

# Program

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## September 11 (Mon)

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(8:30-8:45)

### Opening Remarks

#### Session MO-A1: NV Centers

MO-A1-1 (8:45-9:15)

##### **“Hybrid quantum systems for quantum limited sensing” (invited)**

J. Wrachtrup

Institute for Quantum Science and Technology, University of Stuttgart

MO-A1-2 (9:15-9:30)

##### **Electrical extension of spin coherence time of single electron spin in diamond**

S. Kobayashi<sup>1</sup>, Y. Matsuzaki<sup>2</sup>, H. Morishita<sup>3</sup>, S. Miwa<sup>1</sup>, Y. Suzuki<sup>1</sup>, M. Fujiwara<sup>3</sup>, and N. Mizuochi<sup>3</sup>

<sup>1</sup>Graduate School of Engineering Science, Osaka University, <sup>2</sup>NTT Basic Research Laboratories, NTT Corporation, <sup>3</sup>Institute for Chemical Research, Kyoto University

MO-A1-3 (9:30-9:45)

##### **Optical holonomic quantum gates over an NV spin in diamond**

Y. Sekiguchi, N. Niikura, R. Kuroiwa, H. Kano and H. Kosaka

Yokohama National University

MO-A1-4 (9:45-10:00)

##### **Hybrid quantum sensing using quantum virtual memories in single NV center in diamond**

H. Morishita<sup>1</sup>, T. Tashima<sup>2</sup>, and N. Mizuochi<sup>1</sup>

<sup>1</sup>Institute for Chemical Research, Kyoto University, <sup>2</sup>Department of Electronic Science and Engineering, Kyoto University

MO-A1-5 (10:00-10:15)

##### **Hybridization: a tool to explore nonlinear quantum phenomena**

W. J. Munro<sup>1,4</sup>, A. Angerer<sup>2</sup>, S. Putz<sup>2</sup>, T. Astner<sup>2</sup>, R. Glattauer<sup>2</sup>, D. O. Krimer<sup>3</sup>, K. Nemoto<sup>4</sup>, S.

Rotter<sup>3</sup>, J. Schmiedmayer<sup>2</sup>, J. Majer<sup>2</sup>

<sup>1</sup>NTT Basic Research Laboratories, <sup>2</sup>Vienna Center for Quantum Science and Technology, Atominstytut, TU Wien, <sup>3</sup>Institute for Theoretical Physics, TU Wien, <sup>4</sup>National Institute of Informatics

## Coffee Break

### Session MO-A2: Quantum Transport

MO-A2-1 (10:45-11:15)

**Landau-Zener transitions as universal tool for studying the dynamics of coupled systems (invited)**

S. Ludwig

Paul-Drude-Institut für Festkörperelektronik (PDI)

MO-A2-2 (11:15-11:30)

**Anisotropic heavy-hole g-factors and relevance to photon-to-spin conversion schemes in semiconductor quantum dot circuits**

A. Bogan,<sup>1,2</sup> S. A. Studenikin,<sup>1</sup> M. Korkusinski,<sup>1</sup> G. C. Aers,<sup>1</sup> L. Gaudreau,<sup>1</sup> P. Zawadzki,<sup>1</sup> A. Kam,<sup>1</sup> A. S. Sachrajda,<sup>1</sup> D. G. Austing,<sup>1</sup> L. A. Tracy,<sup>3</sup> J. L. Reno,<sup>3</sup> and T. W. Hargett<sup>3</sup>

<sup>1</sup>Security and Disruptive Technologies Portfolio, National Research Council of Canada,

<sup>2</sup>Department of Physics and Astronomy, University of Waterloo, <sup>3</sup>Sandia National Laboratories

MO-A2-3 (11:30-11:45)

**Symmetry and selection rules in a qubit-oscillator coupled system**

T. Fuse<sup>1</sup>, F. Yoshihara<sup>1</sup>, S. Ashhab<sup>2</sup>, K. Kakuyanagi<sup>3</sup>, S. Saito<sup>3</sup>, K. Semba<sup>1</sup>

<sup>1</sup>National Institute of Information and Communication Technology, <sup>2</sup>Qatar Environment and Energy Research Institute, <sup>3</sup>NTT Basic Research Laboratories

MO-A2-4 (11:45-12:00)

**Quantum algorithm for universal implementation of projective measurement of energy**

S. Nakayama,<sup>1</sup> A. Soeda,<sup>1,2</sup> and M. Murao<sup>1,3</sup>

<sup>1</sup>Department of Physics, University of Tokyo, <sup>2</sup>Centre for Quantum Technologies, National University of Singapore, <sup>3</sup>Institute for Nano Quantum Information Electronics, University of Tokyo

## Conference Photo

## Lunch Break

### Session MO-P1: Quantum Spin Systems

MO-P1-1 (13:15-13:45)

**Towards nitrogen-vacancy colour centre lasers for high sensitivity magnetometry (invited)**

A. Greentree

RMIT University

MO-P1-2 (13:45-14:00)

**Magnetic-field sensing with quantum error detection under the effect of energy relaxation**

Y. Matsuzaki<sup>1</sup> and S. Benjamin<sup>2</sup>

<sup>1</sup>NTT Basic Research Laboratories, <sup>2</sup>Department of Materials, University of Oxford,

MO-P1-3 (14:00-14:15)

**Electron transport in quantum point contact with hyperfine interaction under finite magnetic field**

T. Aono,<sup>1</sup> M. Kawamura,<sup>2</sup> P. Stano,<sup>2,3</sup> K. Ono,<sup>2</sup> and T. Komine<sup>1</sup>

<sup>1</sup>Faculty of Engineering, Ibaraki University, <sup>2</sup>RIKEN Center for Emergent Matter Science,

<sup>3</sup>Institute of Physics, Slovak Academy of Sciences

MO-P1-4 (14:15-14:30)

