Nishina Asia Award 2013年度候補者一覧

ファイル番号	候補者	候補者所属	候補者E-MAIL	推薦者	推薦者mailアドレス
No.13-1 △	**Dong Qian** 生年月日1977年1月24日、 中国	Physics Department,Shanghai Jiao Tong University		**Dr.Gui Lu Long** (Department of Physics,Tsinghua University)	**gllong@tsinghua.edu.cn** **guilulong@gmail.com**
No.13-2	**Haozhao Liang** 生年月日 中国	JSPS Post-doctoral fellow in RIKEN Nishia Center		**佐川　弘幸** (Univiersity of Aizu and Nishina Center,RIKEN)	sagawa@u-aizu.ac.jp
No.13-3	**Nguyen Quang Hung** 生年月日1980年7月24日 ベトナム	School of Engieering,TanTao University,TanDuc Ecity,Duc Hoa,Long Anprovince,Vietnam		**Nguyen Dinh Dang** (Doctor of Physics and Mathematics Sciences Riken Nishina Center Research Scientist)	dang@riken.jp
No.13-4 〇	**Xueqing Yan** 生年月日1977年7月2日 中国	Institute of Heavy Ion Physics,school of physics,Peking University,China		**田島　俊樹** IZEST	tajima.toshiki@gmail.com
No.13-5 △	**Zhai Hui** 生年月日 中国	Institute for Advanced Study,Tsinghua University		**Chen Ning YANG** (Professor at The Chineses University of Hong Kong)	cnyang@cuhk.edu.hk
No.13-6 〇	**Yuando Zhang** 生年月日 中国	Department of Physics,Fudan University,China		**Ruibao Tao** Department in Physics,Fudan University,Shanghai200433,China	rbtao@fudan.edu.cn
No.13-7 △	**Seok Kim** 生年月日1977年1月17日 韓国	Assistant Professor in Seoul Natural University,Seoul,Korea Visiting Professor,Perimeter Institute for Theoretical Physics,Waterloo,Ontario Canada		**Kimyeong Lee** Professor in Korea Institute for Advanced Study	klee@kias.re.kr

No.13-8	**Alexander Ling** 生年月日 シンガポール	National University of Singapore		**Kwek Leong Chuan** Deputy director,Institute of Advanced Studies,Nanyang Technological University,Singapore	cqtklc@nus.edu.sg
No.13-9 ○	**Shiraz Minwalla** 生年月日 インド	Department of Theoretical Physics Tata Institute of Fundamental Research,	minwalla@theory.tifr.res.in shiraz.minwalla@gmail.com	**Spenta R.Wadia** Director International Center for Theoretical Sciences and Distinguished Professor of Physics, Tata Institute of fundamental Research, India	wadia@theory.tifr.res.in spenta.wadia@gmail.com
No.13-10	**Nguyen Van Minh** 生年月日 ベトナム	Hanoi National University of Education		**Nguyen Viet Thinh** Hanoi National University of Education	hieutruong@hnue.edu.vn
No.13-11	**Amit Dutta** 生年月日1968年12月19日 インド	Professor in Department of Physics,Indian Institute of Technology,		**Dr.Bikas Chakrabarti** Senior Professor,Saha Institute of Nuclear Physics	bikask.chakrabarti@saha.ac.in
No.13-12 △	**Bae Ho Park** 生年月日1971年1月14日 韓国	Professor,Department of Physics,Konkuk University		**Tae Won Noh** Professor,Department of Physics and Astronomy,Seoul National University & Director,IBS Center for Functional Interfaces of Correlated Electron Systems	twnoh@snu.ac.kr
No.13-13 △	**Xi Dai** 生年月日1971年7月21日 中国	Department of Material Science and Technology,Zhejiang University,Zhejiang Chaina		**ZHANG,Fu-Chun** Chair Professor of Physics and Zhou Guangzhao Professor of Natural Sciences Department of Physics,the University of Hong Kong,China	fuchun@hku.hk
No.13-14	**Kim YOUSOO** 生年月日1968年8月19日 韓国	Surface and Interface Science Laboratory,RIKEN		**延与　秀人** 理 化学研究所仁科加速器研究センター長	enyo@riken.jp

No.13-15	**Hyotherl Ihee** 生年月日 韓国	Professor, Department of Chemistry, KAIST (Korea Advanced Institute of Science and Technology)		**志田　忠正**　京 都大学　名誉教授	shida@kyoto.email.ne.jp
No.13-16 △	**Hawoong Jeong** 生年月日 韓国	KAIST-Chair Professor / Head of Department, Department of Physics, KAIST (Korea Advanced Institute of Science and Technology)		**Prof Dr. Bongsoo Kim** Affiliation: Department of Physics, Changwon National University, Changwon, Korea	bongsoo.bskim@gmail.com
No.13-17 △	**Ren-Bao Liu**　生 年月日1973年9月 中国	The Chinese University of Hong Kong Department of Physics		**Ke-Qing Xia**　Department of Physics The Chinese University of Hong Kong	kxia@phy.cuhk.edu.hk
No.13-18	**C H Raymond Ooi** 生年月日 マレーシア	Associate Professor Department of Physics,Faculty of Science University of Malaya		**Prof Dr.Kurunathan Ratnavelu** Deputy Vice-Chancellor(Development) University of Malaya	kuru052001@gmail.com
No.13-19	**Song-Ming Wang** 生年月日 台湾	Taiwan Academia Sinica,Institute of Physics		**Dr.Ting-Kuo Lee** Director Institute of Physics Academia Sinica	tklee@phys.sinica.edu.tw
No.13-20	**Ying-jer Kao** 生年月日 台湾	Department of Physics,National Taiwan University		**Ching-Ray Chang** Dean, College of Science and Professor, Department of Physics,National Taiwan University	crchang@phys.ntu.edu.tw
No.13-21 ○	**Jian-Wei Pan** 生年月日1970年3月11日 中国	National Lab. for Physical Sciences at the Microscale University of Science and Technology of China		**Lu Yu**, Institute of Physics, Chinese Academy of Sciences,	lyu@iphy.ac.cn

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)
NAME: Dong Qian AFFILIATION: Physics Department, Shanghai Jiao Tong University PERSONAL: Male, Born in Jan. 24th, 1977, P.R. China DEGREE: 1998.7 B.S. in Physics, Fudan University, Shanghai, China 2003.1 Ph.D. in Physics, Fudan University, Shanghai, China EDUCATION AND APPOINTMENTS: 1994.9-1998.7 Physics Department, Fudan University, China 1998.9-2003.6 Surface Physics Lab., Physics Department, Fudan University, China 2003.7-2006.7 Postdoctoral Research Associate, Physics Department, Princeton University, USA 2006.7-2009.3 Associate Research Scholar, Physics Department, Princeton University, USA 2009.5- Professor, Physics Department, Shanghai Jiao Tong University, China RESEARCH INTERESTS: Topological phases of matter, Strongly correlated electrons, Superconductivity, Magnetism, STM, Angle-Resolved Photoemission NATIONALITY: China ADDRESS: 800 Dongchuan Road, Physics Department, Shanghai, China 200240 EMAIL: dqian@sjtu.edu.cn TELEPHONE: 86-21-34203047
Citation for the Award (within 30 words)
Dr. Qian has achieved the coexistence of superconductivity and topological state in topological insulator films, which is a breakthrough for the probing and manipulating of Majorana Fermions in topological insulators.

Description of the work

Topological insulators (TIs) are a new quantum class of matters discovered recently and were considered as a "star materials" in science and technology. Dr. Qian made significant contributions in the experimental realization of three dimensional TIs (Nature 2008, Nature Physics 2009). He and his collaborators found the first 3D TI (BiSb alloy) and the TI with simplest surface band structures and largest bulk gap (Bi_2Se_3). TIs have nontrivial surface states with spin-momentum locking under the protection of time reversal symmetry, which make them promising for application in spintronics, fault-tolerant quantum computation and lots of other fields. Topologically ordered phase in TIs does not break any symmetry. Known from history, new sciences always comes out of the intermixing. The interplay of topological order and system breaking such as superconductivity can lead to new quantum phenomena such as time-reversal invariant topological superconductors and Majorana fermions. To exploring those new phenomena, the first and most important problem is how to introduce superconducting states into TI's surface states and whether topological surface states can host Cooper pairs. It remains a big challenge due to the extreme difficulty to get atomically sharp and electronic transparent TI/SC interface.

One proposed experimental way to introduce superconductivity to TI's surface is utilizing superconducting proximity effect between s-wave superconductor (SC) and TI's surface state. In 2012, Dr. Qian and his collaborators made a breakthrough in introducing superconductivity into TI's surface (Science 2012):

1) For the first time, they succeeded in growing single crystal Bi_2Se_3 thin films on superconducting $NbSe_2$ substrate with atomically sharp and electronic transparent interface.
2) Further, in this high quality TI/SC heterostructure, by *in situ* scanning tunneling spectroscopy they unambiguously observed that superconducting states are present at $Bi_2Se_3/NbSe_2$ at the surface and interface.
3) By angle-resolved photoemission spectroscopy, they confirmed the formation of topological surface states in the films in which Copper pairs present. The topological surface states can host Copper pairs.

The superconducting TI/SC heterostructure that Dr. Qian made provides excellent platform for feature experiments on the interplay of TI and SC. Those findings immediately lay the groundwork for detecting Majorana fermions in TI system. Majorana fermions are proposed to emerge as superconducting vortex core states on superconducting TI's surfaces. The thin film based geometry opens many possibilities for probing and manipulating Majorana fermions.

Key references (up to 3 key publications*)

1. The Coexistence of Superconductivity and Topological Order in the Bi2Se3 Thin Films

Mei-Xiao Wang, Canhua Liu, Jin-Peng Xu, Fang Yang, Lin Miao, Meng-Yu Yao, C. L. Gao, Chenyi Shen, Xucun Ma, X. Chen, Zhu-An Xu, Ying Liu, Shou-Cheng Zhang, **Dong Qian**, Jin-Feng Jia, Qi-Kun Xue, *Science* **336**, 52 (2012).

2. Observation of a large-gap topological-insulator class with a single Dirac cone on the surface

Y. Xia, **D. Qian**, D. Hsieh, L. Wray, A. Pal, H. Lin, A. Bansil, D. Grauer, Y.S. Hor, R.J. Cava, M.Z. Hasan, *Nature Physics*, **5**, 398 (2009).

3. A topological Dirac insulator in a quantum spin Hall phase

D. Hsieh, **D. Qian**, L. Wray, Y. Xia, Y. S. Hor, R.J. Cava and M.Z. Hasan, *Nature*, **452**, 970 (2008).

*) Copy of one most significant publication should be attached.

Nominator (name, affiliation, email, telephone and relation to the candidate)

Prof. Dr. Gui Lu Long (APS Fellow, IoP Fellow, Member of IUPAP C13 Commission)
Department of Physics, Tsinghua University, Beijing 10084, China
gllong@tsinghua.edu.cn;guilulong@gmail.com
Tel: +861062772692

Relation to candidate: colleague, fellow members of Chinese Physics Society. Dr Qian is a leading figure in the Chinese physics community. I have also invited President Jie Zhang of Shanghai Jiaotong University, Prof. Qikun Xue(who had worked in Tohoko University for many years), who is one of the leading world experts in topological insulator and superconductivity to write supporting letters to support my recommendation .

Signature  Date 30, December 30, 2012

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)

Haozhao Liang, JSPS Post-doctoral fellow in RIKEN Nishina Center

Nationality: China, Telephone: +81-48-467-4086, Email: haozhao.liang@riken.jp

Address: Theoretical Nuclear Physics Laboratory, RIKEN Nishina Center, Wako 351-0198, Japan

Date of the degree of Ph.D.: July 1, 2010

Employment

2012.8 -	JSPS Post-doctoral fellow, RIKEN Nishina Center, Japan
2010.7 - 2012.7	Post-doctoral fellow, School of Physcis, Peking University, China

Education

2005.9 - 2010.7	Ph.D. (co-supervision), School of Physcis, Peking University, China
2007.11 - 2010.7	Ph.D. (co-supervision), Institut de Physique Nucléaire, Université Paris-Sud XI, France
2001.9 - 2005.7	Bachelor, School of Physcis, Peking University, China

Citation for the Award (within 30 words)

Dr. Haozhao Liang has established a fully self-consistent covariant density functional theory for quantum many-body problems and gave a new insight into the nuclear structure effect on Cabibbo-Kobayashi-Maskawa matrix.

Description of the work

Dr. Haozhao Liang's research interests are mainly focused on nuclear physics with covariant density functional theories (CDFT). He has contributed quite a lot for the development of CDFT and its applications for nuclear astrophysics and the test of Standard Model, in particular for the following two issues.

Nuclear charge-exchange excitations

Nuclear charge-exchange excitations, e.g., Gamow-Teller and spin-dipole resonances, play central roles in many important issues of nuclear physics, particle physics, and astrophysics, such as the effective strong interaction in medium, nuclear (double) β-decays, neutrino-nucleus scatterings, r-process, and the unitarity of the Cabibbo-Kobayashi-Maskawa (CKM) matrix. The self-consistent random phase approximation (RPA) based on microscopic density functional theories aims at describing these excitations throughout the whole nuclear chart in a systematical, reliable, and predictive way.

Dr. Liang *et al.* established the fully self-consistent RPA based on the relativistic Hartree-Fock (RHF) approach in the key reference #1. For the first time, the Gamow-Teller and spin-dipole resonances can be self-consistently described in the relativistic framework. Different from the previous CDFT within only the Hartree level, the isoscalar mesons are found to play an essential role in these resonances via the exchange terms, which leads to a profound effect in the nuclear isovector properties.

Recently, in the key reference #3, Dr. Liang *et al.* proposed a new local RHF equivalent covariant density functional, where the essential roles played by the isoscalar mesons via the exchange terms can be successfully folded into a local equivalent scheme. In this way, the advantages of existing relativistic local functionals can be

maintained, while the problems in the isovector channel can be solved.

Unitarity of the CKM matrix

The Cabibbo-Kobayashi-Maskawa (CKM) matrix is one of the key transformations in the Standard Model, and verifying its unitarity condition provide a rigorous test for the Standard Model.

Dr. Liang *et al.* have applied the self-consistent RPA approach to evaluate the isospin symmetry-breaking corrections for the superallowed β transitions. With these corrections, the value of the leading CKM matrix element V_{ud} is obtained in combination with the most up-to-date experimental data and the radiative corrections. It is found that the $|V_{ud}|$ value thus obtained well agrees with the values obtained in neutron decay, pion β-decay and nuclear mirror transitions, however, the squared sum of top-row elements deviates from the unitarity condition. The key reference #2 which reported these results has received a wide attention. It has been quoted twice by the Particle Data Group in *the Review of Particle Physics* (2010 and 2012 editions), and also highlighted as "unitarity lost?" by Professor William Marciano in the plenary talk "Precision Electroweak Tests of the Standard Model" in International Nuclear Physics Conference (INPC) 2010.

Since 2007, Dr. Liang has published 19 peer-refereed papers and 15 conference proceedings indexed by SCI (http://www.researcherid.com/rid/A-6747-2010), including 2 in *Physical Review Letters*, 9 in *Physical Review C*, and 1 in *Physics Letters B*.

Key references (up to 3 key publications*)

1. **H.Z. Liang**, N. Van Giai, and J. Meng, Spin-Isospin Resonances: A Self-consistent Covariant Description, *Physical Review Letters* **101**, 122502 (2008).
2. **H.Z. Liang**, N. Van Giai, and J. Meng, Isospin corrections for superallowed Fermi beta decay in self-consistent relativistic random-phase approximation approaches, *Physical Review C* **79**, 064316 (2009).
3. **H.Z. Liang**, P.W. Zhao, P. Ring, X. Roca-Maza, and J. Meng, Localized form of Fock terms in nuclear covariant density functional theory, *Physical Review C* **86**, 021302(R) (2012).

*) Copy of one most significant publication should be attached.

Nominator (name, affiliation, email, telephone and relation to the candidate)

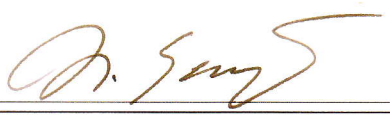
Name: Hiroyuki Sagawa

Affiliation : University of Aizu and Nishina Center, RIKEN

e-mail:sagawa@u-aizu.ac.jp

tel:0242-37-2725

relation to the candidate: a researcher in the same field of physics

Signature  Date January 8, 2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)

Name: NGUYEN QUANG HUNG Date of birth: July 24, 1980
Nationality: Vietnamese Sex: male
Affiliation: School of Engineering, TanTao University, TanDuc Ecity, Duc Hoa, Long An province, Vietnam;
Position: Assistant Professor and Head of Physics Department of TanTao University;
Tel: +84-72 376 9213, Fax: +84-72 376 9208, Email: hung.nguyen@ttu.edu.vn
Home address: Room 06.05, Block A4, Hoang Anh Gold House Building, Nguyen Huu Tho street, Nha Be district, Ho Chi Minh city, Vietnam.

Education:

- Undergraduate: Department of Nuclear Physics, Faculty of Physics, Hanoi University of Science – Hanoi National University. *Date of university graduation*: September 2003;
- Master: Department of Nuclear Physics, Faculty of Physics, Hanoi University of Science, Hanoi National University. *Date of master degree*: November 2005;
- PhD: Heavy-Ion Nuclear Physics Laboratory, Nishina Center for Accelerator-Based Science, RIKEN and Institute of Physics – Vietnam Academy of Science and Technology. *Date of Ph.D. degree*: November 2009;
- Postdoc: Nishina Memorial Fellow at Nishina Center for Accelerator-Based Science, RIKEN, December 2009 – May 2010.

