

●トポロジカル超伝導体 TQP2012 会議録

2012年5月16日ー5月20日 (名古屋大学 ES 総合館)

暖かい穏やかな五月晴れの名古屋に、参加者 163 名、うち海外からの出席者 14 名を集め、名古屋大学 ES 総合館にて 4 日間にわたって開催された。会議は HP での申し込みの段階においてすでに大きな反響を呼んでおり、会場の収容人員を超えるおそれがあったため、本来意図していた締切日よりも早めに申し込みが打ち切られるという異例の人気であった。会議の冒頭においてチェアマンである田仲氏による講演からスタートし、主に外国からの出席者向けに日本の歴史の中における尾張、名古屋城、および現代の名古屋の発展についての紹介が行われ、続いて、同じくチェアマンである前野氏による科研費、新学術領域研究の紹介が行われた。これらに引き続いて、4 件のプレナリー発表、31 件の口頭発表、98 件のポスター発表が行われた。

プレナリーには 1 件あたり 50 分の時間が割り当てられ、すべてにおいて極めて重要で意義の深い発表が行われた。Volovik 氏は当該分野を立ち上げた先駆者であり、運動量空間におけるトポロジーの基礎から quantum vacua の universality class と現実のトポロジカル物理現象に関して、安藤氏はトポロジカル絶縁体の新しい物質開発、物性制御に関する最新の展開、Leggett 氏はヘリウムの特異な側面、マヨラナフェルミオンの性質、量子コンピュータに関する将来展望などを、また Zhang 氏は凝縮系の多くの実験結果を使いながら、トポロジカル凝縮系の理解がどのように進んできたか、についての歴史を明瞭に解説した。

そのほかの口頭発表において主にフォーカスされたのは、物性実験研究に関しては、ヘリウムや Sr_2RuO_4 などのカイラル超伝導・超流動、トポロジカル絶縁体およびそのドーピングによる超伝導体の最新の成果、 $5/2$ の分数量子ホール状態の理解、グラフェンなどのディラック電子系などの話題が取り上げられた。また、理論的側面に関しては、トポロジカル物質の分類、トポロジカル現象のデザイン、マヨラナ粒子によるブレーディング、冷却原子気体における新奇なトポロジカル構造などが議論された。また最新のホットな話題として、超伝導/強磁性接合系における奇周波数超伝

導状態や 1 次元ナノワイヤーのマヨラナ粒子の検出、半整数磁束量子の検出、中心対称性の破れた超伝導など、急激に理解が進みつつある新現象についても議論された。これらのさらなる詳細については、添付のプログラムを参照して頂きたい。

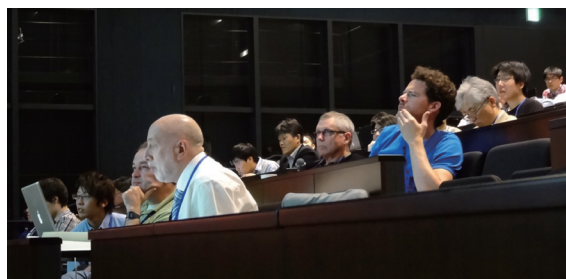
また会議中に目に付いたのは、ポスター発表の盛り上がりであった。ほぼすべてのポスターに、通路を遮るくらいの人だかりができており、会場内の移動に苦労をしたほどであった。会議の最後には、参加者の投票に基づき、ポスターおよびポスターレビューに対する表彰が行われ、中河西氏 (東大)、入江氏 (NTT)、竹内氏 (広島大学) が優れた発表として表彰された。ポスターの質の高さにみられる若い力の参入は、当該分野の大きな発展を支えるものであり、新しい視点に基づく今後の展開が大いに期待される。

会議の中途には、ES 総合館に仕事部屋が構えられているという益川氏による激励の言葉も頂き、大いに盛り上がりのある議論が進められた。4 日間のスケジュールを通して、内容は極めて濃厚で、トポロジカル量子現象の今後のさらなる大きな発展を予期させる内容であった。新学術領域研究の国際アドバイザーである Leggett 氏、Zhang 氏、Aarts 氏らから、本学術領域が世界に先駆けたトポロジカル関連プロジェクトであり、また本国際会議も世界最先端の流れを作っているとの有りがたいコメントも頂いた。2 年後に行われる TQP2014 において、さらなる発展が報告されることを願ってやまない。