**Resistively detected NMR line shapes in a quasi-one-dimensional electron system**

M. H. Fauzi<sup>1,2</sup>, A. Singha<sup>3</sup>, M. F. Sahdan<sup>1</sup>, M. Takahashi<sup>1</sup>, K. Sato<sup>1</sup>, K. Nagase<sup>1</sup>, B. Muralidharan<sup>3</sup>, and Y. Hirayama<sup>1,2</sup>

<sup>1</sup>Department of Physics, Tohoku University, <sup>2</sup>CSRN, Tohoku University, <sup>3</sup>Department of Electrical Engineering, IIT-Bombay

MO-P1-5 (14:30-14:45)

**Relaxation to negative temperatures in spin domain systems**

Y. Hama,<sup>1</sup> W. J. Munro,<sup>1,2</sup> K. Nemoto<sup>1</sup>

<sup>1</sup>National Institute of Informatics, <sup>2</sup>NTT Basic Research Laboratories

MO-P1-6 (14:45-15:00)

**Nuclear spins in quantum dot spin qubits**

P. Stano,<sup>1</sup> T. Nakajima,<sup>1</sup> T. Otsuka,<sup>1</sup> J. Yoneda,<sup>1</sup> L. Camenzind,<sup>2</sup> L. Yu,<sup>2</sup> D. Loss,<sup>1,2</sup> S. Tarucha,<sup>1</sup> D. Zumbühl<sup>2</sup>

<sup>1</sup>CEMS, RIKEN, <sup>2</sup>Department of Physics, University of Basel

MO-P1-7 (15:00-15:15)

**Real-space mapping of nuclear resonance spectroscopy in a quantum-Hall system**

K. Hashimoto, T. Tomimatsu, and Y. Hirayama

Department of Physics, Tohoku University

**Coffee Break**

**Session MO-P2: Quantum Manipulation**

MO-P2-1 (15:45-16:15)

**Andreev quantum dots (invited)**

C. Urbina

CEA-Saclay

MO-P2-2 (16:15-16:30)

**Microwave irradiation as an alternative method for controlling the energy detuning of a superconducting flux qubit**

H. Toida, T. Ohrai, Y. Matsuzaki, K. Kakuyanagi, H. Yamaguchi, and S. Saito

NTT Basic Research Laboratories

MO-P2-3 (16:30-16:45)

**Toward spin coupling of double QDs to superconducting coplanar waveguide cavities**

R. Wang,<sup>1</sup> R.S. Deacon,<sup>1,2</sup> J. Sun,<sup>1</sup> J. Yao,<sup>3</sup> C.M. Lieber,<sup>4</sup> D. Car<sup>5</sup>, E.P.A.M. Bakkers,<sup>5</sup> and K. Ishibashi<sup>1,2</sup>

<sup>1</sup>Advanced Device Laboratory, RIKEN, <sup>2</sup>Center for Emergent Matter Science (CEMS), RIKEN,

<sup>3</sup>Department of Chemical Biology, Harvard University, <sup>4</sup>Division of Engineering and Applied Sciences, Harvard University, <sup>5</sup>Department of Applied Physics, Eindhoven University of Technology

MO-P2-4 (16:45-17:00)

**Quantum transport assisted by non-Markovian environment**

C. Uchiyama<sup>1</sup>, W. J. Munro<sup>2</sup> and K. Nemoto<sup>3</sup>

<sup>1</sup>Graduate School of Interdisciplinary Research, Univ. of Yamanashi, <sup>2</sup>NTT Basic Research Laboratories, <sup>3</sup>National Institute of Informatics

MO-P2-5 (17:00-17:15)

**Characteristic spectra of circuit quantum electrodynamics systems from the ultrastrong- to the deep-strong-coupling regime**

F. Yoshihara,<sup>1</sup> T. Fuse,<sup>1</sup> S. Ashhab,<sup>2</sup> K. Kakuyanagi,<sup>3</sup> S. Saito,<sup>3</sup> and K. Semba<sup>1</sup>

<sup>1</sup>National Institute of Information and Communications Technology, <sup>2</sup>Qatar Environment and Energy Research Institute, <sup>3</sup>NTT Basic Research Laboratories

MO-P2-6 (17:15-17:30)

**Strong coupling between an electron in a quantum dot circuit and a photon in a cavity**

L.E Bruhat,<sup>1</sup> T. Cubaynes,<sup>1</sup> J.J. Viennot,<sup>2</sup> M. C. Dartailh,<sup>1</sup> M.M. Desjardins,<sup>1</sup> A. Cottet,<sup>1</sup> and T. Kontos<sup>1</sup>

<sup>1</sup>Laboratoire Pierre Aigrain, Ecole Normale Supérieure-PSL Research University, CNRS, Université Pierre et Marie Curie-Sorbonne Universités, Université Paris Diderot-Sorbonne Paris Cité, <sup>2</sup>JILA and Department of Physics, University of Colorado

MO-P2-7 (17:30-17:45)

**Quantum teleinteraction algorithm: Entanglement assisted LOCC protocol implementing multi-body interaction between spatially and chronologically distant systems**

S. Nakayama and K. Nemoto

National Institute of Informatics

MO-P2-8 (17:45-18:00)

**Giant Lamb shift observed in deep-strongly-coupled superconducting qubit-oscillator circuit**

Z. Ao,<sup>1,2</sup> F. Yoshihara,<sup>2</sup> T. Fuse,<sup>2</sup> S. Ashhab,<sup>3</sup> K. Kakuyanagi,<sup>4</sup> S. Saito,<sup>4</sup> T. Aoki,<sup>1</sup> K. Semba<sup>2</sup>

<sup>1</sup>Waseda University, <sup>2</sup>NICT, <sup>3</sup>QEERI, <sup>4</sup>NTT BRL

**Break**

**Poster Session** (18:15-20:15)

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## September 12 (Tue)

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### Session TU-A1: Phononic Structures

TU-A1-1 (8:30-9:00)