Citation for the Award (within 30 words)

The award is given to Dr. Nguyen Quang Hung for his contributions in the field of nuclear structure theory, particularly for the understanding of nuclear pairing properties under extreme conditions.

Description of the work

In the work by Dr. Nguyen Quang Hung during the period of 2007 – 2012, a fully self-consistent microscopic theory has been proposed for the description of nuclear pairing properties under extreme conditions (high temperature and/or rotational frequency). This theory has resolved, explored and/or reexamined a number of issues related to pairing properties of atomic nuclei. Some of them are listed below:

1) Microscopic theory showing that smoothing of superfluid-normal phase transition in hot finite systems and the manifestation of pairing reentrance phenomenon in hot rotating finite systems because ofthermal fluctuations, typically the quasiparticle-number fluctuations;
2) Extraction of the nuclear pairing gap at finite temperature using an improved odd-even mass difference,
3) Microscopic description of the empirical nuclear thermodynamic quantities within the canonical and microcanonical ensembles,
4) Effects of thermal fluctuations on the specific shear viscosity in hot rotating systems of paired fermions
5) Effects of exact pairing on the pygmy and giant dipole resonances of atomic nuclei.

Key references (up to 3 key publication*)

1) N. Quang Hung and N. Dinh Dang,
Canonical and microcanonical ensemble descriptions of thermal pairing within BCS and quasiparticle random-phase approximation,
Phys. Rev. C81 (2010) 057302.

2) N. Quang Hung and N. Dinh Dang,
Exact and approximate ensemble treatments of thermal pairing in a multilevel model, Phys. Rev. C 79 (2009) 054328.

3) N. Quang Hung and N. Dinh Dang,
Pairing in hot rotating nuclei,
Phys. Rev. C 78 (2008) 064315.

*) Copy of one most significant publication is attached (Ref. 1).

Nominator (name, affiliation, email, telephone and relation to the candidate)

NGUYEN DINH DANG
Doctor of Physics and Mathematics Sciences
RIKEN Nishina Center Research Scientist
Affiliation:
1) Theoretical Nuclear Physics Laboratory,
RIKEN Nishina Center for Accelerator-Based Science, RIKEN
2) Institute for Nuclear Science and Technique – Vietnam Atomic Energy Institute
Contact address: Main Research Bldg. R. 159, RIKEN, 2-1 Hirosawa, Wako city, 351-0198 Saitama, Japan; Tel: 048-467-4068, Fax: 048-462-5314
Email: dang@riken.jp URL: http://ribf.riken.go.jp/~dang

Dr. Nguyen Quang Hung was my Ph.D. student in 2006 – 2009 in RIKEN and I was the official supervisor of Dr. Nguyen Quang Hung's Ph.D., thesis. He has been my collaborator from 2006 until now, even when he returned back to Vietnam after completing his postdoc as a Nishina Memorial Fellow in 2009 – 2010. We are co-authors in 13 publications between 2007 - 2012, which can be previewed online at
http://ribf.riken.go.jp/~dang/publication.html

Signature: NGUYEN DINH DANG Date: 9 January 2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D, nationality, address, and telephone)

Name:	Xueqing Yan
Affiliation:	Institute of Heavy Ion Physics, school of physics, Peking University, China
Sex:	Male
Nationality:	P.R. China
telephone:	+86-10-62755023/ +8615010810394
E-mail:	**x.yan@pku.edu.cn**
Address:	No.201, Chengfu Road, Haidian, Beijing, China, 100871
Date of Ph.D Degree:	June, 2004

Citation for the Award (Within 30 words)

He pioneered in the **Phase Stability Acceleration** in laser-plasma-accelerators, playing the key role obtaining the record-high energies of 30MeV proton and 0.5 GeV-carbon in **PSA experiments**.

Description of the work

Professor Xueqing Yan made fundamental breakthroughs in advancing the laser-driven ion acceleration method.

Ultrahigh-intensity lasers can produce accelerating fields of TV/m, surpassing those in conventional accelerators for ions by a few orders of magnitude. In spite of this fascinating feature, due to the lack of longitudinal confinement of the ion beam, the laser plasma community has long been hampered that the laser ion acceleration has failed results with an impressive beam quality since the advent of laser ion acceleration experiments reported in the well-known 2000 publications. In order to address this problem, Professor Xueqing Yan was the first (in 2008) to realize the importance of and propose a method to maintain the **Phase Stability Acceleration** in a laser plasma accelerator of protons and ions. This method can accelerate and bunch the proton beams similar to the conventional accelerators, leading to the solution of the above key

issue and excitement in the community (PRL 100, 135003 2008).

Since then Dr. Yan worked at the Max-Planck-Institute for Quantum Optics (MPQ) since September 2008 under an Alexander von Humboldt Research Fellowship. For his outstanding accomplishments, he was granted an extension of stay by the Humboldt Foundation. He further investigated ultra-thin foils irradiated by circularly polarized laser light. This work was the first to show that a GeV mono-energetic proton beam can be generated by the **Phase Stability Acceleration,** now documented in the Physical Review Letters with Dr. Yan as the first author (PRL 103, 135001,2009).

At MPQ he has also strongly contributed to experimental investigations on ion acceleration. These experiments have pioneered the use of ultra-thin (few nanometer thick) target foils and were performed at the laser facilities in Berlin and Los Alamos. Dr. Yan played a key role in these successfully experiments, demonstrating 30MeV carbon/proton (peak energy) acceleration (PRL 103, 245003 (2009)) and half GeV carbon (cut off energy) acceleration (Nucl. Fusion 51 (2011)). **Both are the records in energies until now. This is a break-through in laser-driven ion acceleration, a great milestone for the laser driven ion accelerator research.**

The Phase Stability Acceleration is very efficient for ion acceleration. However, it requires an ultra-high intensity as well as an ultra high contrast laser pulse with steep front. These are quite challenging for the state-of-the-art laser technology. He further proposed to use **near critical density plasma as a laser plasma lens** located in front of a thin foil [PRL 107, 265002 (2011)]. This cleans the laser pulse and enhances the laser intensity by one order of magnitude; this wonderful idea should break a new ground and lead to many experiments to come.

Key references (up to 3 key publications)

1.X. Q. Yan, C. Lin, Z. M. Sheng, Z. Y. Guo, B. C. Liu,Y. R. Lu, J. X. Fang, and J. E. Chen , High current and monoenergetic proton beams generated by a circularly-polarized laser pulse in the phase-stable acceleration (PSA) regime, Phys. Rev. Lett. **100,** 135003 (2008).

2.X. Q. Yan, H. C. Wu, Z. M. Sheng, J. E. Chen and J. Meyer-ter-Vehn,

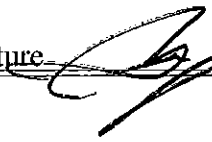
Self-organizing GeV nano-Coulomb collimated proton beam from laser foil interaction at 7×10^{21} W/cm^2, Phys. Rev. Lett. **103,** 135001 (2009).

3.H.Y.Wang, C. Lin, Z. M. Sheng, B. Liu, S. Zhao, Z.Y. Guo, Y. R. Lu, X. T. He, J. E. Chen, and X. Q Yan, Laser Shaping of a Relativistic Intense, Short Gaussian Pulse by a Plasma Lens, Phys. Rev. Lett. **107**, 265002 (2011).

*copy of one most significant publication should be attached

Nominator (name, affiliation, email, telephone, and relation to the candidate)

Name: Toshiki Tajima
Affilication: IZEST
Email: tajima.toshiki@gmail.com
Telephone: +1-562-371-7249
relation to the candidate: the former colleague/supervisor at MPQ

Signature  Date Jan. 15, 2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)
Last name: Zhai; First name: Hui Affiliation: Institute for Advanced Study, Tsinghua University 2005.1 Pd. D obtained in Institute for Advanced Study, Tsinghua University 2005-2007: Postdoc in Department of Physics, Ohio-State University 2007-2009: Postdoc in Physics Department of University of California at Berkeley and Material Science Division of Lawrence Berkeley National Laboratory 2009-2012: Member in Institute for Advanced Study, Tsinghua University 2012—present: Tenure Member in Institute for Advanced Study, Tsinghua University Nationality: China Address: Science Building, Institute for Advanced Study, Tsinghua University, Beijing, 100084, China Email: huizhai.physics@gmail.com Telephone: 86-10-62789975
Citation for the Award (within 30 words)
for his proposals of new physics in ultracold atomic gases with synthetic spin-orbit coupling
Description of the work
Hui Zhai has published 51 papers on cold atom physics and condensed matter physics, among which 16 papers are published in Phys. Rev. Lett. The total citation to his papers is over 1000 now, and currently his H-index is 17. His major contributions in cold atom physics include: 1. Pioneering theoretical studies of ultracold bosons and fermions with synthetic spin-orbit coupling and the first experimental realization and study of spin-orbit coupled Fermi gas PRL, 105, 160403 (2010); PRL, 107, 195305 (2011); PRL, 109, 095301 (2012); PRL, 109, 115301 (2012) 2. Discover new quantum phases for ultracold atoms in optical lattice with synthetic magnetic field PRL, 100, 070402 (2008); PRL, 104, 145301 (2010); PRL, 105, 155302 (2010); PRL, 109, 265302 (2012) 3. Discover new effects and new phase transitions in strongly interacting Fermi gases

PRL, 97, 180414 (2006); PRL, 99, 100402 (2007); PRL, 100, 030404 (2008); PRL, 106, 163201 (2011)

His major contribution in condensed matter physics is:

4. Correctly predict the pairing symmetry of iron pnictide superconductor
PRL, 102, 047005 (2009); PRB, 80, 064517 (2009)

Key references (up to 3 key publications*)

1 Spin-Orbit Coupled Degenerate Fermi Gases
Pengjun Wang, Zeng-Qiang Yu, Zhengkun Fu, Jiao Miao, Lianghui Huang, Shijie Chai, Hui Zhai and Jing Zhang (co-corresponding author)
Physical Review Letters, 109, 095301 (2012)

2. Spin-Orbit Coupled Fermi Gases across a Feshbach Resonance
Zeng-Qiang Yu and Hui Zhai
Physical Review Letters, 107, 195305 (2011)

3. Spin-Orbit Coupled Spinor Bose-Einstein Condensates
Chunji Wang, Chao Gao, Chao-Ming Jian and Hui Zhai
Physical Review Letters, 105, 160403 (2010)

*) Copy of one most significant publication should be attached.

Nominator (name, affiliation, email, telephone and relation to the candidate)

Nominated by Chen Ning YANG, Professor at The Chinese University of Hong Kong.
Email: cnyang@cuhk.edu.hk

The nominator was PhD thesis supervisor of the nominee, 2002-2005, at Tsinghua University in Beijing.

Signature Chen Ning Yang Date Jan 2, 2013

Nomination Form For the 2013 Nishina Asia Award

Candidate

Name: Yuanbo Zhang

Affiliation: Department of Physics, Fudan University, China

Curriculum: Ph.D. in Physics, Columbia University, 2006

Nationality: China

Address: Advanced Materials Building, Room 305, 2205 Songhu Road,
Shanghai 200433, China

Phone: +86-18616137929

Email: zhyb@fudan.edu.cn, yuanbo.zhang@gmail.com

Professional Experience:

Professor of Physics, Fudan University, China, 2011-present

Postdoctoral Researcher, IBM Almaden Research Center, USA, 2010

Miller Research Fellow, University of California at Berkeley, 2006-2009

Citation for the Award

For his work understanding the electronic properties of graphene.

Description of the work

Dr. Yuanbo Zhang, while working in Prof. Philip Kim's group at Columbia University, is among the researchers who first discovered an unconventional quantum Hall effect in graphene, a mono-atomic layer of carbon. The effect implies that the charge carriers in graphene are massless Dirac fermions owning to graphene's special electronic structure. That work, published in Nature (Nature 438, 201 (2005)), is a widely used reference in the field of graphene research. Dr. Zhang also uses scanned probe and optical techniques to further elucidate graphene's electronic properties. His work has significantly advanced our understanding of graphene.

Key references

1. Y. Zhang, Y.-W. Tan, H. L. Stormer, P. Kim, "Experimental Observation of Quantum Hall Effect and Berry's Phase in Graphene" Nature 438, 201 (2005).

2. Y. Zhang, T.-T. Tang, C. Girit, Z. Hao, M. C. Martin, A. Zettl, M. F. Crommie, Y. R. Shen and F. Wang, "Direct Observation of a Widely Tunable Bandgap in Bilayer Graphene" Nature 459, 820 (2009).

3. Y. Zhang, V. W. Brar, C. Girit, A. Zettl and M. F. Crommie, "Origin of Spatial Charge Inhomogeneity in Graphene" Nature Physics 5, 722 - 726 (2009)

Nominator

Name: Ruibao Tao

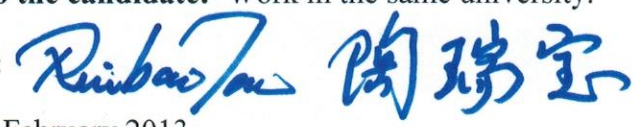
Affiliation: Department of Physics, Fudan University, Shanghai 200433, China

Occupation: Professor in Physics, Member of Academy of Science, China

Email: rbtao@fudan.edu.cn

Telephone: +86-21-65642968

Relation to the candidate: Work in the same university.

Signature: 

Date 18 February 2013

Yuanbo Zhang

Department of Physics, Fudan University
Advanced Materials Building, Room 305, 2205 Songhu Road, Shanghai 200433, China
Phone: +86-18616137929 *Email*: zhyb@fudan.edu.cn, yuanbo.zhang@gmail.com

Education

Ph.D. in Physics, Columbia University	June 2006
B.S. in Physics, Peking University, China	Fall 2000

Professional Experience

Professor of Physics, Fudan University, Shanghai, China	2010-present
Miller Research Fellow, University of California at Berkeley	Sept. 2006-2009

Honors and Awards

Dongfang Scholarship Award, China	2012
Thousand Young Talent Award, China	2011
IUPAP Young Scientist Prize (C8), International Union of Pure and Applied Physics	2010
Miller Fellowship, University of California at Berkeley	2006-09
Charles H. Townes Fellowship, Columbia University	2005-06

Invited Presentations

Seminar, National Institute for Materials Science (NIMS), Tsukuba, Japan	Aug. 2012
5th workshop for Emergent Materials Research, Pohang, Korea	Jul. 2012
A3 Conference, Urumqi, China	Oct. 2011
CNMM International Workshop, Beijing	Sept. 2011
OCPA7 Conference, Taiwan	Aug. 2011
Semiconductor Physics Conference, Hohhot, China	Aug. 2011
The 11th Asia Pacific Physics Conference (APPC11), Shanghai	Nov. 2010
Dasan Conference on Graphene - New Science and Technology, Korea	Nov. 2010
30th International Conference on the Physics of Semiconductors, Seoul, Korea	Jul. 2010
International Conference on Superlattices, Nanostructures and Nanodevices, Beijing, China	Jul. 2010
Graphene Week, University of Maryland, College Park, USA	Apr. 2010
Seminar, University of Science and Technology, Hefei, China,	Nov. 2009
Seminar, Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA	Aug. 2009
Colloquium, Department of Physics, National Taiwan University, Taipei	Mar. 2009

Seminar, Korea Advanced Institute of Science and Technology (KAIST)	Mar. 2009
Seminar, Samsung, Korea	Mar. 2009
Seminar, Sungkyunkwan University (SKKU), Korea	Mar. 2009
Colloquium, University of Virginia, Charlottesville, Virginia	Feb. 2009
Seminar, IBM Almaden Research Center, San Jose	Jan. 2009
Colloquium, University of Chicago, Chicago	Jan. 2009
Colloquium, University of California at Santa Barbara, Santa Barbara	Jan. 2009
APS March Meeting, Pittsburgh	Mar. 2009
Seminar, Georgia Institute of Technology, Atlanta	Nov. 2008
Seminar, Nanyang Technological University, Singapore	Nov. 2008
The 2008 Asian Conference on Nanoscience and Nanotechnology, Singapore	Nov. 2008
Seminar, Center for Nanoscale Science & Technology, Peking University	Oct. 2008
Colloquium, Department of Physics, Fudan University, Shanghai	Oct. 2008
Seminar, Department of Physics, Nanjing University, Nanjing	Oct. 2008
Seminar, Department of Physics, Renmin University, Beijing	Oct. 2008
Seminar, Department of Physics, Tsinghua University, Beijing	Oct. 2008
Seminar, Institute of Physics, Academia Sinica, Taipei	Oct. 2008
Seminar, Institute of Physics, Chinese Academy of Science, Beijing, China	Sept. 2008
International Conference on Nanoscience + Technology (ICN+T), Keystone	Jul. 2008
APS March Meeting, Denver	Mar. 2007
Free Electron Laser Workshop, Synchrotron Radiation Center, UW-Madison	Aug. 2006
Gordon Conference, Correlated Electron Systems, Mount Holyoke College	Jun. 2006
Seminar, IBM Almaden Research Center, San Jose	Jan. 2006

Publication List

1. Gang Mi, Likai Li, **Yuanbo Zhang** and Gengfeng Zheng "Sn-doped Bismuth Telluride Nanowires with High Conductivity" *Nanoscale* **4**, 6276 (2012).