最後になりましたが、本会議の開催に当たって、スムーズな運営と細やかなサポートを行っていただいた名古屋大学田仲研究室の皆様への支援に深く感謝いたします。

(文責、柏谷 聡)





PROGRAM

MAY 17, 2012 (THU)

- 9:00 **Welcome** Y. Tanaka (10min)
- 9:10 17AM-0 Introducing Topological Quantum Phenomena Project Y. Maeno (20min)
- 9:30 ~ 10:50 Topological States: Chair M. Nakahara
- 9:30 17AM-1 Topology of Quantum Vacua G. Volovik (50min)
- Recent Topics on Topological Superconductors M. Sato (30min)
- 11:20~12:30 Chiral SC: chair N. Birge
- 11:20 17AM-3 Searching for Complex Order Parameters and Majorana Fermions in Superconducting Materials and Josephson Devices D. Van Harlingen (30min)
- 11:50 17AM-4 Chiral Edge States of Sr_2RuO_4 S. Kashiwaya (20min)
- 12:10 17AM-5 Anomalous Superconducting Transition of Sr_2RuO_4 Investigated by Magnetocaloric Effect S. Yonezawa (20min)
- 13:40~15:30 Odd-parity/Odd-freq. pairs: Chair Y. Tanaka
- 13:40 17PM-1 Twofold Symmetry Breaking in the Gap Function of UPt_3 Probed by Thermal Conductivity K. Izawa (30min)
- 14:10 17PM-2 Odd-frequency Pairing in Superconducting Heterostructures A. A. Golubov (30min)
- 14:40 17PM-3 Odd-frequency Pairing in Superfluid ^3He S. Higashitani (20min)
- 15:00 17PM-4 Odd-frequency Superconductivity: Stability and Ubiquitousness K. Miyake (30min)
- 16:00~18:20 Poster Session A: Chair T. Nojima
- 16:00 ~ 16:50 Poster Preview A (50min)
- 16:50 ~ 18:20 Poster Session A (90min)

MAY 18, 2012 (FRI)

- 9:20~10:40 Topological Ins. / Topological SC: Chair N. Nagaosa
- 9:20 18AM-1 Topological Insulators and Superconductors: Materials Frontier Y. Ando (50min)
- 10:10 18AM-2 From the Topological Invariants to the Edge States of Topological Insulators V. Gurarie (30min)
- 11:10~12:20 RS invariant: chair V. Gurarie
- 11:10 18AM-3 Classification of Topological Insulators and Superconductors: Some Applications A. Furusaki (30min)
- 11:40 18AM-4 Surface Majorana Cone of the Topological Superfluid ^3He B Phase R. Nomura (20min)
- 12:00 18AM-5 Theory of Tunneling Spectroscopy in Superconducting Topological Insulators A. Yamakage (20min)

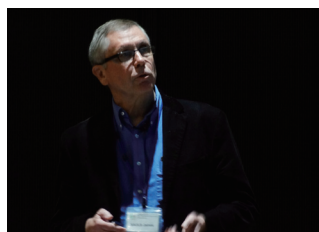
MAY 19, 2012 (SAT)

- 9:20 ~ 10:30 Majorana Fermion: Chair M. Ueda
- 9:20 19AM-1 Some Remarks about Majorana Fermions and Their Use in Topological Quantum Computing A. Leggett (50min)