**Piezo-optomechanical transducers as a link between radio frequency, optical, and acoustic waves (invited)**

K. Srinivasan

NIST

TU-A1-2 (9:00-9:15)

**Heat flux engineering in Si membrane by phononic nanostructures**

M. Nomura<sup>1,2</sup>, R. Anufriev<sup>1</sup>, A. Ramiere<sup>1</sup>, J. Maire<sup>1</sup>, and R. Yanagisawa<sup>1</sup>

<sup>1</sup>Institute of Industrial Science, The University of Tokyo, <sup>2</sup>PRESTO, Japan Science and Technology Agency

TU-A1-3 (9:15-9:30)

**Dynamic coupling control of dark and bright bound excitons in a mechanical resonator**

R. Ohta, H. Okamoto, T. Tawara, H. Gotoh, and H. Yamaguchi

NTT Basic Research Laboratories, NTT Corporation

TU-A1-4 (9:30-9:45)

**Coherent control of the phonon density of states using phononic nanostructures**

R. Anufriev<sup>1</sup> and M. Nomura<sup>1,2</sup>

<sup>1</sup>Institute of Industrial Science, The University of Tokyo, <sup>2</sup>PRESTO, Japan Science and Technology Agency

TU-A1-5 (9:45-10:00)

**Sub-10-nm pitch nanopore array in graphene by helium ion beam milling for heat phonon engineering**

M.E. Schmidt<sup>1</sup>, T. Kanzaki<sup>1</sup>, M. Haque<sup>1</sup>, T. Iwasaki<sup>1</sup>, M. Muruganathan<sup>1</sup>, S. Ogawa<sup>2</sup>, and H. Mizuta<sup>1</sup>

<sup>1</sup>Japan Advanced Institute of Science and Technology, <sup>2</sup>National Institute of Advanced Industrial Science and Technology

TU-A1-6 (10:00-10:15)

**Diameter and defect-density dependence of intermediate frequency Raman mode measured with single-walled carbon nanotubes**

T. Inaba,<sup>1</sup> S. Konabe,<sup>2</sup> and Y. Homma<sup>1,2</sup>

<sup>1</sup>Department of Physics, Tokyo University of Science, <sup>2</sup>Research Institute of Science and Technology, Tokyo University of Science

## Coffee Break

### Session TU-A2: Optical Properties of Nanostructures

TU-A2-1 (10:45-11:00)

#### **Circularly polarized spontaneous emission from quantum dots in three-dimensional semiconductor chiral photonic crystals**

S. Takahashi,<sup>1,2</sup> T. Tajiri,<sup>3</sup> Y. Ota,<sup>1</sup> J. Tatebayashi,<sup>1</sup> S. Iwamoto,<sup>1,3</sup> and Y. Arakawa<sup>1,3</sup>

<sup>1</sup>Institute for Nano Quantum Information Electronics, University of Tokyo, <sup>2</sup>Kyoto Institute of Technology, <sup>3</sup>Institute of Industrial Science, University of Tokyo

TU-A2-2 (11:00-11:15)

#### **Carrier dynamics in hybrid structure of quantum dot and quantum well superlattice**

K. Akahane<sup>1</sup>, H. Yamamoto<sup>2</sup>, A. Matsumoto<sup>1</sup>, T. Umezawa<sup>1</sup>, H. Sotobayashi<sup>2</sup>, and N. Yamamoto<sup>1</sup>

<sup>1</sup>National Institute of Information and Communications Technology, <sup>2</sup>Aoyama Gakuin University

TU-A2-3 (11:15-11:30)

#### **Optical probe of single Cr spin in a self-assembled CdTe dot**

A. Laente-Sampietro<sup>1,2,3</sup>, H. Utsumi<sup>1</sup>, M. Sunaga<sup>1</sup>, L. Besombes<sup>2,3</sup>, H. Boukari<sup>2,3</sup>, and S. Kuroda<sup>1</sup>

<sup>1</sup>Institute of Materials Science, University of Tsukuba, <sup>2</sup>Université Grenoble Alpes, Institut Néel, <sup>3</sup>CNRS, Institut Néel

TU-A2-4 (11:30-11:45)

#### **$\Lambda$ -system initialization through spectral hole burning in $^{167}\text{Er}^{3+}:\text{Y}_2\text{SiO}_5$**

M. Ijspeert,<sup>1</sup> G. Mariani,<sup>1</sup> T. Tawara,<sup>1,2</sup> K. Shimizu,<sup>1</sup> H. Omi,<sup>1,2</sup> S. Adachi,<sup>3</sup> and H. Gotoh<sup>1</sup>

<sup>1</sup>NTT Basic Research Laboratories, <sup>2</sup>NTT Nanophotonics Center, <sup>3</sup>Hokkaido University

TU-A2-5 (11:45-12:00)

#### **Nanofiber cavity QED systems coupled by an optical fiber**

T. Aoki<sup>1</sup>, S. Kato<sup>2</sup>, and A. S. Parkins<sup>3</sup>

<sup>1</sup>Department of Applied Physics, Waseda University, <sup>2</sup>PRESTO, JST, <sup>3</sup>University of Auckland

## Lunch Break

### Session TU-P1: Nanomechanics and Nanoprobes

TU-P1-1 (13:00-13:30)

#### **Nanomechanics with graphene drums (invited)**

M. Deshmukh

Tata Institute of Fundamental Research

TU-P1-2 (13:30-13:45)

#### **The coupling between electron transport and mechanical motion in nanoelectromechanical systems with a two-dimensional electron gas**

A. A. Shevyrin,<sup>1,2</sup> A.G. Pogosov,<sup>1,2</sup> A. K. Bakarov,<sup>1,2</sup> and A. A. ShklyaeV<sup>1,2</sup>

<sup>1</sup>Rzhanov Institute of Semiconductor Physics SB RAS, <sup>2</sup>Novosibirsk State University

TU-P1-3 (13:45-14:00)