2. J. Horng, C.-F. Chen, B. Geng, C. Girit, **Y. Zhang**, Z. Hao, H. A. Bechtel, M. Martin, A. Zettl1, M. F. Crommie, Y. R. Shen and F. Wang "Drude conductivity of Dirac fermions in graphene" *Phys. Rev. B* **83**, 165113 (2011).

3. A. Splendiani, L. Sun, **Y. Zhang**, T. Li, J. Kim, C.-Y. Chim, G. Galli and F. Wang "Emerging Photoluminescence in Monolayer MoS_2" *Nano Lett.* **10**, 1271–1275 (2010).

4. V. W. Brar (韦小宝), S. Wickenburg (魏烈钢), M. Panlasigui, C.-H. Park, T. O. Wehling, **Y. Zhang** (张远波), R. Decker, C. Girit, A. V. Balatsky, S. G. Louie, A. Zettl and M. F. Crommie "Observation of Carrier-Density-Dependent Many-Body Effects in Graphene via Tunneling Spectroscopy" *Phys. Rev. Lett.* **104**, 036805 (2010).

5. T.-T. Tang*, **Y. Zhang***, C.-H. Park, B. Geng, C. Girit, Z. Hao, M. C. Martin, A. Zettl, M. F. Crommie, S. G. Louie, Y. R. Shen and F. Wang "A Tunable Electron-Phonon Fano System in Gated Bilayer Graphene" *Nature Nanotechnology* **5**, 32 – 36 (2010).

6. **Y. Zhang***, T.-T. Tang*, C. Girit, Z. Hao, M. C. Martin, A. Zettl, M. F. Crommie, Y. R. Shen and F. Wang, "Direct Observation of a Widely Tunable Bandgap in Bilayer Graphene" *Nature* **459**, 820 (2009).

7. **Y. Zhang***, V. W. Brar*, M. F. Crommie, "Origin of Spatial Charge Inhomogeneity in Graphene" *Nature Physics* **5**, 722 - 726 (2009)

8. C. Girit, V. Bouchiat, O. Naaman, **Y. Zhang**, M. F. Crommie, A. Zettl, and I. Siddiqi, "Tunable Graphene dc Superconducting Quantum Interference Device" *Nano Lett.* **9**, 198 (2009).

9. **Y. Zhang**, V. W. Brar, F. Wang, C. Girit, Y. Yayon, M. Panlasigui, A. Zettl, M. F. Crommie, "Giant phonon-induced conductance in scanning tunneling spectroscopy of gate-tunable graphene" *Nature Physics* **4**, 627 (2008).

10. F. Wang, **Y. Zhang**, C. Tian, C. Girit, A. Zettl, M. F. Crommie, Y. R. Shen, "Gate-Variable Optical Transitions in Graphene" *Science* **320**, 206 (2008).

11. E. Stolyarova, D. Stolyarov, L. Liu, K. T. Rim, Y. Zhang, M. Han, M. Hybersten, P. Kim, G. Flynn "Scanning tunneling microscope studies of ultrathin graphitic (graphene) films on an insulating substrate under ambient conditions" *J. Phys. Chem. C* **112**, 6681-6688 (2008).

12. V. W. Brar, **Y. Zhang** et. al., "Scanning tunneling spectroscopy of inhomogeneous electronic structure in monolayer and bilayer graphene on SiC" *Appl. Phys. Lett.* **91**, 122102 (2007).

13. K. S. Novoselov, Z. Jiang, **Y. Zhang**, S. V. Morozov, H. L. Stormer, U. Zeitler, J. C. Maan, G. S. Boebinger, P. Kim, A. K. Geim, "Room-Temperature Quantum Hall Effect in Graphene" *Science* **315**, 1379 (2007). Brief Report.

14. Y.-W. Tan, **Y. Zhang**, K. Bolotin, Y. Zhao, S. Adam, E. H. Hwang, S. Das Sarma, H. L. Stormer, and P. Kim, "Measurement of Scattering Rate and Minimum Conductivity in Graphene" *Phys.. Rev. Lett.* **99**, 246803 (2007).

15. Z. Jiang, **Y. Zhang**, Y.-W. Tan, J. A. Jaszczak, H. L. Stormer, and P. Kim, "Graphene in extremely high magnetic fields" *Int. J. Mod. Phys. B* **21**, 1123 (2007). Review Article.

16. Z. Jiang, **Y. Zhang**, H. L. Stormer and, P. Kim, "Quantum Hall States near the Charge Neutral Dirac Point in Graphene" *Phys. Rev. Lett.* **99**, 106802 (2007).

17. Y.-W. Tan, **Y. Zhang**, H. L. Stormer, and P. Kim, "Temperature Dependent Electron Transport in Graphene" *Eur. Phys. J. Special Topics* **148**, 15 (2007).

18. M. Y. Han, B. Oezyilmaz, **Y. Zhang**, and P. Kim, "Energy Band Gap Engineering in Graphene Nanoribbons" *Phys. Rev. Lett.* **98**, 206805 (2007).

19. M. Han, B. Ozyilmaz, Y. Zhang, P. Jarillo-Herero, P. Kim "Electronic transport measurements in graphene nanoribbons" *PHYSICA STATUS SOLIDI B-BASIC SOLID STATE PHYSICS* **244**, 4134-4137 (2007). Review Article.

20. Z. Jiang, Y. Zhang, Y.-W. Tan, H. L. Stormer, and P. Kim, "Quantum Hall effect in graphene" *Solid State Comm.* 143, 14 (2007). Review Article.

21. J. Yan, **Y. Zhang**, P. Kim, A. Pinczuk, "Electric Field Effect Tuning of Electron-Phonon Coupling in Graphene" *Phys. Rev. Lett.* **98**, 166802 (2007).

22. M. S. Purewal, Y. Zhang, P. Kim. "Unusual transport properties in carbon based nanoscaled materials: nanotubes and graphene" *PHYSICA STATUS SOLIDI B-BASIC SOLID STATE PHYSICS* **243**, 3418-3422 (2006). Review Article.

23. **Y. Zhang**, Z. Jiang *et. al.*, "Landau Level Splitting in Graphene in High Magnetic Fields" *Phys. Rev. Lett*. **96**, 136806 (2006).

24. **Y. Zhang**, Y.-W. Tan, H. L. Stormer, P. Kim, "Experimental Observation of Quantum Hall Effect and Berry's Phase in Graphene" *Nature* **438**, 201 (2005).

25. **Y. Zhang**, J. Small, M. Amori, P. Kim, "Electric Field Modulation of Galvanomagnetic Properties of Mesoscopic Graphite" *Phys. Rev. Lett*. **94**, 176803 (2005).

26. **Y. Zhang**, J. Small, W. Pontius, P. Kim, "Fabrication and Electric-field-dependent Transport Measurements of Mesoscopic Graphite Devices" *Appl. Phys. Lett.* **86**, 073104 (2005).

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D, nationality, address, email and telephone)
Seok KIM 2012.09-2013.08: Visiting Professor, Perimeter Institute for Theoretical Physics, Waterloo, Ontario, Canada 2009-present: Assistant Professor in Seoul Natural University, Seoul, Korea 2007.09-2009.08: Research Associate, Imperial College, London, England 2004.09-2007.08: Research Associate, Korea Institute for Advanced Study, Seoul, Korea 1999-2004.08: M.S. and Ph.D. in Physics, Seoul National University, Seoul, Korea 1995-1999: B.S. in Physics, Seoul National University, Seoul, Korea Nationality: Republic of Korea Birthday: 1977.01.17 Address: Department of Physics and Astronomy & Center for Theoretical Physics Seoul National University, Seoul 151-747, Korea Email: , Phone: 82-2-880-1468
Citation for the Award (within 30 words)
Prof. Kim, a distinguished young string theorist, has made very significant contributions to the progress in string theory and QFT by publishing many pioneering ideas on the exact calculation method.
Description of the work
Professor Seok Kim has been publishing on several topics in the string/M theory and quantum field theories since his Ph.D. The main research topics are string theory, quantum field theory, supergravity, quantum gravity, and nonperturbative physics. More recently he has published three major papers on the index functions on M2 and M5 Branes. Especially his work on the full index function on M2 branes is obtained by the localization method of the path integral of the Aharony-Bergman-Jafferis-Maldacena's theory on S^1 x S^2. The BPS magnetic monopole operators in these theories are all included and the resulting index function matches exactly what obtained from AdS_4xCP^3 calculation. This work has new ideas and deep analysis and also has significantly influenced in the development of the subject. Especially its various generalization to the less supersymmetric M2 brane physics, 3-d Mirror symmetry, and higher dimensional superconformal field theories enriched the subject considerably. This work shows that Prof. Kim's research independence, keen and deep insights to the subject, superb analytic skill and passion. In his second work with many younger collaborators and myself on the index function of the dyonic

instantons in 5-dim N=2 supersymmetric Yang-Mills theories, he has shown what kinds of the ¼ BPS dyonic instantons appear quantum mechanically in the Coulomb phase. In the 5d theory, electric charge (W-bosons) and instantons are marginally bounded and the counting of the quantum degeneracy is highly nontrivial. In this work where the Nekrasov's calculation is adapted and improved, he has shown how it is done and has provided the interpretation of this result as the physics of the M5 brane wrapping on a circle. This calculation has shown how additional quantum states appear and how they can be grouped to the N^3 degrees of freedom. This index calculation was expanded there to the DLCQ index calculation of the corresponding 6-dim (2,0) theories. This is the first significant and serious paper on the DLCQ of the (2,0) theory since the initial papers by Seiberg et.al. 15 years ago.

In his third work and a follow-up paper he and his former student H. Kim have wrote down the partition function of the 5d super Yang-Mills theory on S^5 and calculated it perturbatively and non-perturbatively. He has interpreted it as the index function on M5 branes. This is the first field theoretic calculation of the index function on M5 branes. The 6-dim (2,0) superconformal field theory on M5 branes is a notoriously difficult theory whose exact nature is not known yet. It is very hard to approach the problem directly and Prof. Kim's approach via the 5-dim Yang-Mills theory on S^5 is novel and refreshing. This will have a lasting impact on the development of this difficult subject.

Prof. Kim is a young string theorist in Korea who has shown deep insights, tenacious energy, enthusiasm, and keen eyes for new angles. He has made some significant contributions to the field. His scientific standard is very high and demanding. This nominator thinks that Prof. Kim will continue to contribute serious insights to the string/M theory and the quantum field theory, making the subject vibrant, and recommends Prof. Kim to the Nishina Asia Award very highly.

Key references (up to 3 key publications*)

1. **S. Kim**, The complete superconformal index for N=6 Chern-Simons theory, Nucl. Phys. B821 (2009) 241, [arXiv:0903.4172]
2. H. Kim, **S.Kim**, E. Koh, K. Lee, S. Lee, On instantons as Kaluza-Klein modes of M5-branes, JHEP 1112 (2011) 031, [arXiv:1110.2175]
3. H. Kim, **S. Kim**, M5-branes from gauge theories on the 5-sphere, [arXiv:1206.6339]

*) Copy of one most significant publication should be attached.

Nominator (name, affiliation, email, telephone and relation to the candidate)

Kimyeong LEE
Professor in Korea Institute for Advanced Study
Email: ,
Phone: 82-2-958-3729
Relation: colleague, collaborator, informal advisor, scientific friend

Signature Kimyeong Lee Date March , 2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)
Name: Alexander Ling Affiliation: National University of Singapore Others: Singapore Address Block 167, Bedok South Ave. 3 #02-483, Singapore 460167 (+65) 9682-1495 See Attached CV
Citation for the Award (within 30 words)
For his immense contribution to the field of quantum information science particularly in the area of quantum communication and cryptography through free space and satellites.
Description of the work
Dr Ling works on experimental quantum optics particularly in single photon sources and single photon manipulation. He has done several experiments probing into the foundation of quantum physics, like the Leggett inequalities and Bell tests. He has also worked extensively on quantum metrology.

Key references (up to 3 key publications*)

Branciard, C., Brunner, N., Gisin, N., Lamas-Linares, A., ***Ling, A.***, Kurtsiefer, C., and Scarani, V. 2008. *Testing quantum correlations versus single-particle properties within Leggett's model and beyond*. Nature Physics **4**, 681-685

Flagg, E., Mueller, A, Polyakov, S., ***Ling, A.***, Migdall, A., and Solomon, G. 2010. *Two photon interference from separate quantum dots*. Physical Review Letters, **104,** 137401

Sergey V. Polyakov, Andreas Muller, Edward B. Flagg, ***Alexander Ling,*** Natalia Borjemscaia, Edward V. Buren, Alan Migdall and Glenn S. Solomon. 2011. *Coalescence of single photons emitted by disparate single-photon sources: the example of InAs Quantum Dots and Parametric Down Conversion Sources.* Physical Review Letters, **107,** 157402

*) Copy of one most significant publication should be attached.

Nominator (name, affiliation, email, telephone and relation to the candidate)

Kwek Leong Chuan,
Deputy director,
Institute of Advanced Studies,
Nanyang Technological University,
Singapore
Email: cqtklc@nus.edu.sg
Tel: +6590095232

19 March 2013

Signature Date

Nomination form for the 2013 Nishina Asia Award

Nominee: Shiraz Minwalla

Address:
Department of Theoretical Physics
Tata Institute of Fundamental Research,
Homi Bhabha Rd, Mumbai 400 005
minwalla@theory.tifr.res.in

Telephone:
Office: (022) 2278–2212
Home: (022) 2287–5952
Fax: (022) 2280 4611

Citizenship: Indian

Prof. Minwalla's Current Appointments:

Professor, The Dept. of Theoretical Physics, TIFR (From Aug 1, 2009.)
Staff Associate, ICTP, (From May 1, 2012)

Prof. Minwalla's Past Appointments:

Associate Professor, The Dept of Theoretical Physics, TIFR, (Aug 1 2006- July 31 2009).
Asst. Professor, The Department of Physics, Harvard University (Sept 1, 2001 -July 31 2006).
Reader, Dept of Theoretical Physics, TIFR (Aug 17 2004- July 31, 2006)
Junior Fellow, Harvard Society of Fellows. (June 2000–June 2003)

Prof. Minwalla's Education:

Princeton University, Princeton, NJ
September 1995 – Dec. 1999
Degree: Ph.D. Physics (Nov 2000)
Thesis: Branes and Holography (July 2000)
Advisor: Prof. Nathan Seiberg

Indian Institute of Technology, Kanpur, India
August 1990 – May 1995
Degree: M.Sc. (Physics) (May 1995)

Prof. Minwalla's Fellowships and Awards:

Awarded Shanti Swaroop Bhatnagar (SSB) Prize, Sept 2011
Elected Fellow, Indian Academy of Sciences, Jan 2011.
ICTP Prize 2010, Sept 2010.
Elected Young Affiliate of TWAS, Sept 2008
Awarded Swarnajayanti Fellowship, Jan 2007
Awarded Five Year NSF USA Presidential Career Fellowship, Feb. 2003.
Elected Alfred. P. Sloan Research Fellow, May 2002.
Elected Junior Fellow, Harvard Society of Fellows, Dec 1999.
Awarded President's Gold Medal, IITK, July 1995.

Prof. Minwalla's Doctoral Students

1. T. Sharma, Supervised Aug 2010 onwards.
   Expected Phd (TIFR) 2014
2. V. Umesh, Supervised Feb 2010 onwards.
   Expected Phd (TIFR) 2014
3. J. Bhattacharyya, supervised Jan 2007 onwards.
   Expected Phd (TIFR) 2011
   Post Doctoral Appointment: IPMU, Japan, Sept 2011 onwards.
4. R. Loganayagam, supervised Jan 2008 onwards.
   Phd (TIFR) May 2010.
   Post Doctoral Appointment: Harvard Junior Fellow, Aug 2010 onwards.
5. S. Bhattacharyya, supervised Jan 2007 onwards.
   Phd (TIFR) May 2010.
   Post Doctoral Appointment: HRI, Allahabad, Aug 2010 onwards.
6. Subhaniel Lahiri, supervised Aug 2005 onwards.
   Phd (Harvard) April 2009.
   Post Doctoral position in Biophysics, Harvard, 2009-2012.
7. Suvrat Raju, supervised Jan 2004 onwards.
   Phd (Harvard) May 2008.
   Post Doctoral Appointment, HRI, Allahabad.
8. Lars Grant, supervised May 2004 onwards.
   Phd May 2008.
   Currently in medical school.
9. Joeseph Marsano, supervised May 2002-May 2006
   Phd (Harvard) May 2006.
   Post Doctoral Appointment: Caltech Aug 2006-2009.
   Post Doctoral Appointment: U Chigaco, Aug 2009-2012
10. Kyriakos Papadodimas, supervised Jan 2003 -May 2006.
    Phd (Harvard) May 2006.
    Post Doctoral Appointment: Amsterdam, Aug 2006-2010.
    Post Doctoral Appointment: CERN, Aug 2010-2013.
    Faculty Appointment, Gronigen, Aug 2012.
11. Matthew Headrick, supervised 2000-2003.
    Phd, Harvard, 2003.
    Elected Pappalardo Fellow at MIT, 2003-2006.
    Appointed Post Doctoral Fellow at Stanford Aug 2006-2009.
    Appointed Assistant Professor, Brandeis University, Aug 2008.

Prof. Minwalla's Teaching Experience:

Principal Instructor for:
"String Theory, 1 and 2", Aug 2012-May 2013, TIFR
"General Relativity", Aug 2011-Dec2011, TIFR
"Classical Mechanics" Aug 2010-Dec 2010, TIFR
"String Theory, 1 and 2" October 2007-Dec 2009, TIFR
" Quantum Mechanics", Aug 2006-Dec 2006, TIFR
"Supersymmetric Qauntum Field Theory", Aug 2005- Dec 2005, Harvard.
"Advanced String Theory", Feb 2005-May 2005, Harvard.
"Quantum Field Theory", Aug 2004-Jan 2005, TIFR.
"Advanced Quantum Field Theory", Feb 2004-May 2004, Harvard.