- 10:10 19AM-2 Symmetry Protected Topological Phase and Spin Susceptibility in ^3He -B K. Mizushima (20min)
- 11:00~12:20 S/F junctions: chair A. A. Golubov
- 11:00 19AM-3 Micron-ranged Supercurrents Induced in the Half-metallic Ferromagnet CrO_2 J. Aarts (30min)
- 11:30 19AM-4 Spin-triplet Supercurrent in Ferromagnetic Josephson Junctions N. Birge (30min)
- 12:00 19AM-5 Odd-frequency Cooper pairs in Spin-triplet Superconducting Proximity Structures Y. Asano (20min)
- 14:30~16:20 Chiral States: chair K. Nagai
- 14:30 19PM-1 Surface States and Edge Currents of Superfluid ^3He in Confined Geometry J. Sauls (30min)
- 15:00 19PM-2 NMR Study on Mermin-Ho Texture in Rotating Superfluid ^3He -A O. Ishikawa (30min)
- 15:30 19PM-3 NMR Investigation of the $\nu = 5/2$ Fractional Quantum Hall State K. Muraki (30min)
- 16:00 19PM-4 Proposal for Transporting and Braiding Edge Majorana Fermions X. Hu (20min)
- 16:50~19:10 Poster Session B: Chair T. Shishidou
- 16:50~17:40 Poster Preview B (50, 50min)
- 17:40~19:10 Poster Session B (90min)

MAY 20, 2012 (SUN)

- 9:00 ~ 10:10 Topological Ins. Topological SC: Chair G. Zheng
- 9:00 20AM-1 Topological Insulators and Superconductors S. Zhang (50min)
- 9:50 20AM-2 STM/STS Studies of Topological Insulators under Magnetic Fields T. Hanaguri (20min)
- 10:40 ~ 12:00 Topological Excitation: chair K. Miyake
- 10:40 20AM-3 Topological Aspects in Ultracold Atomic Gases M. Ueda (30min)
- 11:10 20AM-4 Single-site Resolved Detection and Manipulation of Atoms in an Optical Lattice T. Fukuhara (20min)
- 11:40 20AM-5 Probing the Physics of the Fractional Vortex State in Mesoscopic Rings of Sr_2RuO_4 R. Budakian (30min)
- 13:20 ~ 14:50 Chiral SC/ NCS SC: chair Y. Inada
- 13:20 20PM-1 Novel States at Defects and Twin Boundaries in Non-centrosymmetric Superconductors M. Sigrist (30min)
- 13:50 20PM-2 Novel Superconducting State in Non-centrosymmetric Compounds $\text{Li}_2(\text{Pd}_{1-x}\text{Pt}_x)_3$ G. Zheng (20min)
- 14:10 20PM-3 Surface Superconductivity on SrTiO_3 : Depth and Crystal Orientation Dependence K. Ueno (20min)
- 14:30 20PM-4 Probing the Direction of the Angular Momentum of Cooper Pairs in Superfluid ^3He -A H. Ikegami (20min)
- 15:20 ~ 16:40 Topological States: Chair G. Volovik
- 15:20 20PM-5 Topological and Chiral Aspects of Graphene H. Aoki (30min)

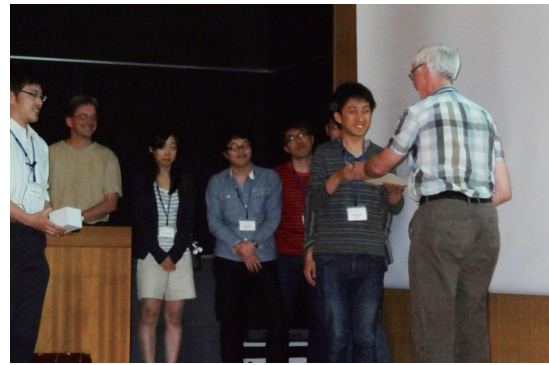


15:50 20PM-6 Topological Chiral Edge Modes in Magnonic Crystals S. Murakami (20min)
 16:10 20PM-7 Theoretical Design of Topological Materials N. Nagaosa (30min)
 16:40~17:00 Closing