#### **Terahertz spectroscopy of a single atom in a fullerene cage**

S.Q. Du<sup>1</sup>, Y. Zhang<sup>1</sup>, K. Yoshida<sup>1</sup>, and K. Hirakawa<sup>1,2</sup>

<sup>1</sup>Institute of Industrial Science, University of Tokyo, <sup>2</sup>Institute for Nano Quantum Information Electronics, University of Tokyo

TU-P1-4 (14:00-14:15)

#### **A two-electron double quantum dot coupled with a coherent phonon field**

T. Fujisawa<sup>1</sup>, Y. Sato<sup>1</sup>, J. C. H. Chen<sup>1</sup>, M. Hashisaka<sup>1</sup>, K. Muraki<sup>2</sup>

<sup>1</sup>Department of Physics, Tokyo Institute of Technology, <sup>2</sup>NTT Basic Research Laboratories

TU-P1-5 (14:15-14:30)

#### **Quantum state readout of individual quantum dots enabled by coupling to mechanical resonator with high quality factor**

Y. Miyahara, A. Roy-Gobeil, and P. Grutter

Department of Physics, McGill University

TU-P1-6 (14:30-14:45)

#### **Incompressible strips in quantum Hall system investigated by scanning gate microscopy**

T. Tomimatsu, K. Hashimoto, S. Taninaka, K. Sato, and Y. Hirayama

Department of Physics, Tohoku University



## Coffee Break

### Session TU-P2: 2D Materials

TU-P2-1 (15:15-15:45)

#### **Hybrid quantum systems based on two-dimensional van der Waals crystals (invited)**

Amalia Patane

School of Physics and Astronomy, The University of Nottingham

TU-P2-2 (15:45-16:00)

#### **Far- and mid-infrared photodetectors based on van der Waals/graphene heterostructures: concept and characteristics**

V. Ryzhii<sup>1,2</sup>, T. Otsuji<sup>1</sup>, M. Ryzhii<sup>3</sup>, V. E. Karasik<sup>2</sup>, V. G. Leiman<sup>4</sup>, D. Svintsov<sup>4</sup>, V. Ya. Aleshkin<sup>5</sup>, A. A. Dubinov<sup>5</sup>, V. Mitin<sup>6</sup>, and M. S. Shur<sup>7</sup>

<sup>1</sup>Research Inst. for Electrical Communication, Tohoku University, <sup>2</sup>Center of Photonics and Infrared Eng., Bauman Moscow State Technical University, <sup>3</sup>Dept. of Computer Science and Eng., University of Aizu, <sup>4</sup>Lab. of 2D Material's Optoelectronics, Moscow Institute of Physics and Technology, <sup>5</sup>Inst. for Physics of Microstructures RAS and Lobachevsky State University, <sup>6</sup>Dept. of Electrical Eng., University at Buffalo, SUNY, <sup>7</sup>Dept. of Electrical, Computer, and Systems Eng., Rensselaer Polytechnic Institute

TU-P2-3 (16:00-16:15)

#### **Spin-flip processes and radiative decay of dark intravalley excitons in transition metal dichalcogenide monolayers**

A. O. Slobodeniuk<sup>1</sup> and D. M. Basko<sup>2</sup>

<sup>1</sup>Laboratoire National des Champs Magnétiques Intenses, CNRS-UJF-UPS-INSA, <sup>2</sup>Laboratoire de Physique et Modélisation des Milieux Condensés, Université de Grenoble-Alpes and CNRS

TU-P2-4 (16:15-16:30)

#### **Topological properties in single-wall carbon nanotube: effective one-dimensional lattice model approach**

R. Okuyama,<sup>1</sup> W. Izumida,<sup>2</sup> M. Eto<sup>1</sup>

<sup>1</sup>Faculty of Science and Technology, Keio University, <sup>2</sup>Department of Physics, Tohoku University

TU-P2-5 (16:30-16:45)

#### **Monte Carlo simulation of carrier transport in hybrid graphene-quantum dot transistors**

N. Mori,<sup>1</sup> L. Turyanska,<sup>2</sup> O. Makarovskiy,<sup>2</sup> A. Patane,<sup>2</sup> and L. Eaves<sup>2</sup>

<sup>1</sup>Graduate School of Engineering, Osaka University, <sup>2</sup>School of Physics and Astronomy, The University of Nottingham

TU-P2-6 (16:45-17:00)

**Fabrication and electrical properties of single layer graphene nanoribbons obtained by unzipping of single- or double-walled carbon nanotubes**

Hirofumi Tanaka

Kyusyu Institute of Technology

TU-P2-7 (17:00-17:15)

**Graphene strain engineering for band gap opening**

H. Tomori,<sup>1,2</sup> R. Hiraide,<sup>1</sup> K. Nakamura,<sup>1</sup> N. Hoshi,<sup>1</sup> T. Kichikawa,<sup>1</sup> T. Tanaka,<sup>1</sup> K. Watanabe,<sup>3</sup> T. Taniguchi,<sup>3</sup> A. Kanda<sup>1</sup>

<sup>1</sup>Division of Physics and TIMS, University of Tsukuba, <sup>2</sup>PRESTO, Japan Science and Technology Agency, <sup>3</sup>National Institute for Materials Science (NIMS)

TU-P2-8 (17:15-17:30)

**Band-like transport in highly crystalline graphene thin films from defective graphene oxide material**

R. Negishi,<sup>1</sup> M. Akabori,<sup>2</sup> T. Ito,<sup>3,4</sup> Y. Watanabe,<sup>5</sup> and Y. Kobayashi<sup>1</sup>

<sup>1</sup>Graduate School of Engineering, Osaka University, <sup>2</sup>Cetnet for Nano Materials and Technology, JAIST, <sup>3</sup>Nagoya University Synchrotron Radiation Research Center (NUSR), <sup>4</sup>Graduate School of Engineering, Nagoya University, <sup>5</sup>Aichi Synchrotron Radiation Center

**Break**

**Banquet**

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## September 13 (Wed)