"String Theory", Sept 2003-Dec 2003, Harvard.
"Advanced String Theory", Feb 2002-May 2002, Harvard.
"String Theory", Sept 2001-Dec 2001, Harvard.

Teaching Assistant at Princeton University for:
"Physics for Poets", January–May 1999
"General Relativity", August 1998–January 1999
"Undergraduate Quantum Mechanics I, II",August 1997–May 1998
"Graduate Quantum Mechanics II', January–May 1997
"General Relativity", August 1996–January 1997
"Quantum Field Theory" August 1996–May 1997
"Electromagnetism", January – May 1996

Prof. Minwalla's Invited Conference Talks

1. "Fundamental CS matter theories on $S^2 \times S^1$", Solvay Meeting on higher spins, Brussels, Feb 2013.
2. "Fundamental CS matter theories on $S^2 \times S^1$", Joint London Triangle Seminar, City College London, UK, Jan 2013.
3. "Fundamental Cherm Simons matter theories and their gravity duals", ISM 2012, Puri, Dec 2012.
4. "Constraints on Hydrodynamics from Equilibrium Partition Functions", Bits Branes and Black Holes, KITP Santa Barbara, May 2012.
5. "Hydrodynamics from Gravity", Royal Society Meeting on Condensed Matter Physics and String thoery, Chicheley Hall, UK, April 2011.
6. "Review of Higher Spin Theories,", National Strings Meeting, New Delhi, Dec 2011.
7. "Gauge Gravity Duality", Letpton Photon 2011 Plenery Talk, TIFR, Mumbai.
8. "Large N Chern Simons Theory with Fundamental Matter", Workshop on Higher Spin Theories, HRI, Allahabad, Oct 2011.
9. "Large N Chern Simons Theory with Fundamental Matter", KIAS String Workshop, Sept 2011, Seoul, Korea.
10. "A framework for dissipative superfluid hydrodynamics", Strings 2011, Upsalla, June 2011.
11. "A framework for dissipative superfluid hydrodynamics", Solvay Meeting, Brussels, May 2011.
12. "A framework for dissipative superfluid hydrodynamics", Great Lakes String Meeting, Chicago, April 2011.
13. "Chern Simons Theories and their bulk duals", ISM 2011, Puri, Jan 2011.
14. "Chern Simons Theories and their bulk duals", Applications of AdS/CFT, Cambridge, UK, Sept 2010.
15. "Fluid Dynamics from Gravity", ICTP 45 year aniversary meeting, ICTP Trieste, Italy, Sept 2010.
16. "Small Hairy black holes in $AdS_5 \times S^5$", GR19, Mexico City, July 2010.
17. "Fluid Dynamics from Gravity", PASCOS 2010, Valencia, Spain, July 2010.
18. "Nonlinear Fluid Dynamics from Gravity", ISM, IIT, Powai, Mumbai India, Feb 2010.
19. "Small Hairy Black Holes in Global AdS Space", "Condensed Matter Physics Meets High Energy Physics", IPMU, Tokyo, 2010.
20. "Nonliner Fluid Dynamics from Gravity", Taiwan String Workshop, Taipei, Dec 2009.

21. "Nonliner Fluid Dynamics from Gravity", Madrid Xmas Workshop, Madrid, Dec 2009.
22. "Equilibration from black hole formation," IST String Fest, Lisbon, June 2009
23. "Nonlinear Fluid Dynamics from Gravity", ISM 2008, Dec 2008, Pondicherry.
24. "Nonlinear Fluid Dynamics from Gravity", TWAS 25th Anniversary meeting, Mexico City, November 2008.
25. "Nonlinear Fluid Dynamics from Gravity", Strings 2008, CERN, Geneva, Aug 2008.
26. "Fluid dynamics and entropy from Gravity", String Theory from theory to Experiment, Jerusalem, April 2008.
27. "Fluid Dynamics from Gravity", KEK workshop on String Theory, Tokyo, Japan, Jan 2008.
28. "Fluid dynamics from Black Holes", ICTS meeting on strongly correlated systems, Goa, October 2007.
29. "Large Rotating Black Holes from fluid dynamics", Strong Fields and Integrability, Newton Institute, Cambridge, Sept 2007.
30. "Large Rotating Black Holes from fluid dynamics", Paris summer workshop, Paris, August 2007.
31. "Plasmarings as black rings", 4th Mideast Regional Conference, Patras, Greece, June 2007.
32. "Plasmarings as black rings", Solvay Conference, Brussels, April 2007.
33. "Supersymmetric States in $\mathcal{N} = 4$ Yang Mills", Strings 2006, Cambridge, Beijing, June 2006.
34. "Supersymmetric States in $\mathcal{N} = 4$ Yang Mills", Eurostrings 2006, Cambridge, UK, April 2006.
35. "Plasma-balls in Confining Large N Gauge Theories and Localized Black Holes", Benasque String Meeting, Benasque, Spain, July 2005.
36. "Plasma-balls in Confining Large N Gauge Theories and Localized Black Holes", Third Regional String Meeting, Kolimbari, Crete, June 2005.
37. "Plasma-balls in Confining Large N Gauge Theories", Amsterdam Summer Workshop, Amsterdam, June 2005.
38. "Plasma-balls in Confining Large N Gauge Theories", Einstein Symposium, Alexandria, June 2005.
39. "Plasma-balls in Confining Large N Gauge Theoeries", Workshop on Gravitational Aspects of String Theory, Toronto, March 2005.
40. "The Phase Structure of Large N Yang Mills on Torii", Indian String Meeting, Khajuraho, Dec 2004.
41. "Black Holes in Yang Mills Theories", QCD Workshop on String Theory, Santa Barbara, Sept 2004.
42. "Black Holes in Yang Mills Theories", Workshop on String Theory, CERN, Aug 2004.
43. "The Black Hole - Black-String Transition in Yang Mills on a Torus," Post Strings Conference, CERN, July 2004.
44. "The Hagedorn-Deconfinement Transition In Weakly Coupled Yang Mills", Indian String Meeting, Kanpur, Dec 2003.
45. "Lessons from Closed String Tachyon Condensation" 3rd RTN Workshop, Copenhagen, Sept 2003.
46. "The Hagedorn Transition in Weakly Coupled Yang Mills", 2nd Regional Crete Conference, Kolimbari, June 2003.

47. "A Hagedorn Transition in Weakly Coupled Yang Mills", Applications of Lie Theory, Varna, Bulgaria, June. 2003.
48. "Closed String Tachyon Condensation", Allahabad String Workshop, Allahabad, India, Dec. 2002.
49. "pp-wave string Interactions from Yang Mills", Strings 2002, Cambridge UK, July 2002.
50. "The pp-wave / String Theory duality", The pre strings meeting, Durham 2002.
51. "PP-wave String Interactions from Yang Mills Theory", KIAS String Workshop, Seoul, Korea, April 2002.
52. "Noncommutativity in String Theory", Kolimbari, Greece, June 2001.
53. "Closed String Tachyon Condensation on Twisted Circles", Kyoto Meeting on String theory, Japan, September 2001.
54. "Fermions in Bosonic String Theories", Amsterdam Workshop, Holland, July 2001.
55. "The Zero Brane as a Lump of Flux", Strings 2001, Mumbai, India, January 2001.
56. "Noncommutative Diagramatics", Bangalore Millennium Meeting, India, Dec 1998.
57. "3 Pt Ftns of Chiral Operators in SYM", Puri Workshop, India, Dec 1998.
58. "3 Pt Ftns of Chiral Operators in SYM", Strings 98, Santa Barbara, USA, June 1998.

Summer Schools Lecture Courses delivered by Prof Minwalla

1. "Fundamental CS matter theories and their bulk duals", ICTP Spring School, ICTP, Trieste, March 2013.
2. "Hydrodynamics and Gravity", Cargese Summer School on String theory and field theory, Cargese, Corsica June 2012.
3. "Hydrodynamics and Gravity", Condensed Matter, Black Holes and Holography, Newton Institute, Cambridge, UK, April 2012.
4. "Hydrodynamics and Gravity", ICTP Spring School, March 2012.
5. "Fluid Dynamics from Gravity", Iran String School, Isfahan May 2011.
6. "Fluid Dynamics from Gravity", TASI, Boulder, USA, June 2010.
7. "Fluid Dynamics from Gravity", 4th Asian Winter School, Mahabaleshwar, India, Jan 2010.
8. "Fluid Dynamics from Gravity", Iranian String School, Esfahan, April 2008
9. "Fluid Dynamics from Gravity", String Theory, from theory to Experiment, Tel Aviv, April 2008
10. "Fluid Dynamics from Gravity", ICTP Spring school, Trieste, March 2008.
11. "The AdS/CFT Correspondence", 2nd Asian Winter school, Kusatsu, Japan, 2008
12. "Black Holes in Gauge Theory", Newton Institute, Cambridge, Sept 2007.
13. "String Theory, an Introduction", Institute for Cultivation of Sciences, Kolkata October 2006.
14. "Phase Transitions in Large N Yang Mills theories and Black Holes ", CERN, Geneva, Switzerland, Jan 2006.
15. "Black Holes in Yang Mills", Oporto, Portugal, June 2004.
16. "String Theory, an Introduction" Institute for Cultivation of Sciences, Kolkata.
17. "New Dynamics in Noncommutative Field and String Theories", Villa de Leyva, Colombia, July 2003.
18. "Noncommutativity in String Theory", TASI, Boulder, USA, June 2003.

19. "The Hagedorn/ Deconfinement Transition in Weakly Coupled Yang Mills", ICTP Spring School, Trieste, Italy, April 2003.
20. "String Theory: An Introduction" Bari Loche, Argentina, Jan 2003
21. "The pp-wave / Gauge Theory Duality", Cargese, France, 2002.
22. "Noncommutativity in String Theory", Sao Paulo, Brazil, Jan 2001.
23. "Noncommutativity in String Theory", KIAS, Seoul, Korea, Dec 2000.
24. "Noncommutativity in String Theory", Huatulco, Mexico, Dec 2000.

Prof. Minwalla's invited Colloquia

1. "The Gauge Gravity duality", NISER foundation day conference, NISER, Bhubhaneshwar, Dec 2012.
2. "Fluid Dynamics and Gravity", NISER, Bhbhaneshwar, April 2011.
3. "Fluid Dynamics and Gravity", HRI, Allahabad Oct 2011.
4. "Fluid Dynamics and Gravity", TIFR, Sept 2011.
5. "Fluid Dynamics from Gravity", IUCAA, Pune, Dec 2010.
6. Black Holes in Yang Mills theory,
   Chennai Mathememetical Institute, Chennai, Jan 2009
7. Fluid Dynamics from Gravity,
   Jawaharlal Nehru Center, Bangalore, Dec 2008
8. Fluid Dynamics from Gravity,
   Tata Institute of Fundamental Research, Feb 2008
9. The Gravity Gauge Theory Correspondence,
   IIT Mumbai, Feb 2008
10. String Theory, CBS, Kalina, Mumbai,
    Feb 2008.
11. Yang Mills Thermodynamics and Black Holes,
    IISC Bangalore, Sept 2006.
12. The Gauge Gravity Correspondence,
    NCBS, Bangalore, Aug 2006.
13. Black Holes in Yang Mills Theory (Colloquium),
    The University of Washington at Seattle, November 2005.
14. The Gravity-Gauge Theory Correspondence (Colloquium)
    Tata Institute of Fundamental Research, Mumbai, Aug 2003
15. Noncommutativity in String Theory (Colloquium)
    MIT, Cambridge, USA, Sept 2001.

Prof. Minwalla's Publications

1. **"Phases of large N vector Chern-Simons theories on $S^2 \times S^1$"**
   S. Jain, S. Minwalla, T. Sharma, T. Takimi, S. R. Wadia and S. Yokoyama.
   arXiv:1301.6169 [hep-th]
2. **"Applications of the AdS/CFT correspondence"**
   S. Minwalla.
   10.1007/s12043-012-0456-5
   Pramana **79**, 1075 (2012).
3. **"ABJ Triality: from Higher Spin Fields to Strings"**
   C. -M. Chang, S. Minwalla, T. Sharma and X. Yin.
   arXiv:1207.4485 [hep-th]
4. **"Constraints on Superfluid Hydrodynamics from Equilibrium Partition Functions"**
   S. Bhattacharyya, S. Jain, S. Minwalla and T. Sharma.
   arXiv:1206.6106 [hep-th]
   10.1007/JHEP01(2013)040
   JHEP **1301**, 040 (2013)
5. **"Constraints on Fluid Dynamics from Equilibrium Partition Functions"**
   N. Banerjee, J. Bhattacharya, S. Bhattacharyya, S. Jain, S. Minwalla and T. Sharma.
   arXiv:1203.3544 [hep-th]
6. **"Hairy black holes and solitons in global AdS 5"**
   O. J. C. Dias, P. Figueras, S. Minwalla, P. Mitra, R. Monteiro and J. E. Santos.
   arXiv:1112.4447 [hep-th]
7. **"Chern-Simons Theory with Vector Fermion Matter"**
   S. Giombi, S. Minwalla, S. Prakash, S. P. Trivedi, S. R. Wadia and X. Yin.
   arXiv:1110.4386 [hep-th]
8. **"The fluid/gravity correspondence"**
   V. E. Hubeny, S. Minwalla and M. Rangamani.
   arXiv:1107.5780 [hep-th]
9. **"A Theory of first order dissipative superfluid dynamics"**
   J. Bhattacharya, S. Bhattacharyya, S. Minwalla and A. Yarom.
   arXiv:1105.3733 [hep-th]
10. **"Supersymmetric States in Large N Chern-Simons-Matter Theories"**
    S. Minwalla, P. Narayan, T. Sharma, V. Umesh and X. Yin.
    arXiv:1104.0680 [hep-th]
    JHEP **1202**, 022 (2012)
11. **"Dissipative Superfluid dynamics from gravity"**
    J. Bhattacharya, S. Bhattacharyya and S. Minwalla.
    arXiv:1101.3332 [hep-th]
    JHEP **1104**, 125 (2011)
12. **"Small Hairy Black Holes in $AdS_5 x S^5$"**
    S. Bhattacharyya, S. Minwalla and K. Papadodimas.
    arXiv:1005.1287 [hep-th]
    JHEP **1111**, 035 (2011)
13. **"Small Hairy Black Holes in Global AdS Spacetime"**
    P. Basu, J. Bhattacharya, S. Bhattacharyya, R. Loganayagam, S. Minwalla and V. Umesh.
    arXiv:1003.3232 [hep-th]
    JHEP **1010**, 045 (2010)
14. **"The fluid-gravity correspondence: The membrane at the end of the universe"**

V. E. Hubeny, M. Rangamani, S. Minwalla and M. Van Raamsdonk.
Int. J. Mod. Phys. D **17**, 2571 (2009).

15. **"Weak Field Black Hole Formation in Asymptotically AdS Spacetimes"**
S. Bhattacharyya and S. Minwalla.
arXiv:0904.0464 [hep-th]
JHEP **0909**, 034 (2009)

16. **"The Incompressible Non-Relativistic Navier-Stokes Equation from Gravity"**
S. Bhattacharyya, S. Minwalla and S. R. Wadia.
arXiv:0810.1545 [hep-th]
JHEP **0908**, 059 (2009)

17. **"Conformal Nonlinear Fluid Dynamics from Gravity in Arbitrary Dimensions"**
S. Bhattacharyya, R. Loganayagam, I. Mandal, S. Minwalla and A. Sharma.
arXiv:0809.4272 [hep-th]
JHEP **0812**, 116 (2008)

18. **"Superconformal Indices for N = 6 Chern Simons Theories"**
J. Bhattacharya and S. Minwalla.
arXiv:0806.3251 [hep-th]
JHEP **0901**, 014 (2009)

19. **"Forced Fluid Dynamics from Gravity"**
S. Bhattacharyya, R. Loganayagam, S. Minwalla, S. Nampuri, S. P. Trivedi and S. R. Wadia.
arXiv:0806.0006 [hep-th]
JHEP **0902**, 018 (2009)

20. **"Comments on 1/16 BPS Quantum States and Classical Configurations"**
L. Grant, P. A. Grassi, S. Kim and S. Minwalla.
arXiv:0803.4183 [hep-th]
JHEP **0805**, 049 (2008)

21. **"Local Fluid Dynamical Entropy from Gravity"**
S. Bhattacharyya, V. E. Hubeny, R. Loganayagam, G. Mandal, S. Minwalla, T. Morita, M. Rangamani and H. S. Reall.
arXiv:0803.2526 [hep-th]
JHEP **0806**, 055 (2008)

22. **"Indices for Superconformal Field Theories in 3,5 and 6 Dimensions"**
J. Bhattacharya, S. Bhattacharyya, S. Minwalla and S. Raju.
arXiv:0801.1435 [hep-th]
JHEP **0802**, 064 (2008)

23. **"Nonlinear Fluid Dynamics from Gravity"**
S. Bhattacharyya, V. EHubeny, S. Minwalla and M. Rangamani.
arXiv:0712.2456 [hep-th]
JHEP **0802**, 045 (2008)

24. **"Large rotating AdS black holes from fluid mechanics"**
S. Bhattacharyya, S. Lahiri, R. Loganayagam and S. Minwalla.
arXiv:0708.1770 [hep-th]
JHEP **0809**, 054 (2008)

25. **"Plasmarings as dual black rings"**
S. Lahiri and S. Minwalla.
arXiv:0705.3404 [hep-th]
JHEP **0805**, 001 (2008)

26. **"Supersymmetric states in M5/M2 CFTs"**
S. Bhattacharyya and S. Minwalla.
hep-th/0702069 [HEP-TH]
JHEP **0712**, 004 (2007)

27. **"Black holes in large N gauge theories"**
S. Minwalla.
Class. Quant. Grav. **23**, S927 (2006).