POSTER PRESENTATION

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| <p>PA1 Superconductivity in Ga-clathrate Compounds
T. Muranaka</p> <p>PA2 Electronic Phase Diagram of Ir Oxide Superlattices with Strong Spin-orbit Interaction
J. Matsuno</p> <p>PA3 Chiral Magnetic Soliton Lattice on Chiral Helimagnet $\text{Cr}_{1/3}\text{NbS}_2$
Y. Togawa</p> <p>PA4 Quantum Transport through Chiral Soliton Lattice in Chiral Helimagne
J. Kishine</p> <p>PA5 Skyrmion Quantum Number and Adiabatic Pumping in 2D Magnetic Topological Insulators
B.-J. Yang</p> <p>PA6 Beliaev theory of a ferromagnetic spinor Bose-Einstein condensate
N. T. Phuc</p> <p>PA7 Half-Quantum Vortices in Thin Film of Superfluid ^3He
M. Nakahara</p> <p>PA8 Effects of Lithium Deficiency on Superconductivity in the Noncentrosymmetric Superconductors $\text{Li}_2\text{Pd}_3\text{B}$
G. Bao</p> <p>PA9 Long Ranged Proximity Effect in Thin Films of Half metallic Ferromagnet CrO_2
M. S. Anwar</p> <p>PA10 Liquefaction of ^3He in Two-dimensions
D. Sato</p> <p>PA11 Probing and Controlling Strongly Interacting Quantum Matter at the Single Atom Level
T. Fukuhara</p> <p>PA12 Controlling Injection of Charge Carriers from Contact Metals to Graphene for Realization of Relativistic Josephson Effects
A. Kanda</p> <p>PA13 Yet-To-Be-Discovered 2D Superfluid ^3He
S. Nakamura</p> <p>PA14 Remarkable Role of Interfacial Thickness on Energetics and Transport in a Perpendicular Magnetic Field: A One-electron and A One-Composite Fermion Approach
K. Mouloupoulos</p> <p>PA15 Hall Effect of Graphene and Single Dirac Fermions with Disorder
M. Noro</p> <p>PA16 Existence of Dense Superfluid ^3He-^4He Mixture in Aerogel
Y. Sasaki</p> <p>PA17 Modulation of Electron Transport by Strain-induced Pseudo-magnetic Fields in Graphene
H. Tomori</p> <p>PA18 Temperature Variation of Critical Current Modulations of dc-SQUIDs with Nb/Ru/Sr_2RuO_4 Junctions
T. Sakurai</p> <p>PA19 Pd-Pt Substitution Effect of the Noncentrosymmetric Superconductor $\text{Li}_2(\text{Pd}_{1-x}\text{Pt}_x)_3\text{B}$
G. Eguchi</p> <p>PA20 Reflectionless Nonlinear Spin Flows Past an Obstacle in spin-1 Polar BECs
D. Takahashi</p> <p>PA21 Strong Suppression of KT Transition and Existence of Quantum Phase Transition of ^4He Film under High Pressure ^3He
S. Murakawa</p> <p>PA22 Stable Skyrmions in SU(2) Gauged Bose-Einstein Condensates
T. Kawakami</p> | <p>PA23 Vortices in Mesoscopic Plates of a Chiral Superconductor Sr_2RuO_4
R. Ishiguro</p> <p>PA24 Gapless Interface States between Two Topological Insulators in the Fu-Kane Model
R. Takahashi</p> <p>PA25 Fabrication of One-hole Micron-size Bridges of the Spin-triplet Superconductor Sr_2RuO_4
Y. Yamaoka</p> <p>PA26 Ultra-low Temperature Mobility of Electron Bubbles Formed below the Free Surface of Superfluid ^3He-B
H. Ikegami</p> <p>PA27 Magnetocaloric Effect of a Sub-mg Sr_2RuO_4 Single Crystal
T. Kajikawa</p> <p>PA28 Calculation of Electronic State for the Topological Superconductor $\text{Cu}_x\text{Bi}_2\text{Se}_3$
T. Hashimoto</p> <p>PA29 Creation of Artificial Gauge Fields in Ultracold Ytterbium Atoms
Y. Yoshikawa</p> <p>PA30 Topological Superconductivity in Bilayer Rashba System
S. Nakosai</p> <p>PA31 ^{77}Se NMR Study of Possible Topological Superconductors $\text{Cu}_x\text{Bi}_2\text{Se}_3$
F. Iwase</p> <p>PA32 Texture of ^3He-A Phase in a Narrow Cylinder
T. Kunimatsu</p> <p>PA33 Enhancement of Magnetization in Liquid ^3He at Aerogel Interface
A. Fukui</p> <p>PA34 Theoretical Analysis of Thermal Hall Effect of Magnon in General Magnets
R. Matsumoto</p> <p>PA35 Magnetic Order and Superconductivity in a Superconducting Ferromagnet UCoGe
K. Deguchi</p> <p>PA36 Acoustic Properties of Normal Liquid ^3He in 97% Aerogel
O. Iwakami</p> <p>PA37 Surface Majorana Cone of the Superfluid ^3He B Phase on a Partially Specular Wall
K. Akiyama</p> <p>PA38 Charge Pumping Due to Triplet Vector Chirality in Ferromagnet/triplet Superconductor Junctions