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### Session WE-A1: Hybrid Quantum Materials (I)

WE-A1-1 (8:30-9:00)

#### **Topological Josephson junctions (invited)**

A. Brinkman

University of Twente

WE-A1-2 (9:00-9:15)

#### **Signatures of topological superconductivity in the dynamics of HgTe Josephson junctions**

R.S. Deacon<sup>1</sup>, J. Wiedenmann<sup>2</sup>, E. Bocquillon<sup>2</sup>, F. Dominguez<sup>2</sup>, T. Klapwijk<sup>3</sup>, E.M. Hankiewicz<sup>2</sup>, S. Tarucha<sup>1,4</sup>, L.W. Molenkamp<sup>2</sup>, and K. Ishibashi<sup>1</sup>

<sup>1</sup>RIKEN Center for Emergent Matter Science (CEMS), Wako, <sup>2</sup>Physikalisches Institut (EP3), Universität Würzburg, <sup>3</sup>Kavli Institute of Nanoscience, Faculty of Applied Sciences, Delft University of Technology, <sup>4</sup>Department of Applied Physics, University of Tokyo

WE-A1-3 (9:15-9:30)

#### **Topology of zero energy edge states in carbon nanotubes with proximity induced superconductivity**

W. Izumida,<sup>1,2</sup> M. Marganska,<sup>2</sup> L. Milz,<sup>2</sup> and M. Grifoni<sup>2</sup>

<sup>1</sup>Department of Physics, Tohoku University, <sup>2</sup>Institute of Theoretical Physics, University of Regensburg

WE-A1-4 (9:30-9:45)

#### **Robust superconductivity of surface atomic layers with the Rashba effect**

Takashi Uchihashi<sup>1</sup> and Shunsuke Yoshizawa<sup>2</sup>

<sup>1</sup>International Center for Materials Nanoarchitectonics (WPI-MANA), National Institute for Materials Science, <sup>2</sup>International Center for Young Scientists (ICYS), National Institute for Materials Science

WE-A1-5 (9:45-10:00)

#### **Tailoring magnetic heterostructures of topological insulators for quantum anomalous Hall effect and axion electrodynamics**

M. Mogi,<sup>1</sup> M. Kawamura,<sup>2</sup> K. N. Okada,<sup>1</sup> R. Yoshimi,<sup>2</sup> A. Tsukazaki,<sup>3</sup> K. S. Takahashi,<sup>2</sup> Y. Takahashi,<sup>1</sup> M. Kawasaki,<sup>1,2</sup> and Y. Tokura<sup>1,2</sup>

<sup>1</sup>Department of Applied Physics, University of Tokyo, <sup>2</sup>RIKEN CEMS, <sup>3</sup>IMR, Tohoku University

WE-A1-6 (10:00-10:15)

**Nuclear spin-induced edge resistance in two-dimensional topological insulators**

C.-H. Hsu,<sup>1</sup> P. Stano,<sup>1,2</sup> J. Klinovaja,<sup>3</sup> and D. Loss<sup>1,3</sup>

<sup>1</sup>RIKEN, <sup>2</sup>Institute of Physics, Slovak Academy of Sciences, <sup>3</sup>Department of Physics, University of Basel

**Coffee Break**

**Session WE-A2: Hybrid Quantum Materials (II)**

WE-A2-1 (10:45-11:00)

**Imaging electron flow in atomically thin materials**

S. Bhandari<sup>1</sup>, G-H. Lee<sup>1</sup>, K. Wang<sup>1</sup>, K. Watanabe<sup>2</sup>, T. Taniguchi<sup>2</sup>, P. Kim<sup>1</sup> and R. M. Westervelt<sup>1</sup>

<sup>1</sup>Department of Physics and School of Engineering and Applied Sciences, Harvard University,

<sup>2</sup>National Institute for Materials Science

WE-A2-2 (11:00-11:15)

**Gate tunable spin-orbit coupling and weak antilocalization effect in an epitaxial  $\text{La}_{2/3}\text{Sr}_{1/3}\text{MnO}_3$  thin film**

S.-P. Chiu<sup>1</sup>, M. Yamanouchi<sup>2,3</sup>, T. Oyamada<sup>3</sup>, H. Ohta<sup>2,3</sup>, and J.-J. Lin<sup>1,4</sup>

<sup>1</sup>Institute of Physics, National Chiao Tung University, <sup>2</sup>Research Institute for Electronic Science, Hokkaido University, <sup>3</sup>Institute of Materials Research, University of Tokyo, <sup>4</sup>Department of Electrophysics, National Chiao Tung University

WE-A2-3 (11:15-11:30)

**Strong coupling of spin and dipole in strain gradient hetero-structured garnet thin films**

H.Tabata, H.Yamahara, A.Katogi, R.Kikuchi, A.Katogi, H.Sato

Graduate School of Engineering, University of Tokyo

WE-A2-4 (11:30-11:45)

**Molecular beam epitaxy of remotely-doped Sb quantum-well structures**

K.S. Wickramasinghe, S. Cairns, J. Massengale, Z. Liu, C.K. Gaspé, T.D. Mishima, J.C. Keay, M.B. Johnson, S.Q. Murphy, and M.B. Santos

Homer L. Dodge Department of Physics and Astronomy, University of Oklahoma

WE-A2-5 (11:45-12:00)

**Anomalous quantum Hall skyrmion transition with long-range ordering**

J. N. Moore,<sup>1</sup> J. Hayakawa,<sup>1</sup> H. Iwata,<sup>1</sup> T. Mano,<sup>2</sup> T. Noda,<sup>2</sup> G. Yusa<sup>1</sup>

<sup>1</sup>Department of Physics, Tohoku University, <sup>2</sup>National Institute for Materials Science

WE-A2-6 (12:00-12:30)

**Majorana fermions and Andreev bound states in hybrid superconductor-semiconductor nanostructure quantum systems (invited)**

H. Q. Xu

Peking University

(12:30-13:00)