28. **"Supersymmetric states of N=4 Yang-Mills from giant gravitons"**
I. Biswas, D. Gaiotto, S. Lahiri and S. Minwalla.
hep-th/0606087
JHEP **0712**, 006 (2007)

29. **"An Index for 4 dimensional super conformal theories"**
J. Kinney, J. M. Maldacena, S. Minwalla and S. Raju.
hep-th/0510251
Commun. Math. Phys. **275**, 209 (2007)

30. **"The Phase structure of low dimensional large N gauge theories on Tori"**
O. Aharony, J. Marsano, S. Minwalla, K. Papadodimas, M. Van Raamsdonk and T. Wiseman.
hep-th/0508077
JHEP **0601**, 140 (2006)

31. **"Plasma-balls in large N gauge theories and localized black holes"**
O. Aharony, S. Minwalla and T. Wiseman.
hep-th/0507219
Class. Quant. Grav. **23**, 2171 (2006)

32. **"A First order deconfinement transition in large N Yang-Mills theory on a small S**3"**
O. Aharony, J. Marsano, S. Minwalla, K. Papadodimas and M. Van Raamsdonk.
hep-th/0502149
Phys. Rev. D **71**, 125018 (2005)

33. **"The deconfinement and Hagedorn phase transitions in weakly coupled large N gauge theories"**
O. Aharony, J. Marsano, S. Minwalla, K. Papadodimas and M. Van Raamsdonk.
Comptes Rendus Physique **5**, 945 (2004).

34. **"Black hole-black string phase transitions in thermal 1+1 dimensional supersymmetric Yang-Mills theory on a circle"**
O. Aharony, J. Marsano, S. Minwalla and T. Wiseman.
hep-th/0406210
Class. Quant. Grav. **21**, 5169 (2004)

35. **"Closed string tachyon condensation: An Overview"**
M. Headrick, S. Minwalla and T. Takayanagi.
hep-th/0405064
Class. Quant. Grav. **21**, S1539 (2004)

36. **"The Hagedorn - deconfinement phase transition in weakly coupled large N gauge theories"**
O. Aharony, J. Marsano, S. Minwalla, K. Papadodimas and M. Van Raamsdonk.
hep-th/0310285
Adv. Theor. Math. Phys. **8**, 603 (2004)

37. **"Evolution of D branes under closed string tachyon condensation"**
S. Minwalla and T. Takayanagi.
hep-th/0307248
JHEP **0309**, 011 (2003)

38. **"Space-time energy decreases under world sheet RG flow"**
M. Gutperle, M. Headrick, S. Minwalla and V. Schomerus.
hep-th/0211063
JHEP **0301**, 073 (2003)

39. **"Operator mixing and the BMN correspondence"**
N. R. Constable, D. Z. Freedman, M. Headrick and S. Minwalla.
hep-th/0209002
JHEP **0210**, 068 (2002)

40. **"PP wave string interactions from perturbative Yang-Mills theory"**
N. R. Constable, D. Z. Freedman, M. Headrick, S. Minwalla, L. Motl, A. Postnikov and W. Skiba.
hep-th/0205089
JHEP **0207**, 017 (2002)

41. **"Lectures on noncommutative theories"**
S. Minwalla.

42. **"Closed string tachyon condensation on twisted circles"**
J. R. David, M. Gutperle, M. Headrick and S. Minwalla.
hep-th/0111212
JHEP **0202**, 041 (2002)

43. **"Fermions in bosonic string theories"**
J. R. David, S. Minwalla and C. Nunez.
hep-th/0107165
JHEP **0109**, 001 (2001)

44. **"Branes and holography"**
S. Minwalla.

45. **"Unstable solitons in noncommutative gauge theory"**
M. Aganagic, R. Gopakumar, S. Minwalla and A. Strominger.
hep-th/0009142
JHEP **0104**, 001 (2001)

46. **"Symmetry restoration and tachyon condensation in open string theory"**
R. Gopakumar, S. Minwalla and A. Strominger.
hep-th/0007226
JHEP **0104**, 018 (2001)

47. **"(OM) theory in diverse dimensions"**
R. Gopakumar, S. Minwalla, N. Seiberg and A. Strominger.
hep-th/0006062
JHEP **0008**, 008 (2000)

48. **"S duality and noncommutative gauge theory"**
R. Gopakumar, J. M. Maldacena, S. Minwalla and A. Strominger.
hep-th/0005048
JHEP **0006**, 036 (2000)

49. **"Noncommutative solitons"**
R. Gopakumar, S. Minwalla and A. Strominger.
hep-th/0003160
JHEP **0005**, 020 (2000)

50. **"Noncommutative perturbative dynamics"**
S. Minwalla, M. Van Raamsdonk and N. Seiberg.
hep-th/9912072
JHEP **0002**, 020 (2000)

51. **"Comments on the IIA (NS)five-brane"**
S. Minwalla and N. Seiberg.
hep-th/9904142
JHEP **9906**, 007 (1999)

52. **"Three point functions of chiral operators in D = 4, N=4 SYM at large N"**
S. Lee, S. Minwalla, M. Rangamani and N. Seiberg.
hep-th/9806074
Adv. Theor. Math. Phys. **2**, 697 (1998)

53. **"Particles on AdS(4/7) and primary operators on M(2)-brane and M(5)-brane world volumes"**
S. Minwalla.
hep-th/9803053
JHEP **9810**, 002 (1998)

54. **"Restrictions imposed by superconformal invariance on quantum field theories"**
S. Minwalla.
hep-th/9712074
Adv. Theor. Math. Phys. **2**, 781 (1998)

55. **"Resonances in the transmission of massless scalar waves in a class of wormholes"**
S. Kar, S. Minwalla, D. Mishra and D. Sahdev.
Phys. Rev. D **51**, 1632 (1995).

Prof. Minwalla's citation Record (Spires), March 18, 2013

1. Number of papers: 53
2. Total number of citations: 5191
3. Average citation per published paper: 97.9
4. h index: 34
5. Number of papers with 500+ citations: 1 [Ref 50]
6. Number of papers with 250-499 citations: 4 [Refs 23, 36, 49, 52]
7. Number of papers with 100-249 citations: 9 [Refs 21, 29, 32, 39, 40, 45, 47, 48, 54]
8. Number of papers with 50-99 citations: 16 [Refs 15, 16, 17, 18, 19, 22, 24, 28, 30, 31, 34, 35, 42, 46, 51, 53]

Citation for the Award

For fundamental contributions to string theory, in particular his seminal work that uncovered a deep connection between the equations of fluid and super-fluid dynamics and Einstein's equations of General Relativity.

Description of the work

Prof Shiraz Minwalla has made pioneering contributions to the study of string theory, quantum field theory and gravity, in particular to the study of the AdS/CFT correspondence. In a particularly seminal work he has uncovered a deep connection between the equations of fluid and super-fluid dynamics and Einstens equations of general relativity. He has established that the nonlinear equations of (asymptotically Anti-deSitter) gravity reduce, in a long wavelength sector, to the nonlinear relativistic Navier-Stokes equations with gravitationally determined transport coefficients. This beautiful discovery sometimes referred to as the fluid-gravity map- unifies two of the best-studied nonlinear partial differential equations in physics.

Prof Minwalla has used the fluid-gravity map to establish a beautiful connection between area theorems of black hole physics and the positivity of the divergence of the entropy current in fluid dynamics.

The fluid-gravity map has led to an improved understanding of the two hundred year old subject of hydrodynamics. Results from the fluid-gravity correspondence prompted Son and Surowka to correct the form of the most general equations of relativistic charged hydrodynamics proposed by Landau in the 1930s and accepted since. Prof Minwalla has contributed significantly to the ongoing effort of developing an improved framework for studying the equations of hydrodynamics. In particular he has demonstrated that the equations of hydrodynamics are significantly constrained by the requirement that they admit a stationary solution in every independent background configuration. This method yields a much simpler rederivation of the Son-Surowka results and has recently been used to relate an undetermined parameter in the Son-Surowka answer to a mixed gauge-gravity anomaly. All known and several new results in hydrodynamics very simply obtained using this new method. In particular, Prof Minwalla has determined the most general allowed equations of super-fluid hydrodynamics which turn to have 23 parameters. These results generalize the earlier 13 parameter equations summarized in the text on superfluidity by Putterman.

Prof Minwalla has recently been engaged in the study of Chern-Simons theories coupled to fundamental matter and their AdS/CFT duals. Together with several collaborators he has presented exact formulas for the partition function of several such theories on S^2. These results have contributed to the discovery of a new bosonization duality in 3 dimensions. Prof. Minwalla has also recently proposed that the N=6 ABJ $U(N) \times U(M)$ theory at large N but finite M admits a weakly coupled description in terms of a $U(M)$ generalization of supersymmetric Vasiliev equations. In this limit the dual IIA fundamental string disintegrates into a collection of string bits whose dynamics is governed by Vasiliev's equations.

In the past Prof. Minwalla has also made path-breaking contributions to the study of black holes in the context of the AdS/CFT correspondence and the relationship between black hole nucleation and deconfinement transitions, the enumeration of supersymmetric states in superconformal field theories (six years ago he he invented and studied a superconformal index which finds new applications every year), the study of non-commutative field and string theories, non-commutative solitons and correlations functions in supersymmetric field theories (in particular he used the AdS/CFT correspondence to conjecture a non-renormalization theorem for 3 point functions of chiral operators; this conjecture has since been proved) and superconformal representation theory.

Key References (up to 3 key publications)

1. **"Nonlinear Fluid Dynamics from Gravity"**
   S. Bhattacharyya, V. EHubeny, S. Minwalla and M. Rangamani.
   arXiv:0712.2456 [hep-th]
   JHEP **0802**, 045 (2008)
   Copy of this paper is attached
2. **"The Hagedorn - deconfinement phase transition in weakly coupled large N gauge theories"**
   O. Aharony, J. Marsano, S. Minwalla, K. Papadodimas and M. Van Raamsdonk.
   hep-th/0310285
   Adv. Theor. Math. Phys. **8**, 603 (2004)
3. **"Three point functions of chiral operators in D = 4, N=4 SYM at large N"**
   S. Lee, S. Minwalla, M. Rangamani and N. Seiberg.
   hep-th/9806074
   Adv. Theor. Math. Phys. **2**, 697 (1998)

Nominator (name, affiliation, email, telephone and relation to candidate)

Prof. Spenta R. Wadia, Director International Center for Theoretical Sciences and Distinguished Professor of Physics, Tata Institute of fundamental Research, India

Email: wadia@theory.tifr.res.in, spenta.wadia@gmail.com
Tel : +912222782216
Relation to candidate: Senior colleague.

(Spenta R. Wadia)
Date: March 21, 2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)
Name: NGUYEN VAN MINH Affiliation: Hanoi National University of Education 1981-1985: Hue University, Bachelor of Physics 1986-1988: Hanoi National University of Education: Master of Physics 1990-1994: PhD, Physics 2000: Guest researcher, PIDC, Taiwan 2000-2003, 2004-2005: post-doctoral research at Ewha Womans University, Korea 2006-now: Hanoi National University of Education Nationality: Vietnamese Add: 136 Xuan Thuy Road, Hanoi, Vietnam Email: minhnv@hnue.edu.vn
Citation for the Award (within 30 words)
This is one of the significant award for scientist, especially the developing country.
Description of the work
The main topic is to use Raman spectroscopy to investigate the properties of superconductors, diluted magnetic semiconductors, colossal magnetoresistance, multiferroics and nanomaterials.

Key references (up to 3 key publications*)
Raman spectroscopy Nanomaterials Multiferroics *) Copy of one most significant publication should be attached.
Nominator (name, affiliation, email, telephone and relation to the candidate)
Nguyen Viet Thinh Hanoi National University of Education hieutruong@hnue.edu.vn Supervisor
Signature Nguyen van Minh Date 22/3/2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)

430. Detailed Bio-data of the Investigator(s)/Co-Investigator(s) including

Name : **Amit Dutta**

Date of birth: December 19, 1968

Present Designation: Professor

Official Address: Department of Physics,
Indian Institute of Technology,
Kanpur 208016, India.

E-mail: dutta@iitk.ac.in
Tel: +91-512-259 7471
Fax: +91-512-259 0914

Nationality: Indian

Gender: Male

- **ACADEMIC RECORD:**

1. **Ph.D. in Physics** from Jadavpur University, Kolkata, India.
(March 2000)

Quantum Phase Transitions in disordered and frustrated systems

Thesis Supervisor: Prof. Bikas K. Chakrabarti
(Saha Institute of Nuclear Physics, Kolkata)

2. **M.Sc. in Physics,** from University of Calcutta, (1991; results declared in 1992; First Class, ranked 2nd).

3. **B. Sc. (Honors) in Physics**, from University of Calcutta, (1989, appeared from Presidency College, Kolkata; First Class).

4. **Higher Secondary Examination**, under the West Bengal Council of Higher Secondary Education, (1986, First Division, ranked 21st).

5. **Secondary Examination**, under the West Bengal Board of Secondary Education, (1984, First Division, ranked 10th).

- **RESEARCH EXPERIENCE:**

1. **Postdoctoral Fellow** at the Institute for Theoretical Physics, Würzburg University, Würzburg, Germany, with Prof. Dr. R. Oppermann (Sep 2002 — Mar 2003).

2. **Guest Scientist** in the Electronic Correlation Group headed by Prof. Dr. Peter Fulde at the Max Planck Institute for Complex Systems, Dresden, Germany (Sep 2000 — Aug 2002).

- **PROFESSIONAL EXPERIENCE:**

Assistant Professor,
Department of Physics, I.I.T. Kanpur, Kanpur, India.
(May 5, 2003 —Dec. 30, 2007)

Associate Professor
Department of Physics,
I.I.T. Kanpur, Kanpur, India.
(Dec. 31, 2007 — March 25th, 2012)

Citation for the Award (within 30 words)

Dr. Amit Dutta has made significant contribution to the fields quantum phase transition, dynamics of many body systems across quantum critical dynamics and quantum information and decoherence.

Description of the work:

Dr. Dutta has made pioneering contributions to the field quantum phase transition in transverse field models. The monograph "Quantum Ising phases and transitions in transverse Ising models" (coauthored with B. K. Chakrabarti and P. Sen) has been recognized as a classic in the field and has inspired many scientists to work on these models. His recent review article on the dynamics and information studies of these models (arXiv:1012.0653) has also attracted the attention of scientists. During his Ph. D., Dutta introduced the concept of quantum Lifshitz points (Phys. Rev. B **55**, 5619 (1997)). This work, though initially overlooked by experimentalists who experimentally obtained the signature of a quantum Lifshitz scaling (similar to that proposed by Dutta et~al,) has now been recognized as a pioneering work (see for example, Yoshihiro Nishiyama, Phys. Rev. E **75**, 051116 (2007)).

In recent years, Dr. Dutta has made very significant and original contributions to the field of quantum dynamics and information. Along with his collaborators, he challenged the established scenario of the Kibble-Zurek scaling of the defect generation following a quench through quantum critical point and it was shown that the scaling gets drastically modified for quenching across a multicritical point or along a gapless critical line. Recently, along with his doctoral students, Dr. Dutta has established a strong connection between non-equilibrium quantum dynamics and decoherence. Here a qubit is coupled to a bath (a quantum many system) that undergoes a non-equilibrium dynamics. It has been established that in some cases, the decoherence factor of the qubit satisfy the same scaling relation as the defect density when the bath is driven through a quantum critical point. Given, the present interest in adiabatic quantum computation and decoherence which is essential for realizing quantum computers and these works may turn out to be very significant in near future.

I would like to emphasize some of the recent acknowledgements of Dutta's work:

a) Quenching schemes proposed by Dutta and collaborators (e.g., in Divakaran and Dutta, Phys. Rev. B 79, 224408 (2009)) have been used by Zurek and coworkers to propose a test of non-adiabtic dynamics using quench echo (H T Quan and W H Zurek , New Journal of Physics **12**, 093025 (2010)).

b) Dutta and collaborators were the first to propose a non-trivial modification of the Kibble-Zurek scaling even for quenching of the simplest XY spin chain (Phys. Rev. B **76**, 174303 (2007) close to a quantum multicritical point. This observation led to many subsequent investigations (including those by Dutta himself) which established the existence of so called "quasicritical points" (close to a quantum multicritical point); these points manifest themselves only in the

dynamic, though not in the static critical behavior of the model. (See for example, the works by Gerado Ortiz and collaborators, EPL, 84 (2008) 67008 and Phys. Rev. B 80, 241109(R) (2009))

c) All the recent works of Dutta has been discussed at length in a review article on quantum dynamics (see J. Dziarmaga, Advances in Physics, vol. 59, issue 6, pp. 1063-1189 (2010)).

d) As a recognition of his contribution to the field of quantum information and dynamics, Dutta was invited to write an article in a special issue of Int. J. Mod. Phys. B, special issue "Classical Vs Quantum correlations in composite systems" edited by L. Amico, S. Bose, V. Korepin and V. Vedral, (Int. J. Mod. Phys. B 27, 1245011 (2013)) where Dutta presented an article that for the first time discussed the connection between dynamics and quantum discord.