T. Yokoyama</p> <p>PA39 NMR/NQR Studies of the Non-centrosymmetric Superconductor LaPtBi & BiPd
K. Matano</p> <p>PA40 Hydrodynamic Equations of Spin-1 Bose-Einstein Condensates
E. Yukawa</p> <p>PA41 Correlation Effects on a Topological Insulator : a Variational Monte Carlo Approach
Y. Takenaka</p> <p>PA42 Local Correlation Effect on Topological Insulators
T. Yoshida</p> <p>PA43 Multicomponent Ginzburg-Landau theory for Sr_2RuO_4
S. Takamatsu</p> <p>PA44 Spin Torques and Charge Transport on the Surface of Topological insulator
A. Sakai</p> <p>PA45 Surface States in Magnetic Topological Insulators
Y. Ueno</p> <p>PA46 Time Reversal Symmetric Kitaev Model and Topological Superconductor in Two Dimensions
R. Nakai</p> <p>PA47 Josephson Characteristics of Superconducting Quantum Point Contact
H. Irie</p> <p>PA48 Molecular Beam Epitaxial Growth of Topological Insulators on Insulating Substrates
A. Taskin</p> <p>PA49 Topological Aspects of the Quantum Spin Nanotubes
T. Ssakai</p> <p>PA50 Chiral Superconductivity in Non-centrosymmetric Systems with Zeeman Magnetic Field
K. Yada</p> |
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- PB1 Surface Density of States in *s*-wave Rashba Superconducting Junctions Y. Tanuma
- PB2 High-Field Anomaly in the Superconducting Mixed State of Sr_2RuO_4 K. Tenya
- PB3 Quantum Vortex Generation in Spin-2 Bose-Einstein Condensate Using Optical Spoon Stirring S. Tojo
- PB4 Index Theorem for Topological Insulator and Superconductor Systems T. Fukui
- PB5 Surface State in the $n=0$ Quantum Hall State in the Organic Dirac Fermion System T. Osada
- PB6 Exotic Superconductivity in Locally Non-centrosymmetric Systems Y. Yanase
- PB7 Optimizing the $\text{Bi}_{2-x}\text{Sb}_x\text{Te}_{3-y}\text{Se}_y$ Solid Solutions to Approach the Intrinsic Topological Insulator Regime Z. Ren
- PB8 Theoretical Study of the Spontaneous Magnetic Moment in the Chiral Superconducting State A. Tsuruta
- PB9 Fourth Sound Resonance of Superfluid ^3He in Slab Geometry C. Kato
- PB10 Axion Strings in Topological Insulators/Quantum Spin Systems A. Tanaka
- PB11 Reentrant Topological Transitions in Quasiperiodically Modulated One-dimensional Quantum Wire Coupled to a Superconductor M. Tezuka
- PB12 Conductance Fluctuation and Weak Antilocalization in a Submicrometer-sized Wire of Epitaxial Bi_2Se_3 S. Matsuo
- PB13 Transport Properties of Topological Insulators with Cobalt Films Deposited on their Surface K. Eto
- PB14 Junction-Size Dependence of Josephson Current in $\text{Nb}/\text{Sr}_2\text{RuO}_4$ Micro-Josephson Junctions K. Saitoh
- PB15 Topological Classification of Vortex-core Structures in Spinor BECs S. Kobayashi
- PB16 Spin-triplet Superconductivity Induced by Longitudinal Ferromagnetic Fluctuations in UCoGe T. Hattori
- PB17 Gating with Ionic Liquid on Bulk Single Crystals of a Topological Insulator K. Segawa
- PB18 Superconducting Pairing Symmetry and Spin/Charge Fluctuations in a Staggered Field K. Shigeta
- PB19 Fermi Surface and Spin Texture of the Noncentrosymmetric Superconductors $\text{Li}_2\text{Pd}_3\text{B}$ and $\text{Li}_2\text{Pt}_3\text{B}$ T. Shishidou
- PB20 Finite Size Effects of the Surface States in a Lattice Model of Topological Insulator K. Ebihara
- PB21 NMR/NQR Studies of Non-centrosymmetric Superconductors K. Arima
- PB22 Topological Aspects and Magnetic Properties of Edge States in the Multi-band Superconductor Sr_2RuO_4 Y. Imai
- PB23 Possibility of Superconducting Proximity Effect of Equal-spin Triplet Components in $\text{NbN}/\text{Co}_2\text{Cr}_{0.6}\text{Fe}_{0.4}\text{Al}/\text{NbN}$ Junctions K. Matsuda
- PB24 Edge State and Edge Current in Superfluid ^3He Y. Tsutsumi
- PB25 Spinless Basis for Spin-singlet FQH States T. Kimura
- PB26 Floquet Theory of Photo-induced Topological Phase Transition: Application to Grapheme T. Oka