**Closing**

**Excursion (optional)**

## Poster Presentations (18:15-20:15, Monday, September 11)

P1

### **High-temperature spin qubit in silicon tunnel field-effect transistor**

Keiji Ono<sup>1</sup>, Takahiro Mori<sup>2</sup>, and Satoshi Moriyama<sup>3</sup>

<sup>1</sup>RIKEN, <sup>2</sup>AIST, <sup>3</sup>NIMS

P2

### **Improvement of generation efficiency of photon echo from inhomogeneous quantum dot ensemble using chirped pulse**

N. Aonuma,<sup>1</sup> Y. Sato,<sup>1</sup> K. Akahane,<sup>2</sup> and J. Ishi-Hayase<sup>1</sup>

<sup>1</sup>School of Fundamental Science and Technology, Keio University, <sup>2</sup>National Institute of Information and Communications Technology (NICT)

P3

### **Towards quantum control of ultracold atoms in an optical lattice by optical means**

S. Yamanaka, S. Sunami, D. Okuno, T. Tomita, Y. Suzuki, S. Nakajima, J. Kobayashi, Y. Takahashi

Department of Physics, Graduate School of Science, Kyoto University

P4

### **Alternative Leggett-Garg test in a superconducting flux qubit**

K. Kakuyanagi<sup>1</sup>, G. C. Knee<sup>1</sup>, M-C. Yeh<sup>2</sup>, Y. Matsuzaki<sup>1</sup>, H. Toida<sup>1</sup>, H. Yamaguchi<sup>1</sup>, S. Saito<sup>1</sup>, A. J. Leggett<sup>2</sup>, and W. J. Munro<sup>1</sup>

<sup>1</sup>NTT Basic Research Laboratories, NTT Corporation, <sup>2</sup>Department of Physics, University of Illinois at Urbana-Champaign

P5

### **Observation of singlet-triplet oscillation of nuclear spins of ultracold neutral atoms in an optical super-lattice**

H. Ozawa, S. Taie, H. Shiotsu, T. Yagami, Y. Fukushima, Y. Takasu, Y. Takahashi

Graduate School of Science, Kyoto University

P6

### **Superconducting flux qubits in a 3D cavity**

S. Saito<sup>1</sup>, I. Mahboob<sup>1</sup>, H. Toida<sup>1</sup>, Y. Matsuzaki<sup>1</sup>, K. Kakuyanagi<sup>1</sup>, W. J. Munro<sup>1</sup>, Y. Nakamura<sup>2,3</sup>, and H. Yamaguchi<sup>1</sup>

<sup>1</sup>NTT BRL, <sup>2</sup>RCAST-UTokyo, <sup>3</sup>CEMS-RIKEN

P7

**Electronic states in quantum point contacts with flat potential barriers**

T. Aono

Faculty of Engineering, Ibaraki University

P8

**Dynamical mechanisms and role of the edge states on the nuclear spin polarization in the  $\nu = 2/3$  quantum Hall states**

A. Fukuda,<sup>1</sup> D. Terasawa,<sup>1</sup> Y. Sasaki,<sup>2</sup> Y. Hashimoto,<sup>3</sup> and S. Katsumoto<sup>3</sup>

<sup>1</sup>Physics Department, Hyogo College of Medicine, <sup>2</sup>Graduate School of Science, Kyoto University, <sup>3</sup>Institute for Solid State Physics, The University of Tokyo

P9

**Characterization and control of hole spin states in Ge/Si core/shell nanowires**

R. Wang,<sup>1</sup> R. S. Deacon,<sup>1,2</sup> J. Yao,<sup>3</sup> C. M. Lieber<sup>3,4</sup> and K. Ishibashi<sup>1,2</sup>

<sup>1</sup>Advanced Device Lab., RIKEN, <sup>2</sup>CEMS, RIKEN, <sup>3</sup>Department of Chemistry and Chemical Biology, Harvard University, <sup>4</sup>School of Engineering and Applied Sciences, Harvard University

P10

**Assessment of InGaAs/InAlAs double quantum wells as an enhancing module for the Edelstein effect**

K. Okamoto,<sup>1</sup> J. C. Egues,<sup>2</sup> and T. Koga<sup>1</sup>

<sup>1</sup>Graduate School of Information Science and Technology, Hokkaido University, <sup>2</sup>Instituto de Física de São Carlos, Universidade de São Paulo

P11

**Modeling of weak localization-antilocalization in quasi-two-dimensional electron system using predetermined return trajectories**

A. Sawada, K. Okamoto and T. Koga

Graduate School of Information Science and Technology, Hokkaido University

P12

**Prediction of the enhanced Edelstein effect in InGaAs/InAlAs double quantum well by the Boltzmann equation approach**

K. Okamoto<sup>1</sup>, J. C. Egues,<sup>2</sup> and T. Koga<sup>1</sup>

<sup>1</sup>Graduate School of Information Science and Technology, Hokkaido University, <sup>2</sup>Instituto de Física de São Carlos, Universidade de São Paulo

P13

**Optical currents induced by surface plasmon fields nearby a metallic nano-complex**

N. Yokoshi,<sup>1</sup> M. Hoshina,<sup>1</sup> and H. Ishihara<sup>1,2</sup>

<sup>1</sup>Department of Physics and Electronics, Osaka Prefecture University, <sup>2</sup>Department of Materials Engineering Science, Osaka University

P14

**Amplification of photon echo signal from quantum dots using optical resonator**

R. Ide,<sup>1</sup> K. Akahane,<sup>2</sup> and J. Ishi-Hayase<sup>1</sup>

<sup>1</sup>School of Fundamental Science and Technology, Keio University, <sup>2</sup>National Institute of Information and Communications Technology (NICT)

P15

**Superfluorescence from emitters on a fiber**

H. Hisamune,<sup>1</sup> N. Yokoshi,<sup>1</sup> and H. Ishihara<sup>1,2</sup>

<sup>1</sup>Department of Physics and Electronics, Osaka Prefecture University, <sup>2</sup>Department of Materials Engineering Science, Osaka University