Key references (up to 3 key publications*)

1. V. Mukherjee, U. Divakaran, A. Dutta and D. Sen, Phys. Rev. B **76**, 174303 (2007).
2. T. Nag, U. Divakaran and A. Dutta, Phys. Rev. B (Rapid. Comm.) 86, 020401 (2012).
3. Victor Mukherjee, Shraddha Sharma, Amit Dutta, Phys. Rev. B (Rapid. Comm.) 86, 020301 (2012).

*) Copy of one most significant publication should be attached.

Nominator (name, affiliation, email, telephone and relation to the candidate)

Dr. Bikas Chakrabarti
Senior Professor,
Saha Institute of Nuclear Physics
1/AF Bidhannagar, Kolkata-700064, India
mail: bikask.chakrabarti@saha.ac.in
phone: +919339511916
Dutta completed his Ph. D. under the nominator in the year 2010.

Signature Date 25th March, 2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)

Name: Bae Ho Park
Affiliation: Department of Physics, Konkuk University, Seoul 143-701, Korea
Date of the degree of Ph.D.: Aug. 26, 1999
Birth: January 14, 1971 (Daegu, Korea)
Nationality: Republic of Korea
Job Status: Professor (Tenured), Department of Physics, Konkuk University
Mailing Address:
Department of Physics, Konkuk University
120 Neungdong-ro, Gwangjin-gu
Seoul 143-701, Korea
(Tel)+82-2-450-3405 (Fax)+82-2-875-1222
E-mail: baehpark@konkuk.ac.kr

Citation for the Award (within 30 words)

Characterization and manipulation of atomic distribution in emerging nano-materials applicable to next-generation electronic devices

Description of the work

Prof. Bae Ho Park is one of the most promising and energetic young scientists in nano-science and condensed matter physics. He has put lots of his efforts to find origins of suppressed electrical performances of emerging nano-materials, which can be applicable to next-generation electronic devices. Based on such knowledge, he has succeeded in modifying materials or device structures for improvement of electrical properties. Especially, he investigated chemical or structural defect structures in oxide nano-materials or graphene (Nature 1999, cited 1568 times; Applied Physics Letters 2004, cited 547 times; Science 2011, cited 24 times), and proposed suitable modification of nano-materials or device structures (Advanced Materials 2007, cited 147 times; Advanced Materials 2007, cited 106 times; ACS Nano 2011, cited 15 times).

Currently, his research is concentrated on characterization and modification of graphene using atomic force microscopy (AFM). Although graphene has a very high carrier mobility, it had been reported that graphene on a substrate cannot have such high mobility. For a long time, it had been suspected that invisible ripples might cause the reduced mobility. In 2011 Science paper, he demonstrated that such ripples

can be observed by friction mode of AFM and he showed that they form well-defined domain structures. Furthermore, he could patterned oxidized or hydrogenated graphene lines with several 10 nm width using AFM lithography without any chemical or etching process at room temperature and atmospheric pressure. These characterization and modification using AFM are important scientifically as well as technologically, since they will provide standard methods for processing future generation devices using graphene.

Prof. Bae Ho Park's work was selected as one of the Basic Research Outstanding Performances from Korea Ministry of Education, Science, and Technology (MEST) in 2012. He was selected as the Scientist of the Month from Korean MEST and the President Trusted Professor from Konkuk University in 2012. He received the Best Academic Achievement Award from Korea Physical Society in 2009 and Scopus Citation Award from Elsevier Korea in 2006. During his publication career of 15 years, he published more than 150 journal articles (including 1 Science, 1 Nature, 1 ACS Nano, 5 Advanced Materials, 5 Nano Letters, and 39 Applied Physics Letters) and got more than 5,060 citations. He was honored as an Outstanding Referee for Nature Materials in 2011 and is presently serving as an editorial board member of Scientific Reports (Nature Publishing Group) and Journal of the Korean Physical Society.

Key references (up to 3 key publications*)

1. Friction anisotropy-driven domain imaging on exfoliated monolayer grapheme, Science **333**, 6042 (2011). (Corresponding Author)
2. Lanthanum-substituted bismuth titanate for use in non-volatile memories, Nature **401**, 682 (1999). (First Author)
3. Large resistive switching in ferroelectric BiFeO3 nano-island based switchable diodes, Advanced Materials, 10.1002/adma.201204839 (2013). (Corresponding Author)

*) Copy of one most significant publication should be attached.

Nominator (name, affiliation, email, telephone and relation to the candidate)

Name: Tae Won Noh

Affiliation: Professor, Department of Physics and Astronomy, Seoul National University
& Director, IBS Center for Functional Interfaces of Correlated Electron Systems

Email: twnoh@snu.ac.kr

Telephone: +82-2-880-6616

Relation to the candidate: Ph.D. thesis advisor and collaborator

Signature  Date March 24, 2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)

XI DAI
Division of Theory, Institute of Physics,
Chinese Academy of Science, P.O. Box 603, Beijing100080, China
Tel: 010-82648057
Email: daix@aphy.iphy.ac.cn

Personal Information :

First Name : Xi **Last Name:** Dai

Gender : Male **Date of Birth :** 07-21-1971

Place of Birth : Zhejiang, China **Nationality :** P.R. China

Education

1. Bachelor of Engineering [1989.9-1993.7]
   Department of Material Science and Technology, Zhejiang University, Zhejiang, China
   Major: Material Science
2. Master of Science [1993.9-1996.1]
   Department of Physics, Zhe-jiang University, Zhejiang, China
   Major: Condensed Matter Physics

3. Ph. D.
   [1996.3-1999.7]
   Institute of Theoretical Physics, Chinese Academy of Science, Beijing, China
   Received PhD degree in October, 1999

Previous Work Experience

1. Postdoctoral Fellow
   [1999.9-2001.7]
   Physics Department,

Hong Kong University of Science and Technology, Hong Kong

2. Postdoctor
[2001.9-2002.4]
Physics Department, Boston College, MA, USA

3. Postdoctor
[2002.4-2004.5]
Department of physics and astronomy, Rutgers University, NJ, USA

4. Research Assistant professor
[2004.6-2006.7]
Department of Physics, University of Hong Kong, Hong Kong

5. Professor

[2006.8-now]
Division of condensed matter theory, Institute of Physics, Chinese Academy of Science, Beijing100080, China

Awards:

2011.6 Young Scientist Prize of Chinese Academy of Sciences

2011.9 Qiushi group prize for science and technology (prestigious annual award by Qiushi Foundation in Hong Kong to a single most significant science achievement in China)

2011.9 Distinguished Young Scientist Award of National Science Foundation of China

2012.1 The Chinese Academy of Sciences prize for outstanding scientific achievements

2012.8 The OCPA (Oversea Chinese Physicist Association) "Achievements in Asia Award"

Citation for the Award (within 30 words)

For his important contribution to the theory and computational material design for three-dimensional topological insulator and the quantum anomalous Hall effect.

Description of the work

Prof. Xi Dai has made significant contributions to the theory of a new quantum matter called topological insulator, including its realization in condensed matter systems. Dai has made a theoretical prediction of the quantum anomalous Hall effect (QAHE) in magnetically doped topological insulator thin films, and the prediction has been observed. Quantum Hall effect is a major discovery in recent decades, where the transverse conductance is quantized to an integer of e^2/h, with e the electron's charge and h the Planck constant. The QAHE is a new type of quantum Hall effect without external magnetic field and Landau levels. In a quantum anomalous Hall insulator, spontaneous magnetic moments and spin-orbit coupling combine to give rise to a topologically nontrivial electronic structure, leading to the quantized Hall effect in the absence of external magnetic fields. This phenomenon is of fundamental interest to basic physics. The QAHE has been searched in condensed matter physics for decades, but has only been successfully discovered very recently guided by the prediction of Prof. Dai's work. To realize QAHE, two important ingredients are needed. A mechanism to realize ferromagnetic insulator phases and a way to generate topologically non-trivial band structure. Based on first-principles calculations, Dai and his collaborators predict that when doped with transition metal elements (Cr or Fe), the 3D topological insulators Bi2Te3, Bi2Se3, and Sb2Te3 form magnetically ordered insulators through a new mechanism called Van Vleck mechanism, which does not require any free carriers in contrast to conventional dilute magnetic semiconductors. In two-dimensional thin films, this magnetic order gives rise to unique band inversion features controlled by the film thickness resulting in topological electronic structure characterized by a finite Chern number, with the Hall conductance quantized in units of e^2/h, with e the electron charge and h the Planck constant. Their work was published in a Science paper in 2010 (see the attached representative publication). Their prediction has most recently been confirmed and the QAHE has been successfully detected experimentally in the Cr doped Sb2Te3 thin films (see No. 3 in the listed key references), which is exactly predicted by Dai and his co-workers. Dai is a corresponding author of the Science paper, and a driving force of the work.

Dai has also made significant contribution to the theory of 3-dimensional topological insulator, which was first proposed in 2006 as a new state of electronic matter, insulating in the bulk, with unique topologically protected conducting surface states. However, the early studies did not identify good materials with such peculiar properties. By parameter-free first-principle calculations, combined with the effective Hamiltonian approach Prof. Dai and collaborators predicted a family of three-dimensional topological insulators represented by Bi_2Se_3 with an energy gap as large as 0.3 eV, keeping its topological properties even at room temperature. Their results have soon been confirmed by concurrent experiments. The discovery of Bi_2Se_3 family as realistic three-dimensional topological insulator materials has great impact on both fundamental studies and potential applications. Till now, most of the experimental studies on three-dimensional topological insulators have been carried out on the Bi_2Se_3 family materials and the original paper published in Nature Physics has been cited over 700 times in four years. In this groundbreaking work, Prof. Dai played a major role in deriving the effective k•p theory, while the first author was a Ph.D. student co-supervised by Prof. Dai.

Key references (up to 3 key publications*)

1) 1. Rui Yu, Wei Zhang, Hai-Jun Zhang, Shou-Cheng Zhang, **Xi Dai** and Zhong Fang, "Quantized Anomalous Hall Effect in Magnetic Topological Insulators", Science **329**, 61, (2010).

2) H. Zhang, C.-X. Liu, X.-L. Qi, **X. Dai**, Z. Fang and S.-C. Zhang," Topological insulators in Bi2Se3, Bi2Te3 and Sb2Te3 with a single Dirac cone on the surface" , Nature Phys **5**, 438, (2009).

3) Cui-Zu Chang, Jinsong Zhang, Xiao Feng, Jie Shen, Zuocheng Zhang, Minghua Guo, Kang Li, Yunbo Ou, Pang Wei, Li-Li Wang, Zhong-Qing Ji, Yang Feng, Shuaihua Ji, Xi Chen, Jinfeng Jia, **Xi Dai**, Zhong Fang, Shou-Cheng Zhang, Ke He, Yayu Wang, Li Lu, Xu-Cun Ma, Qi-Kun Xue, "Experimental Observation of the Quantum Anomalous Hall Effect in a Magnetic Topological Insulator", **Science express**, DOI: 10.1126/science.1234414; http://www.sciencemag.org/content/early/2013/03/13/science.1234414

*) Copy of one most significant publication should be attached.

Nominator (name, affiliation, email, telephone and relation to the candidate)

ZHANG, Fu-Chun
Chair Professor of Physics and Zhou Guangzhao Professor of Natural Sciences
Department of Physics, the University of Hong Kong, Hong Kong, China
e-mail:
telephone: (852) 2859 2360

Relation to the candidate: collaborated in several papers, but not directly related to the candidate's contributions, which are based for this nomination. The candidate was a research Assistant Professor in the Univ. of Hong Kong, where the nominator was working.

Signature F.-C. Zhang Date: 25 March 2013

Nomination form for the 2013 Nishina Asia Award

Candidate

Name: Kim YOUSOO
Affiliation: Surface and Interface Science Laboratory, RIKEN
Nationality: Korea
Office:
Address: 351-0198 RIKEN ASI, Hirosawa 2-1, Wako-City, Saitama, Japan
Telephone: 048-467-4073
Home:
Address: Hayamiya 1-44-18-407, Nerima-ku, Tokyo 179-0085, Japan
Telephone: 03-6914-9086

CV:

Born: Aug. 19th, 1968
1991 Feb., Bachelor of Science, Seoul National University
1993 Feb., Master of Science, Seoul National University
1999 Mar., Doctor of Engineering, The University of Tokyo
1999 Apr., Postdoctoral Fellow, RIKEN
2002 Oct., Researcher, RIKEN
2006 Apr., Senior Researcher, RIKEN
2010 Jan., Associate Chief Scientist, RIKEN

Citation for the Award

Unveiling and controlling surface elementary processes of a single molecule with tunneling electrons

Description of the work

Dr. Kim has unveiled the interaction and excitation of a single molecule on the solid surfaces, through the systematic studies on the controlling a single molecule with a Scanning Tunneling Microscope (STM). He performed the world-first experiment and theoretical analysis which revealed that vibrational spectra of a single molecule "moving or reacting" on the metal surfaces is indeed measurable using STM [Science 295(2002)2055, PRL 89(2002)126104, PRL 95(2005)246102, PRL 100(2008)136104, and PRL 105(2010)76101], and has been leading the experimental physics field in studying mechanism of molecular vibration.

This method was extended to investigate novel physical properties via vibrational and electronic states of a single molecule on an ultrathin metal-oxide film surface for the first time in the world; especially he successfully achieved state-selective selective dissociation of a water molecule [Nature Materials 49(2010)442], and explored a novel way to control surface reactivity by tuning interface between metal oxide film and supporting metal surface[JACS 133(2011)6142 and JACS 134(2012)10554]. It is apparent that those works made big impacts on both solid-state physics and nano technology.

Key reference (up to 3, most significant publication should be attached)

1. Single-molecule reaction and characterization by vibrational excitation, Yousoo Kim, T. Komeda and M. Kawai*, Phys. Rev. Lett. 89 (2002) 126104.

2. Excitation of Molecular Vibrational Modes with Inelastic Scanning Tunneling Microscopy Processes: Examination through Action Spectra of cis-2-Butene on Pd(110), Y. Sainoo, Yousoo Kim*, T. Okawa, T. Komeda, H. Shigekawa, and M. Kawai*, Phys. Rev. Lett. 95 (2005) 246102.

3. State-selective dissociation of a single water molecule on an ultrathin MgO film, H.-J. Shin, J. Jung, K. Motobayashi, S. Yanagisawa, Y. Morikawa, Yousoo Kim*, and Maki Kawai*, Nature Materials 9 (2010) 442.

Nominator(name, affiliation, email, telephone and relation to the candidate)

Name: Hideto En'yo

Affiliation: Director, RIKEN Nishina Center for Accelerators-Based Science

Email: enyo@riken.jp

Relation to the candidate:

Nominator has been observing Dr. Kim's work in RIKEN for 10 years as a colleague in a different field of physics in RIKEN. He has been hidden after the great name of Dr. Maki Kawai, but it is apparent many of significant works in her laboratory were indeed conducted by Dr. Kim. By knowing the call for the Nishina Asia Award, Nominator considered Dr. Kim fits very well to the aim of this award.

Signature  Date March 21st, 2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D, nationality, address, email and telephone)
Hyotcherl Ihee, Professor, Department of Chemistry, KAIST (Korea Advanced Institute of Science and Technology) *Curriculum vitae including the date of the degree of Ph.D, nationality, address, email and telephone is attached as a separate file.
Citation for the Award (within 30 words)
For making it possible to study the molecular structural changes and molecular reaction dynamics in the solution phase by advancing ultrafast x-ray liquidgraphy (solution scattering).
Description of the work
The term liquidgraphy coined by the candidate is a new methodology to observe structural changes of molecules undergoing photo-induced chemical reactions in liquids. The understanding of such dynamical processes in the liquid phase on an atomic and molecular level is a paramount target of fundamental chemistry since the vast majority of chemical and biochemical processes proceed in liquids. However, complex interactions between solute and solvent defy detailed studies compared with the study in gas phase. So far, for tracking of time-dependent processes, whether in gas or in solution, time-resolved optical absorption and emission spectroscopic methods have been developed which, however, have failed to provide direct information on *molecular structural changes* such as the bond lengths and bond angles. In order to resolve this problem, Ihee and his team developed a "camera" to shoot ultrafast X-ray diffraction patterns of solution (i.e., liquidography). This is a direct technique to probe structural dynamics for chemical processes *in solution*. The visualizing power and unbiased sensitivity of X-ray scattering proved to be instrumental in identifying global reaction pathways and in some cases capturing detailed three dimensional structures of ephemeral reaction intermediates. Their technique to provide direct structural information is in sharp contrast to conventional ultrafast optical spectroscopy, which is difficult to provide time dependence of bond lengths and angles of all molecular species involved in dynamic processes over a wide range of times, i.e., from picoseconds to milliseconds. Using the technique, they have studied structural dynamics and spatiotemporal kinetics of many molecular systems including diatomic molecules, alkyl halides, organometallic complexes, and protein molecules. The choice of the above molecules is not at all capricious. These molecules have been

traditionally studied in gas phase or in solid by conventional methods so that they are sure starting systems for Ihee's group to apply their new endeavor to unveil such processes as isomerization, bond breaking and forming in solution. In a long range, of course, they aim to decipher various enigmas of molecular biological processes, say, folding and unfolding of proteins to begin with.

