Accelerate the Circulation of Talented Researchers
  - Tohoku Forum for Creativity, Tohoku University
- Speakers:
  - Yoshinosuke Hirakawa (Keio University)
  - Ming-Lun Hsieh (National Taiwan University)
  - Chan-Ho Kim (Korea Institute for Advanced Study)
  - Shihchi Kobayashi (Tohoku University)
  - Tadashi Ochiai (Osaka University)
  - Kazuto Ota (Keio University)
  - Nobuo Tsuchiya (Tohoku University)
  - Shanwen Wang (Dhaguanl center for mathematical sciences, Fudan University)
  - Zhengyu Xiang (Shanghai Center for Mathematical Sciences, Fudan University)
  - Fumito Yobuki (Tohoku University)
Symposium: Mathematics can change the World: Report of the Survey on Co-operative Research between Mathematics and Other Research Fields

- Date: Saturday, February 20, 2016
- Venue: Graduate School of Mathematical Sciences, University of Tokyo
- Hosted by: Tohoku Forum for Creativity, Tohoku University (Commissioned by the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT), "Report of the Survey on Co-operative Research between Mathematics and Other Research Fields")
- In association with: Graduate School of Mathematical Sciences, University of Tokyo
- Assisted by: Research Center for Mathematics for Social Creativity Research Institute for Electronic Science, Hokkaido University, Graduate School of Information Sciences, Tohoku University, Research Organization of Information and Systems, The Institute of Statistical Mathematics, Meiji Institute for Advanced Study of Mathematical Sciences, Waseda University Graduate School of Fundamental Science and Engineering, Research Institute for Mathematical Science, Kyoto University, Institute of Mathematics for Industry, Kyushu University
- Supported by: The Mathematical Society of Japan, The Japan Society for Industrial and Applied Mathematics

Program
- Part 1: Why we need mathematics
  - MCI: Tetsuji Tokihiro (Professor, Graduate School of Mathematical Sciences, University of Tokyo)
  - Opening Remarks: Guest Speech
  - Opening Remarks: Takashi Tsutsumi (Dean, Graduate School of Mathematical Sciences, University of Tokyo)
  - Guest Speech: Guests from MEXT
    - Motohiko Motoki (President of MGJ)
    - Shinichi Oshiki (President of JSPM)
  - Background and purpose:
    - Activities for Mathematical Innovation by MEXT
    - Yasuhito Awatsuji (Basic Research Promotion Division, Research Promotion Bureau, MEXT/JUIN)
    - Survey Report to MEXT:
      - Situations in Japan and overseas countries regarding interdisciplinary fusion research using mathematics
      - Yoshiaki Maeda (Vice Director of Tohoku Forum for Creativity.

MCI: Masahiro Yamamoto (Professor, Mathematical Sciences, University of Tokyo)
- Report III:
  - Recommendations to MEXT based on the findings of the survey
  - Discussions from the committee for mathematical innovation
  - 15:40 - 17:45 Closing Remarks
    - Masayasu Mimura (Vice Director, Meiji Institute for Advanced Study of Mathematical Sciences (MiMeS))
    - Report IV:
      - Needs to mathematics
      - Takashi Yamada (Research Planning Section, NTT Communication Science Laboratories)
      - Yosh Iwasawa (Professor, Faculty of Science, Kyushu University)

Panelists:
- [Mathematics] Kazuyuki Aihara (Professor, Institute of Industrial Science, University of Tokyo)
- Fuyuhiko Tanaka (Associate prof. Graduate School of Engineering Science, Osaka University)
- Reiko Miyaoka (Professor, Mathematical Institute, Graduate School of Science, Tohoku University)
- [Company] Akira Takada (Research Center, Asahi Glass Co., Ltd.)
- [Other fields] Tetsuo Halsuda (Research Group Director of ITHES)
- [Media] Tatsuya Tsujimura (Editor, Kyodo News)
- [Cooperation with the Society] Takashi Kenaga (Career Adviser, Career Support Office, Graduate School of Mathematical Sciences, University of Tokyo)
- 18:00 - Reception

Information 2015 | 48
Workshop - Why don’t you realize to your ideas? -

- Incorporated nonprofit organization natural science
- Tohoku University

In association with:
- Tohoku University Micro System Integration Center
- Advanced Institute for Materials Research, Tohoku University (AIRM)
- Tohoku Forum for Creativity, Tohoku University
- Institute of Multidisciplinary Research for Advanced Materials, Tohoku University
- The Japan Society of Applied Physics, Tohoku Chapter

Venue:
- TOKYO ELECTRON House of Creativity 3F, Lecture Theater, Katahira Campus, Tohoku University