- PB27 High Field Magnetoresistance of Topological Insulator Bi_2Se_3 T. Sasaki
- PB28 Index Theorem for Topological Insulator Heterostructure Systems K. Shiozaki
- PB29 Symmetry Breakdown of Zn-Excimer Condensates Induce by Weak Magnetic Field K. Obara
- PB30 Tachyon Condensation in Bose-Einstein Condensates H. Takeuchi
- PB31 Non-Abelian Statistics of Vortices with Multiple Majorana Fermions M. Nitta
- PB32 Transport and Superconducting Properties of $\text{Cu}_x\text{Bi}_2(\text{Se}_{1-y}\text{Te}_y)_3$ K. Kadowaki
- PB33 Soft Point-contact Spectroscopy of $\text{Cu}_x\text{Bi}_2\text{Se}_3$ S. Sasaki
- PB34 Small Superfluid Density in $\text{Cu}_x\text{Bi}_2\text{Se}_3$ M. Kriener
- PB35 A New Long-Range-Ordered Superfluid State of ^4He Films in Three-Dimensional Topology N. Wada
- PB36 Critical Exponent of the Plateau Transition in the Integer Quantum Hall Effect K. Slevin
- PB37 Possible 1D Superfluid ^4He Realized in Nanochannels T. Matsushita
- PB38 Electric-Field Tuning of Superconductivity in Y123 High- T_c Cuprates T. Nojima
- PB39 Transport in InAs/GaSb Topological Insulating Phase K. Suzuki
- PB40 Quantum Hall States in Two-component Bose Gases under Rapid Rotation S. Furukawa
- PB41 Chiral Majorana Edge Excitations in Sr_2RuO_4 H. Nobukane
- PB42 Spin-Antisymmetric Pomeranchuk Instability in $\text{Sr}_3\text{Ru}_2\text{O}_7$ Nematic Phase Y. Yoshioka
- PB43 Spin-polarized Magneto-optical Current of Dirac Electrons in Bismuth Y. Fuseya
- PB44 Spin-to-surface Locking in Gapped and Gapless Topological Phases K. Imura
- PB45 Possible Unconventional Pairing States in SrPtAs J. Goryo
- PB46 Magnetic-Field Modulation of the Josephson Effect between URu_2Si_2 and Al A. Sumiyama
- PB47 Mermin-Ho Texture and Intrinsic Angular Momentum of ^3He A-phase T. Takagi
- PB48 The Appearance of Robust Odd Frequency Pairing in Superconductor/Inhomogeneous-ferromagnet Junctions S. Kawabata