The nominator believes that Ihee's graduate advisor, Ahmed Zewail, who is the Chemistry Nobel laureate in 1999 must be very proud of Ihee and his activity because Ahmed laid a road to ultrafast sciences dealing with gaseous systems, which was relayed to Ihee's enterprise to cultivate a vast virgin land of science (cf. Ihee's home page). Ihee is wisely utilizing synchrotron facilities in KEK, Japan, ERSF in Europe and APS in the US. Since the PF at KEK may be regarded as a heritage of Nishina who was eager in cooperative work of physics and chemistry, the nominator regards Ihee as one of the most eligible scientists.

Key references (up to 3 key publications*)

"Visualizing Solution-Phase Reaction Dynamics with Time-Resolved X-ray Liquidography", H. Ihee, *Acc. Chem. Res.*, **2009**, 42, 356-366.

"Tracking the structural dynamics of proteins in solution using time-resolved wide-angle X-ray scattering", M. Cammarata, M. Levantino, F. Schotte, P. A. Anfinrud, F. Ewald, J. Choi, A. Cupane, M. Wulff, H. Ihee, *Nature Methods*, **2008**, 5, 881-887.

"Filming the Birth of Molecules and Accompanying Solvent Rearrangement", J. H. Lee, M. Wulff, S. Bratos, J. Petersen, L. Guerin, J.-C. Leicknam, M. Cammarata, Q. Kong, J. Kim, K. B. Moller, H. Ihee, *J. Am. Chem. Soc.*, **2013**, 135, 3255-3261.

Nominator (name, affiliation, email, telephone and relation to the candidate)

Tadamasa Shida
Professor Emeritus, Kyoto University
e-mail: shida@kyoto.email.ne.jp
Tel: +81-(0)75-722-7841 (home)

Relation to the candidate: In September 2011 I made the acquaintance of Professor Ihee on the occasion of his lecture at Kobe University. He was invited to Japan by The Morino Foundation for Young Physical Chemists. As a committee member of that foundation I chaired Ihee's lecture to notice almost instantly that "This is genuine".

He introduced his idea to utilize ultrafast X-ray pulse to probe dynamical molecular structural changes by combining the pulse with separate UV-pulses to induce time-dependent photochemical processes in *liquid* phase. He maneuvered to extract desired information by subtraction of hampering diffraction signals due to irrelevant solvent molecules. Idea is simple, but performance

requires the utmost consideration and skill. Above all, Ihee's approach has a potentiality of eventual thrust into clarification of molecular processes of life because the most events in living things occur in the aqueous solution in a wider sense.

I was once with Ihee's advisor, Ahmed Zewail, a Nobel laureate for chemistry in March 1987 when we had a bi-national seminar in Honolulu. I felt a strong aura emanating from him, a born Egyptian, who was on the way of climbing up in the academic world in the States. To me, Ihee's work seems to be a splendid extension of Ahmed's science from Gas to Liquid.

As for Nishina and myself, I was told that the room assigned to me to use from 1958 to 1964 was the very room that Nishina used. Here, I am talking about the original The Institute of Physical and Chemical Research (RIKEN) established in 1917, a part of the lot of The Institute is still being used by the present Nishina Foundation.

Thus, I have a special affection to the original RIKEN. Besides Nishina, the same room mentioned above once belonged also to the group of Professor Shoji Nishikawa, a worldly renowned X-ray crystallographer. His son is the late Professor Tetsuji Nishikawa, who was the former President of KEK where nowadays Ihee uses the PF machine occasionally.

Signature Takamasa Ishida Date March 25, 2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree Ph.D, nationality, address, email and telephone)
Name: Hawoong Jeong **Affiliation:** KAIST-Chair Professor / Head of Department, Department of Physics, KAIST (Korea Advanced Institute of Science and Technology) **Curriculum Vitae:** **Nationality :** Korean **Email:** hjeong@kaist.ac.kr **Telephone:** +82-42-350-2543 **Address:** Department of Physics, KAIST, Daejeon, 305-701, South Korea **Education :** Feb. 26 1998 Ph.D. in Physics at Seoul National University Feb. 26 1993 MS in Physics at Seoul National University Feb. 26 1991 BS in Physics at Seoul National University **Professional Career:** 2011/5~present : KAIST Chair Professor & Head of Physics Department, KAIST 2001/9~2011/4 : Assistant/Associate/Professor at KAIST 1998/8~2001/8 : Post-Doc/Assistant Research Professor at Univ. of Notre Dame (USA) 1998/3~1998/7 : Post-Doc at Center for Theoretical Physics, SNU **Selected Publications:** 1. "Fundamental structural constraint of random scale-free networks" Phys. Rev. Lett. (2012) 2. "Googling social interactions: Web search engine based social network construction", PLoS ONE (2010) 3. "Dynamics and directionality in complex networks" Phys. Rev. Lett. (2009) 4. "Scaling laws between population and facility densities" PNAS (2009) 5. "Price of anarchy in transportation networks: Efficiency and optimality control" Phys. Rev. Lett. (2008) 6. "Metabolite essentiality elucidates robustness of E. coli metabolism" PNAS (2007) 7. "Universality class of fiber bundle model on complex networks", Phys. Rev. Lett. (2005) 8. "Role of the cytoskeleton in signaling networks", J. of Cell Science (2004) 9. "Subnetwork hierarchies of biochemical pathways", Bioinformatics (2003) 10. "Classification of scale-free networks", PNAS (2002) 11. "Modeling the Internet's large-scale topology", PNAS (2002) 12. "Comparable system-level organization of Archaea and Eukaryotes", Nature Genetics (2001) 13. "Lethality and centrality in protein networks", Nature (2001) 14. "The large-scale organization of metabolic networks", Nature (2000) 15. "Error and attack tolerance of complex networks", Nature (2000) 16. "The diameter of the World Wide Web", Nature (1999)

Citation for the Award (within 30 words)
Innovative scientist, who plays a major role in the opening and developing the entire new field of statistical physics, "network science" which is now considered as new way of understanding of complex system.
Description of the work
Prof. Jeong has played major role in the current revolution in new field of interdisciplinary science, "Network Science", whose work has been cited over 11,000 times from diverse fields. His activities have an invaluable impact, well beyond the boundaries of physics, concerning as well technological and biological system. Prof. Jeong's early papers on complex networks are now part of the canon of the field. Indeed, it was his 1999 paper in Nature that first described the emergence of the power law degree distribution in the World Wide Web, and this led to the introduction of the concept of scale-free networks, a true paradigm shift in the field. Since Prof. Jeong collected and analyzed the data that made this study possible, his role was the key in this discovery. One year later, in another Nature article (cover story), he contributed to the introduction of the error and attack tolerance concept. This was the first indication that the scale-free nature of real networks has an important impact on their ability to resist breakdown and failure. That idea in itself has developed into a major direction of inquiry within physics, computer science, and biology – the robustness of complex systems to node failure is now a much-explored topic. Prof. Jeong was first author of two papers, published in Nature in 2000 and 2001, that presented the first evidence that the scale-free state is not just a property of humanly-devised networks, but is also found in networks that took four billion years to emerge: those within living cells. His discovery that both metabolic and protein interaction networks are scale-free constituted the genesis of the new subfield of systems and network biology. In particular, his observation that hub status correlates with how essential a protein is has been hugely influential, and his paper on this topic was the first to alert biologists to the importance of network research. Also his 2000 Nature paper was called by a leading biologist an "essential reading for everyone engaged in metabolic network reconstruction" and has acquired almost two thousand citations. If Prof. Jeong had published no other work beyond that just described, he would still be a legend in this field. Since returning to Korea, however, he has initiated new research and continues to have a strong impact. He has been able to capitalize on his knowledge on networks to be a leader in the field by proposing new and important work in the area of biology, information network, socio/econo-physics, and statistical physics. The output of his research activity is phenomenal as witnessed by the number of papers and the high impact journal where he published such as PNAS and PRL. Of his recent work, "Subnetwork hierarchies of biochemical pathways" in Bioinformatics was highly cited and "Role of cytoskeleton in signaling networks" was selected as cover article in J. of Cell Science. Also he did not only theoretical calculation, but also collaboration with wet-biologist, to prove his idea with real bio-system, E. coli, in his 2007 PNAS paper. Besides bio-system, he works on socio/econo-physics

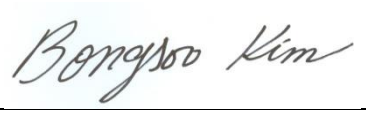
complex problems, such as grouping the stock market with eigen-vector based algorithm, and analyzing online social network services, like twitter and facebook. His work is highly appreciated from non-scientific field as well, for example, his 2008 PRL paper, "Price of Anarchy in transportation networks" was introduced in "The Economist" magazine as noticeable sci-tech paper. Of course, he studies traditional statistical physics problems as well, such as phase transition and synchronization, which were published in PRL. As shown above, Prof. Jeong combines very high intellectual curiosity with a wide range of interdisciplinary interest and technical expertise, and he has proved his excellency with a series of papers that have opened new field of science. He is an international leader in one of the most active subfields of physics, "network science", one that is poised to radically redefine our thinking about complex system.

Key references (up to 3 key publications)

1. H. Jeong et al, "The large-scale organization of metabolic networks", Nature **407** 651 (2000) [cited 1978 times]
2. H. Jeong et al, "Lethality and centrality in protein networks", Nature **411** 41 (2001) [cited 1717 times]
3. R. Albert, H. Jeong, A.-L. Barabasi, "Error and attack tolerance of complex networks", Nature 406 378 (2000) [cited 2057 times] [Nature Cover Article]

Nominator (name, affiliation, email, telephone and relation to the candidate)

Name: Prof. Dr. Bongsoo Kim
Affiliation: Department of Physics, Changwon National University, Changwon, Korea
Email: bongsoo.bskim@gmail.com
Telephone: +82-(0)55-213-3426
Relation to the candidate: A colleague in Korean statistical physics community

Signature:  Date: March 26, 2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)

Ren-Bao Liu

The Chinese University of Hong Kong
Department of Physics
Shatin, New Territories
Hong Kong SAR, China

Tel: +852 3943-6312
Fax: +852 2603-5204
Email: rbliu@phy.cuhk.edu.hk
URL: http://www.phy.cuhk.edu.hk/rbliu

Personal Data

Nationality:	Chinese	Citizenship:	China (Hong Kong)
Birth Date:	Sep 1973	Birthplace:	Hunan, China

Education

PhD (1 July 2000), Institute of Semiconductors, Chinese Academy of Sciences
BSc (1 July 1995), Nanjing University, Department of Physics

Academic Appointments

Sep 2010 - present, Associate Professor, Department of Physics, The Chinese University of Hong Kong
Sep 2005 - Aug 2010, Assistant Professor, Department of Physics, The Chinese University of Hong Kong
Nov 2002 - Aug 2005, Postgraduate Researcher, University of California - San Diego
Sep 2000 - Sep 2002, Postdoctoral Fellow, Center for Advanced Study, Tsinghua University

Honors

Huang Kuang Prize (2013)
Outstanding Fellow of Faculty of Science, The Chinese University of Hong Kong (2013-2017)
Ministry of Education of China Natural Science Award - Rank 2 (2013)
Young Researcher Award 2010, The Chinese University of Hong Kong (2011)
Outstanding Postdoctoral Fellow, Tsinghua University, Beijing (2003)
President Prize, Chinese Academy of Sciences, Beijing (2000)
Outstanding Graduate Honor, Nanjing University (1995)

Citation for the Award (within 30 words)

For his seminal contributions to the understanding of spin decoherence in solid-state systems and development of atomic-scale sensing schemes of single nuclear spin clusters, and discovery of time as a new dimension for phase transitions.

Description of the work

Decoherence, i.e., breaking of quantum superposition states of quantum objects due to coupling to environments, is a critical issue in quantum computing and other quantum technologies and also a key to bridging the quantum and classical worlds. The electron spin decoherence in solid-state systems is particularly important considering that electron spins are a most promising candidate for quantum computing and the solid-state environments are complicated. The nominee has made significant progresses in understanding the microscopic mechanisms of electron spin decoherence, in combating decoherence for practical quantum computing, and in applying decoherence as a sensitive probe.

He established a quantum many-body theory to model electron spin decoherence caused by nuclear spins in solids [*Phys. Rev. B* **78**, 085315 (2008)] and discovered anomalous decoherence effects due to the quantum nature of nuclear spin environments [*Phys. Rev. Lett.* **106**, 217205 (2011); *Nature Communications* **2**, 570 (2011)]. With the microscopic mechanisms of electron spin decoherence understood, he developed schemes to preserve quantum coherence by dynamical control of spins [*Phys. Rev. Lett.* **98**, 077602 (2007); *Phys. Rev. Lett.* **101**, 180403 (2008)]. The nominee and experimental coworkers demonstrated for the first time that the dynamical control can greatly prolong the coherence time of electron spins in realistic solid-state environments even at room temperatures [*Nature* **461**, 1265 (2009)]. These works "*are vital to pushing the performance of real, physical systems closer to that required for practical quantum computing*" [B. B. Buckely & D. D. Awschalom, *Nature* **461**, 1217 (2009)].

The nominee, utilizing decoherence of the electron spin of a nitrogen-vacancy center in diamond, invented schemes for atomic-scale sensing of single nuclear spin clusters in diamond and nuclear magnetic resonance (NMR) spectroscopy of single molecules on diamond surface [*Nature Nanotechnology* **6**, 242 (2011)]. This work paves the way toward single-molecule NMR, the crown-jewel challenge in research of magnetic resonance spectroscopy. Subsequently, the nominee and experimental coworkers achieved the record sensitivity of sensing single nuclear spins in diamond [*Nature Nanotechnology* **7**, 657 (2012)].

Recently, the nominee pioneered in exploiting spin decoherence as a probe of many-body physics in local environments. He discovered that decoherence of a central spin coupled to an interacting spin environment presents sudden changes at critical times [*Phys. Rev. Lett.* **109**, 185701 (2012)]. This discovery suggests time as a new dimension for phase transitions, in addition to the conventional ones such as temperature, pressure, and magnetic field. This work opens up a new paradigm for phase transitions.

Key references (up to 3 key publications*)

(1) Jiangfeng Du, Xing Rong, Nan Zhao, Ya Wang, Jiahui Yang, and Ren-Bao Liu, *Nature* **461**, 1265 (2009). "Preserving spin coherence in solids by optimal dynamical decoupling"

(2) Nan Zhao, Jian-Liang Hu, Sai Wa Ho, Jones T. K. Wan, and Ren-Bao Liu, *Nature Nanotechnology* **6**, 242 (2011). "Atomic-scale magnetometry of distant nuclear spin clusters via nitrogen-vacancy spin in

diamond"

(3) Bo Bo Wei and Ren-Bao Liu, *Physical Review Letters* **109**, 195701 (2012). "Lee-Yang zeros and critical times in decoherence of a probe spin coupled to a bath"

*) Copy of one most significant publication should be attached.

Nominator (name, affiliation, email, telephone and relation to the candidate)

Ke-Qing Xia
Department of Physics
The Chinese University of Hong Kong
Email:
Telephone: (+852)-3943-6102

The nominator is a colleague and also the Chairman of the nominee's Department.

Signature  Date March 26, 2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)
C H Raymond Ooi Associate Professor Department of Physics, Faculty of Science University of Malaya 50603 Kuala Lumpur MALAYSIA Telephone: 603- 7967 4092 E-mail: rooi@um.edu.my Nationality: Malaysian EDUCATION • Dr. rer. nat. (Doctor of Natural Science): awarded on 18 June 2003 (2000- 2003) Universitaet Konstanz, Konstanz, Germany • Master of Engineering (Photonics): October 1998 - November 1999 Nanyang Technological University, Singapore • Bachelor of Science, 2nd Upper Hons (Physics): July 1993-April 1997 Universiti Sains Malaysia AWARDS AND RECOGNITIONS 1. Marquis Who's Who in the World 2012 edition 2. Marquis Who's Who in the World 2009 edition 3. Distinguished Research Prize (March 2007): Department of Physics, KAIST. SUPERVISION Completed: 2 PhD and 7 MSc 5 final year undergraduates (3 Monash, 2 UM) Ongoing: 3 PhD and 1 MSc students 2 final year undergraduates

PROFESSIONAL PROFILE

- Associate Professor: 8 Feb 2010-now

University of Malaya, Malaysia

Teaching: Thermal Physics, Instrumentation, Quantum Mechanics, Basic Maths, Physics of atoms and molecules

- Visiting Research Scientist: 7 June-6 July 2011

School of Physics, Peking University, China

- Visiting Research Scientist: Nov-Dec 2009

School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore

- Senior Lecturer (top level): 2 January 2009-7 February 2010

Monash University, Malaysia (Sunway Campus)

Teaching: Advanced Engineering Mathematics; Optimization, Estimation and Numerical Methods

- Assistant Professor: 1 September 2007-1 January 2009

Korea University, Seoul

Teaching: General Physics (undergraduate level), Atomic Spectroscopy (graduate level).
Service: member of organizing committee for a conference (http://newton.kias.re.kr/aqis08/)

- Research Professor: 15 September 2006-31 August 2007

Korea Advanced Institute of Science and Technology (KAIST)

Teaching: Nonlinear optics (graduate level), Lasers and Quantum Optics (graduate level).