Leading Young Researcher Overseas Visit Program

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Position</th>
<th>Visiting institute</th>
<th>Research theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kosuke Inoue</td>
<td>Environmental Studies</td>
<td>Assistant Prof.</td>
<td>Harvard Medical School Brigham and Women's Hospital (USA)</td>
<td>Electrochemical devices for construction and evaluation of three-dimensional tissue organs</td>
</tr>
<tr>
<td>Hiroki Takikawa</td>
<td>R&amp;D</td>
<td>Assistant Prof.</td>
<td>Institute for Research in the Social Sciences, Stanford University (USA)</td>
<td>Mathematical sociology on mechanisms generating social inequality</td>
</tr>
<tr>
<td>Yosuke Matsushita</td>
<td>Engineering</td>
<td>Associate Prof.</td>
<td>Loughborough University (UK)</td>
<td>Numerical simulation of pulverized coal combustion and gasification with large Eddy Simulation</td>
</tr>
<tr>
<td>Koichiro Miyamoto</td>
<td>Engineering</td>
<td>Associate Prof.</td>
<td>Institute of Nano- and Biotechnologies, Aachen University (Germany)</td>
<td>Development of novel analytical system by combining chemical image sensor and microfluidic device</td>
</tr>
<tr>
<td>Kazuki Takashima</td>
<td>RIEC</td>
<td>Assistant Prof.</td>
<td>Dept. Computer Science, University of Calgary (Canada)</td>
<td>Dynamic Space Formation for Interspersal Communication with Productive Humanity</td>
</tr>
<tr>
<td>Tejatii Aoyagi</td>
<td>Medicine</td>
<td>Lecturer</td>
<td>University of Michigan (USA)</td>
<td>Is-36 of Novel K.1 Family Members in Acute Lung Injury and Acute Respiratory Distress Syndrome</td>
</tr>
<tr>
<td>Tatsuki Takahashi</td>
<td>Tohoku Univ. Hospital</td>
<td>Clinical Fellow</td>
<td>University of California San Diego (USA)</td>
<td>The Recycle System of Organzelle by Macrophagophy in Epidermal Development</td>
</tr>
<tr>
<td>Takahisa Anada</td>
<td>Dentistry</td>
<td>Associate Prof.</td>
<td>Department of Orthopaedic Surgery, Stanford University (USA)</td>
<td>Development of a highly functional interface between biomaterials and cells for bone regenerative therapy</td>
</tr>
<tr>
<td>Hiroshi Nagamura</td>
<td>Engineering</td>
<td>Assistant Prof.</td>
<td>Unité Mixte de Physique CNRS/Thales (France)</td>
<td>Creation of Interdisciplinary fusion fields by noble multiple cross correlation effects in multiterminal tunnel junctions</td>
</tr>
<tr>
<td>Shuichi Ogawa</td>
<td>IR-RAM</td>
<td>Assistant Prof.</td>
<td>Fritz Haber Institute (Germany)</td>
<td>Development of the near-ambient photoelectron spectroscopy under water vapor condition and its application for oxidation kinetics at metal/semiconductor interface</td>
</tr>
<tr>
<td>Takamiki Fukushima</td>
<td>Engineering</td>
<td>Associate Prof.</td>
<td>University of California Los Angeles (USA)</td>
<td>A Study of Brain Computing System Based on High-Density 3D Interconnect Networking using Directed Self-Assembly</td>
</tr>
<tr>
<td>Kiyosato Kamagata</td>
<td>IR-RAM</td>
<td>Assistant Prof.</td>
<td>University of California Los Angeles (USA)</td>
<td>Elucidation of protein design principle - comparison between artificial and natural proteins</td>
</tr>
</tbody>
</table>

Support for Young Researchers

Visitors List


Achievement

Access and Contact

From Narita Airport
- Narita Airport Sta.
- Airport terminal 2 Sta.
- Narita Sky Access Line
  - Approx. 60 min.
- Narita Express
  - Approx. 60 min.
- Ueno Sta.
- Sendai Sta.

From Haneda Airport
- Haneda Airport Sta.
- Keikyu Line
  - Approx. 20 min.
- Shinagawa Sta.
- Yamamote Line
  - 11 min.
- Tokyo Sta.
- Sendai Sta.

From Sendai Station
- Sendai Airport Sta.
- Sendai Airport Access Line
  - Approx. 25 min.
- Sendai Sta.

From Sendai Station
- By taxi: Approx. 10 min. by taxi from the West Exit on the first floor of Sendai Station
- By foot: Approx. 15 min. walk from the West Exit of Sendai Station

From Aoba-dori Ichibancho Station
- By foot: Approx. 5 min. walk from the South 1 Exit of Aoba-dori Ichibancho Station

Contact
Tohoku Forum for Creativity
2-1-1 Katahira, Aoba-ku, Sendai 980-8577 JAPAN

Administrative Office
3rd Floor, AMMR Main Building
E-mail: creativity@ml.tohoku.ac.jp
URL: http://www.tfc.tohoku.ac.jp/

Administrative Office
1st Floor, TOKYO ELECTRON House of Creativity