P16

**Nanocavity laser and photonic waveguides integrated in three-dimensional photonic crystals**

T. Tajiri<sup>1</sup>, S. Takahashi<sup>2,3</sup>, Y. Ota<sup>3</sup>, K. Watanabe<sup>3</sup>, S. Iwamoto,<sup>1,3</sup> and Y. Arakawa<sup>1,3</sup>

<sup>1</sup>Institute of Industrial Science, University of Tokyo, <sup>2</sup>Kyoto Institute of Technology, <sup>3</sup>Institute of Nano Quantum Information Electronics, University of Tokyo

P17

**A numerical investigation on the directional emission from a quantum dot ensemble embedded in an asymmetric optical waveguide**

W. Lin,<sup>1</sup> Y. Ota,<sup>2</sup> S. Iwamoto,<sup>1,2</sup> and Y. Arakawa<sup>1,2</sup>

<sup>1</sup>Institute of Industrial Science, the University of Tokyo, <sup>2</sup>Institute for Nano Quantum Information Electronics (NanoQuine), the University of Tokyo

P18

**AC magnetic field sensing using continuous-wave optically detected magnetic resonance of NV centers in diamond**

S. Saijo<sup>1</sup>, Y. Matsuzaki<sup>2</sup>, S. Saito<sup>2</sup>, H. Watanabe<sup>3</sup>, N. Mizuochi<sup>4</sup>, and J. Ishi-Hayase<sup>1</sup>

<sup>1</sup>Keio University, <sup>2</sup>NTT Basic Research Laboratories, <sup>3</sup>AIST, <sup>4</sup>Kyoto University

P19

**Electrical detection of nitrogen nuclear spins in NV centers in diamond**

H. Morishita<sup>1,2</sup>, S. Kobayashi<sup>1,2</sup>, M. Fujiwara<sup>1,2</sup>, H. Kato<sup>2,3</sup>, T. Makino<sup>2,3</sup>, S. Yamasaki<sup>2,3</sup>, N. Mizuochi<sup>1,2</sup>



<sup>1</sup>Institute for Chemical Research, Kyoto University, Japan. <sup>2</sup>JST-CREST, Japan Science and Technology Agency, Japan. <sup>3</sup>Energy Technology Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Japan

P20

**Temperature sensing with an ensemble of nitrogen vacancy centers**

K. Hayashi<sup>1,2,3</sup>, Y. Matsuzaki<sup>3</sup>, T. Shimo-Oka<sup>1</sup>, I. Nakamura<sup>2†</sup>, H. Morishita<sup>1</sup>, M. Fujiwara<sup>1</sup>, S. Saito,<sup>3</sup> and N. Mizuochi<sup>1</sup>

<sup>1</sup>Institute for Chemical Research, Kyoto University, <sup>2</sup>Graduate School of Engineering Science, Osaka University, <sup>3</sup>NTT Basic Research Laboratories, NTT Corporation, †Present address: Center for Emergent Matter Science, RIKEN

P21

**Teleportation-based quantum media conversion from a photon to a nucleon in diamond**

H. Kano, R. Kuroiwa, Y. Sekiguchi, and H. Kosaka  
Yokohama National University

P22

**Deterministic measurement of a nuclear spin in diamond under a zero field**

R. Enyo, T. Nakamura, T. Ishizaka, Y. Sekiguchi, and H. Kosaka  
Yokohama National University

P23

**A focusing resonator for surface acoustic waves on GaAs**

Y. Sato, R. Takasu, and T. Fujisawa  
Department of Physics, Tokyo Institute of Technology

P24

**Hexagonal <sup>12</sup>C/<sup>13</sup>C graphene phononic crystal**

Y. Notani, Y. Anno, K. Takei, S. Akita, and T. Arie  
Department of Physics and Electronics, Osaka Prefecture University

P25

**Effects of boundary condition on phonon transport in two-dimensional harmonic lattice**

A. Ueno and N. Mori  
Graduate School of Engineering, Osaka University

P26

**Coupled electron-phonon transport simulation of 1D nanostructures**

Y. Kajiwara and N. Mori

Graduate School of Engineering, Osaka University

P27

**Enhanced sensitivity of MEMS bolometers by introducing two-dimensional phononic crystal structures**

Y. Zhang<sup>1</sup>, B. Qiu<sup>1</sup>, N. Nagai<sup>1</sup>, M. Nomura<sup>1,2</sup>, and K. Hirakawa<sup>1,2</sup>

<sup>1</sup>Institute of Industrial Science, University of Tokyo, <sup>2</sup>INQIE, University of Tokyo

P28

**Topologically protected elastic waves in one-dimensional periodic structure**

I. Kim<sup>1</sup>, S. Iwamoto,<sup>1,2</sup> and Y. Arakawa<sup>1,2</sup>

<sup>1</sup>IIS, University of Tokyo, <sup>2</sup>NanoQuine, University of Tokyo

P29

**Growth of CeO<sub>2</sub> on Si (111) substrates as a magnetically purified host crystal for Er<sup>3+</sup> dopants**

T. Inaba<sup>1</sup>, T. Tawara<sup>1,2</sup>, H. Omi<sup>1,2</sup>, H. Yamamoto<sup>1</sup>, and H. Gotoh<sup>1</sup>

<sup>1</sup>NTT Basic Research Laboratories, <sup>2</sup>NTT Nanophotonics Center

P30

**Effect of radical initiator or polymerization inhibitor in fabrication of single layer graphene nanoribbon by unzipping of single- or double-walled carbon nanotubes**

M. Fukumori<sup>1</sup>, T. Ogawa<sup>1</sup>, and H. Tanaka<sup>1</sup>

<sup>1</sup>Department of Chemistry, Graduate School of Science, Osaka University, <sup>2</sup>Department of Human Intelligence Systems, Graduate School of Life Science and Systems Engineering, Kyushu Institute of Technology

P31

**Phonon engineering of graphene by induced strain**

Y. Imakita, Y. Anno, H. Kawata, K. Takei, S. Akita, and T. Arie

Department of Physics and Electronics, Osaka Prefecture University

P32

**Superconducting transition of thin layered superconductor NbSe<sub>2</sub>: influence of device structures**

D. Yabe,<sup>1</sup> K. Yarimizu,<sup>1</sup> H. Sonoda,<sup>1</sup> H. Tomori,<sup>1,2</sup> K. Watanabe,<sup>3</sup> T. Taniguchi,<sup>3</sup> A. Kanda<sup>1</sup>

<sup>1</sup>Division of Physics and TIMS, University of Tsukuba, <sup>2</sup>PRESTO, Japan Science and Technology Agency, <sup>3</sup>NIMS, National Institute for Materials Science

P33

**Simplified estimation of crystallographic orientation of strained graphene by micro-Raman spectroscopy**

K. Nakamura,<sup>1</sup> H. Tomori,<sup>1,2</sup> and A. Kanda<sup>1</sup>

<sup>1</sup>Division of Physics and TIMS, University of Tsukuba, <sup>2</sup>PRESTO, Japan Science and Technology Agency

P34

**Fabrication of tunnel barriers in multi-wall carbon nanotube by Ga focused ion beam irradiation**

N. M. Ghazali<sup>1,2</sup>, H. Tomizawa<sup>1</sup>, N. Hagiwara<sup>1</sup>, K. Suzuki<sup>1</sup>, A. M. Hashim<sup>1,2</sup>, T. Yamaguchi<sup>1</sup>, S. Akita<sup>3</sup>, K. Ishibashi<sup>1,4</sup>

<sup>1</sup>Advanced Device Laboratory, RIKEN, <sup>2</sup>Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, <sup>3</sup>Osaka Prefecture University, Osaka, <sup>4</sup>RIKEN Center for Emergent Matter Science (CEMS)

P35

**Layer-by-layer assembly of graphene heterostructures using direct growth method**

K. Okuyama, Y. Anno, Y. Mochizuki, K. Takei, S. Akita, and T. Arie

Department of Physics and Electronics, Osaka Prefecture University

P36

**Polarizability of Raman spectra from suspended single-walled carbon nanotubes**

Y. Tanaka,<sup>1</sup> T. Kato,<sup>1</sup> K. Yoshino,<sup>1</sup> S. Chiashi,<sup>2</sup> and Y. Homma<sup>1</sup>

<sup>1</sup>Department of Physics, Tokyo University of Science, <sup>2</sup>Department of Mechanical Engineering, The University of Tokyo

P37

**Ballistic electron transport in coupled graphene nanoribbons**

F. Hashimoto and N. Mori

Osaka University

P38

**Raman analysis on nanocarbon materials formation by isotope labelling toward <sup>13</sup>C position control in graphitic lattice**

A. Ohata, X. Xizhao, T. Ishida, and Y. Kobayashi

Department of Applied Physics, Osaka University

P39

**Synthesis of turbostratic multilayer graphene film from graphene oxides by ultrahigh temperature process**

S. Nakamura<sup>1</sup>, T. Ishida<sup>1</sup>, Y. Nishina<sup>2</sup> and Y. Kobayashi<sup>1</sup>

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P40

**Localization length analysis of quantum anomalous Hall state in a ferromagnetic topological insulator**

M. Kawamura<sup>1</sup>, R. Yoshimi<sup>1</sup>, A. Tsukazaki<sup>2</sup>, K. S. Takahashi<sup>1</sup>, M. Kawasaki<sup>1,3</sup>, and Y. Tokura<sup>1,3</sup>

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P41

**Observation of surface state of topological crystalline insulator (Pb,Sn)Te thin films**

Y. Otaki<sup>1</sup>, T. Yamaguchi<sup>1</sup>, H. Itoh<sup>1</sup>, R. Ishikawa<sup>1</sup>, S. Kuroda<sup>1</sup>, R. Nakanishi<sup>2</sup>, D. Fan<sup>2</sup>, R. Akiyama<sup>2</sup>, S. Hasegawa<sup>2</sup>, K. Miyamoto<sup>3</sup>, H. Sato<sup>3</sup>, A. Kimura<sup>4</sup>

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## Late News Posters

LN1

### **Terahertz spectroscopy of carbon nanotube quantum dots performed by detecting THz-induced photocurrent in the single electron transistor geometry**

T. Tsurugaya<sup>1</sup>, K. Yoshida<sup>1</sup>, F. Yajima<sup>2</sup>, M. Shimizu<sup>2</sup>, Y. Homma<sup>2</sup>, S. Q. Du<sup>1</sup>, Y. Zhang<sup>1</sup>, and K. Hirakawa<sup>1</sup>

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LN2

### **What limits the observability of resistively detected-NMR (RD-NMR) in quantum point contact (QPC)?**

A. Noorhidayati,<sup>1</sup> M. H. Fauzi,<sup>2</sup> M. F. Sahdan,<sup>1</sup> S. Maeda,<sup>1</sup> K. Sato,<sup>1</sup> K. Nagase,<sup>1</sup> and Y. Hirayama<sup>1,2</sup>

<sup>1</sup>Department of Physics, Tohoku University, <sup>2</sup>CSRN, Tohoku University

LN3

### **Practical requirements of quantum information processing with the silicon-vacancy center in diamond**

M. Hanks<sup>1,2</sup>, K. Nemoto<sup>2,1</sup> and W. J. Munro<sup>3,4</sup>

<sup>1</sup>Department of Informatics, School of Multidisciplinary Sciences, Sokendai (The Graduate University for Advanced Studies), <sup>2</sup>National Institute of Informatics, <sup>3</sup>NTT Basic Research Laboratories, <sup>4</sup>NTT Research Center for Theoretical Quantum Physics

# **Abstracts**