- Postdoctoral Research Associate: 26 June 2003-25 June 2006

Institute for Quantum Studies, Department of Physics, Texas A&M University, USA

- Visiting Scientist: summer 2004, 2005 and 12 July 2006-1 September 2006

Max-Planck Institute for Quantum Optics, Garching, Germany

- Visiting Research Associate: 18 September 2003- 1 January 2004

Frick Laboratory, Chemistry Department, Princeton University, USA

- Research Assistant (Mitarbeiter): March 2000-June 2003

Universitaet Konstanz, Germany (Theoretical Quantum Optics Group)
Project: Laser cooling schemes for molecules

PROFESSIONAL MEMBERSHIPS

Member: Optical Society of America (OSA)

Council Committee Member: Institute of Physics, Malaysia (IFM)

PROFESSIONAL SERVICES

Editor: Central European Journal of Physics (http://www.versita.com/science/physics/cejp/)

Referee: Applied Physics Letters, Physical Review Letter, Physical Review A, B and E
IEEE, European Physical Journal D, Optics Communications

Organizing committee member for:

a)Asia Pacific Conference and Workshop on Quantum Information Science (APCWQIS 2012)

b)National Physics Conference (PERFIK 2010)

c)Asian Conference on Quantum Information Science (AQIS 2008)

PUBLICATIONS

A. JOURNAL PAPERS (Refereed, Web of Science)

1) C. H. Raymond Ooi and Au Yeung T. C., "Polariton gap in a superconductor–dielectric superlattice", Physics Letters A 259, 413 (1999).

IF=2.17 18 citations

2) C. H. Raymond Ooi, Au Yeung T. C., Kam C. H. and Lim T. K., "Photonic band gap in a superconductor-dielectric superlattice", Physical Review B 61, 5920 (2000).

IF= 3.77 42 citations

3) C. H. Raymond Ooi, T. C. Au-Yeung, T. K. Lim and C. H. Kam, "General electromagnetic density of modes for a one-dimensional photonic crystal", Physical Review E 62, 7405 (2000).

IF= 2.50

4) C. H. Raymond Ooi, K.-P. Marzlin and J. Audretsch, "Momentum Spread of Spontaneously Decaying Cold Gas in Thermal Radiation", Physical Review A 66, 063413 (2002).

IF=2.91

5) C. H. Raymond Ooi, K.-P. Marzlin, and J. Audretsch, "Laser Cooling of Molecules via Single Spontaneous Emission", European Physical Journal D 22, 259 (2003).

IF= 1.476

6) C. H. Raymond Ooi, "Rotational cooling of polar molecules by Stark-tuned cavity resonance", Physical Review A 68, 013410 (2003).

IF=2.91

7) M. O. Scully and C. H. Raymond Ooi, "Improving quantum microscopy and lithography via Raman photon pairs: II. Analysis", Journal of Optics B: Quantum Semiclassical Optics 6, S816 (2004). (becomes JOURNAL OF PHYSICS B-ATOMIC MOLECULAR AND OPTICAL PHYSICS)

IF=2.09 27 citations

8) C. H. Raymond Ooi, Guy Beadie, George W. Kattawar, John F. Reintjes, Y. Rostovtsev, M. Suhail Zubairy, and Marlan O. Scully, "Theory of Femtosecond Coherent anti-Stokes Raman Backscattering Enhanced by Quantum Coherence for Standoff Detection of a Bacterial Spore", Physical Review A 72, 023807 (2005).

IF=2.91 11 citations

9) Anil K. Patnaik, C.H. Raymond Ooi, Yuri Rostovtsev and Marlan O. Scully, "Injection time effects on lasing without inversion with microwave driven non-degenerate ground states", Physica E 29, 111 (2005).

IF=1.53

10) C. H. Raymond Ooi and Marlan O. Scully, "Quantum correlations between a pair of Raman photons from single atom under arbitrary excitation condition", Anil K. Patnaik, Girish S. Agarwal, Physical Review A 72, 043811 (2005).

IF=2.91

11) Marlan O. Scully, Edward S. Fry, C. H. Raymond Ooi and Krzysztof Wodkiewicz, "Directed Spontaneous Emission from an Extended Ensemble of N Atoms: Timing is Everything", Physical Review Letters 96, 010501 (2006) (selected for the January 2006 issue of Virtual Journal of Quantum Information).

IF=7.62 90 citations

12) Z. Deng, D.-K. Qing, P. R. Hemmer, C. H. Raymond Ooi, M. S. Zubairy, and Marlan O. Scully, "Time-Bandwidth Problem in Room Temperature Slow Light", Physical Review Letters 96, 023602 (2006).

IF=7.62 25 citations

13) Vitaly V. Kocharovsky, Vladimir V. Kocharovsky, Martin Holthaus, C. H. Raymond Ooi, Anatoly Svidzinsky, Wolfgang Ketterle, and Marlan O. Scully, "Fluctuations in Ideal and Interacting Bose-Einstein Condensates: From the laser phase transition analogy to squeezed state mathematics applied to Bogoliubov quasiparticles", Advances in Atomic, Molecular and Optical Physics 53, 291 (2006).

IF=4.95 36 citations

14) Andrew Jordan, C. H. Raymond Ooi, and Anatoly Svidzinsky, "Fluctuation statistics of Bose-Einstein condensation: reconciling the master equation with the partition function to revisit the Uhlenbeck-Einstein dilemma", Physical Review A 74, 032506 (2006).
IF=2.91

15) C. H. Raymond Ooi, Qingqing Sun, M. Suhail Zubairy and Marlan O. Scully, "Correlation of Photon Pairs from Double Raman Amplifier: Generalized Analytical Quantum Langevin Theory", Physical Review A 75, 013820 (2007). 19 citations
IF=2.91

16) C. H. Raymond Ooi, "Effects of Spontaneously Generated Coherence on Two-Photon Correlation in a Double-Cascade Scheme", Physical Review A 75, 043818 (2007).
IF=2.91

17) C. H. Raymond Ooi, "Quenching the Effects of Dipole-dipole Interaction on Two-Photon Correlation from Two Double-Raman Atoms", Physical Review A 75, 043817 (2007).
IF=2.91

18) C. H. Raymond Ooi, Byung-Gyu Kim and Hai-Woong Lee, "Coherent Effects on Two-Photon Correlation and Directional Emission of Two Two-level Atoms", Physical Review A 75, 063801 (2007).
IF=2.91

19) C. H. Raymond Ooi, Y. Rostovtsev, and M. O. Scully, "Two-Photon Correlation of Radiation Emitted by Two Excited Atoms: Detailed Analysis of a Dicke Problem", Laser Physics 17, 956 (2007) (in Honor of the Memory of Professor Herbert Walther).
IF=3.60

20) C. H. Raymond Ooi, "Continuous source of phase-controlled entangled two-photon laser", Physical Review A 76, 013809 (2007). (selected for the July 2007 issue of Virtual Journal of Quantum Information)
IF=2.91 13 citations

21) C. H. Raymond Ooi and M. Suhail Zubairy, "Role of noise operators on two-photon correlations in an extended coherent Raman medium", Physical Review A 75, 053822 (2007). (selected for the June 2007 issue of Virtual Journal of Quantum Information)
IF=2.91

22) C. H. Raymond Ooi and Marlan O. Scully, "Two-photon Correlation of Cascade Amplifier: Propagation Effects via Constant Gain or Loss and Limitation of Semiclassical Noiseless Theory", Physical Review A 76, 043822 (2007).
IF=2.91

23) C. H. Raymond Ooi, "Extended Photon Correlation in Negative Temperature Medium", Physical Review A 77, 053820 (2008). (selected for June 2008 issue of Virtual Journal of Quantum Information)
IF=2.91

24) C. H. Raymond Ooi, "Effects of Chirped Laser Pulses on Nonclassical Correlation and Entanglement of Photon Pairs from Single Atom", Physical Review A 77, 063805 (2008). (selected for June 2008 issue of Virtual Journal of Quantum Information)
IF=2.91

25) C. H. Raymond Ooi, "Controlling Irreversibility and Directional Flow of Light with Atomic Motion: Optical Transistor and Quantum Velocimeter", New Journal of Physics 10, 123024 (2008).
IF=4.18

26) **C. H. Raymond Ooi, "Theory of coherent anti-Stokes Raman scattering (CARS) for mesoscopic particle with complex molecules: angular-dependent spectrum", Journal of Raman Spectroscopy 40, 714 (2009).**
IF=3.53

27) Byung-Gyu Kim, C. H. Raymond Ooi, Manzoor Ikram and Hai-Woong Lee, "Directional Property of Radiation Emitted from Entangled Atoms", Physics Letters A 373, 1658 (2009).
IF=2.17

28) Su-Yong Lee, Jiyong Park, Se-Wan Ji, C.H. Raymond Ooi and Hai-Woong Lee, "Nonclassicality generated by photon annihilation-then-creation and creation-then-annihilation operations", Journal of the Optical Society of America B 26, 1532 (2009).
IF=2.18

29) C. H. Raymond Ooi and P. R. Berman, "Preservation of Bosonic commutation relation: Explicit evaluation of quantum Langevin operator products", Physica E 42, 407 (2010).
IF=1.53

30) C. H. Raymond Ooi and Chan Hin Kam, "Echo and Ringing of Optical Pulse in Finite Photonic

Crystal with Superconductor and Dispersive Dielectric", Journal of Optical Society of America B 27, 458 (2010).
IF=2.18

31) C. H. Raymond Ooi, "Superintense Laser Fields from Multiple Laser Pulses Retro-reflected in Circular Geometry", Journal of Applied Physics, 107, 043110 (2010).
IF=2.20

32) C. H. Raymond Ooi and Chan Hin Kam, "Controlling quantum resonances in photonic crystals and thin films with electromagnetically induced transparency", Physical Review B 81, 195119 (2010).
IF=3.77

33) C. H. Raymond Ooi and B. L. Lan, "Nonclassical Two-Photon Talbot Effect from Arrayed Double-Raman Emitters", Physical Review A 81, 063832 (2010).
IF=2.91

34) C. H. Raymond Ooi and T. Y. Tou, "Superintense Laser Fields Circular Array: Effects of Phase and Pulse Jitters", Applied Physics B 101, 825 (2010).
IF=2.28

35) **C. H. Raymond Ooi, "Laser Cooling of Molecules by Zero Velocity Selection and Single Spontaneous Emission", Physical Review A 82, 053408 (2010).**
IF=2.91

36) C H Raymond Ooi, S W Harun, Harith "Quantum Coherence Effects in Raman Amplifier", Ahmad, Journal of Modern Optics 58, 11 (2011) .
IF=1.17

37) C H Raymond Ooi, "Conversion of heat to light using Townes' maser-laser engine: Quantum optics and thermodynamic analysis", Physical Review A 83, 043838 (2011).
IF=2.91

38) C. H. Raymond Ooi, "Near-Field and Particle Size Effects in Nonlinear Optical Scattering", Progress in Electromagnetics Research (PIER) 117, 479 (2011).
IF=5.30

39) C. H. Raymond Ooi and Qihuang Gong, "Temperature dependent resonances in superconductor

photonic crystal", Journal of Applied Physics 110, 063513 (2011).
IF=2.20

40) R. P. Chen and C. H. Raymond Ooi, "Evolution and Collapse of a Lorentz Beam in Kerr medium", Progress in Electromagnetics Research (PIER) 121, 39-52 (2011).
IF=5.30

41) R. P. Chen and C. H. Raymond, "Nonclassicality of vortex Airy beams in Wigner representation", Physical Review A 84, 043846 (2011)
IF=2.91

42) C. H. Raymond Ooi , "Exact Transient Photon Correlation with Arbitrary Laser Pulses", Physical Review A 84, 053842 (2011).
IF=2.91

43) P. R. Berman and C. H. Raymond Ooi, "Single-photon pulse propagation in and into a medium of two-level atoms: Microscopic Fresnel equations", Physical Review A 84, 063851 (2011).
IF=2.91

44) C. H. Raymond Ooi and Qihuang Gong, "Nonclassical photon correlations nanoparticle in microcavity", Physical Review A 85, 023803 (2012).
IF=2.91

45) Eyob A. Sete and C. H. Raymond Ooi, "Continuous-variable entanglement and two-mode squeezing in a single-atom Raman laser", Physical Review A 85, 063819 (2012).
IF=2.91

46) Sudha Singh, C. H. Raymond Ooi and Amrita, "Dynamics for two atoms interacting with intensity-dependent two-mode quantized cavity fields in the ladder configuration", Physical Review A 86, 023810 (2012).
IF=2.91

47) C. H. Raymond Ooi, WaiLoon Ho and A. D. Bandrauk, "Photoionization spectra by intense linear, circular and elliptic polarization laser pulses", Physical Review A 86, 023410 (2012).
IF=2.91

48) C. H. Raymond Ooi, K. C. Low, Ryota Higa and Tetsuo Ogawa, "Surface Polaritons with Arbitrary Magnetic and Dielectric Materials: New Regimes, Effects of Negative Index and

Superconductors," Journal of Optical Society of America B 29, 2691 (2012).
IF=2.18

49) K. Berrada, Abdel Khalek and C. H. Raymond Ooi, "Quantum metrology with binomial coherent states of a single mode field", Physical Review A 86, 033823 (2012).
IF=2.91

50) P. R. Berman and C. H. Raymond Ooi, "Pulse propagation in a medium of Λ-type atoms", Physical Review A 86, 053812 (2012).
IF=2.91

51) S. N. Hazmin and Sudha Singh, "Nonclassical dynamics with time- and intensity-dependent coupling", C. H. Raymond Ooi, Quantum Information Processing, DOI 10.1007/s11128-012-0512-6 (published online Dec 2012)
IF=2.08

52) C. H. Raymond Ooi and Y. Y. Khoo, "Controlling the repulsive Casimir force with the optical Kerr effect", Physical Review A 86, 062509 (2012).
IF=2.91

53) K S Ng and C H Raymond Ooi, "Gravitational Force of Bessel Light Beam", Laser Physics 23, 035003 (2013).
IF=3.60

54) Biswajit Sen, Sandip Kumar Giri, Swapan Mandal, C. H. Raymond Ooi, and Anirban Pathak, "Intermodal entanglement in Raman processes", Physical Review A 87, 022325 (2013).
IF=2.91

55) C. H. Raymond Ooi and Tan Kai Shuen, "Controlling Double Quantum Coherence and Electromagnetic Induced Transparency with Plasmonic Metallic Nanoparticle", Plasmonics DOI 10.1007/s11468-013-9487-0
IF=3.72

B. CONFERENCE PROCEEDINGS

1) C. H. Raymond Ooi, Au Yeung T. C., Lim T. K. and Kam C. H., "Two-dimensional superconductor dielectric photonic crystal", Photonics Technology into the 21st Century: Semiconductors, Microstructures, and Nanostructures, Proceedings of the SPIE Volume: 3899, 278 (1999).

2) De-Kui Qing, Z. Deng, C. H. Raymond Ooi, P. R. Hemmer, and Marlan O. Scully, "Crosstalk noise suppression in slow light for time-bandwidth product", Proceedings of the SPIE Volume: 5842, 282 (2005).

3) C. H. Raymond Ooi, Anil K. Patnaik and Marlan O. Scully, "Two-Photon Correlation of Photon Pairs: Near Field and Polarization Effects", Noise and Information in Nanoelectronics, Sensors, and Standards III, Proceedings of the SPIE Volume: 5846, 1 (2005) (plenary paper).

4) C. H. Raymond Ooi, "Nonclassical Correlation of Macroscopic Raman Photon Pairs", Proceeding of Quantum Communications and Measurement Conference (QCMC 2006, 28 Nov. – 3 Dec 2006, Tsukuba, Japan).

5) B G Kim, C H Raymond Ooi, H W Lee, "Directional property of radiation emitted from entangled atoms", Proceeding of Conference on Lasers and Electro-Optics/Pacific Rim 2007, 941-942 (26-31 Aug 2007, Seoul, South Korea).

6) C. H. Raymond Ooi, "Femtosecond Coherent Anti-Stokes Raman Spectroscopy (CARS) As Next Generation Nonlinear LIDAR Spectroscopy and Microscopy", AIP Conference Proceeding 1150, 50-58 (Frontiers of Physics: 3rd International Meeting, Kuala Lumpur, Malaysia, 12-16 January 2009, Editor: S P Chia).

7) C. H. Raymond Ooi, "Near-Field CARS with Micro- and Nano-Particle", AIP Conference Proceedings 1267 (XXII International Conference on Raman Spectroscopy, Boston (MA), 8–10 August 2010, ISBN: 978-0-7354-0818-0, Editor(s): P. M. Champion, Northeastern University, L. D. Ziegler, Boston University).

8) Ooi C. H. Raymond, "Superconducting Photonic Crystal with Nanostrips for Mid-Infrared Applications", Malaysia Annual Physics Conference 2010 (PERFIK-2010): AIP Conference Proceedings 1328, 24-27 (2011)

9) Konstantin E. Dorfman, Kimberly R. Chapin, C. H. Raymond Ooi, Anatoly A. Svidzinsky, and Marlan O. Scully, "Quantum Thermodynamics of Photo and Solar Cells", AIP Conf. Proc. 1411, 256 (2011).

10) C. H. Raymond Ooi and Ng Kin Fei, "Switching the negative refractive index and surface wavevector of superconducting metamaterials", 2011 IEEE 2nd International Conference on Photonics, ISBN 978-1-61284-264-6, DOI: 10.1109/ICP.2011.6106814

INVITED/PLENARY CONFERENCE TALKS

1. Left-Handed Optics with Superconducting Photonic Crystals, 2nd International Conference on Photonics (ICP 2011), 17-19 October 2011, Kota Kinabalu, Sabah

2. Raman photonics: from coherent backscattering to nonclassical light, TAMU/Princeton Institute for Quantum Science and Engineering Summer School, 24-30 July 2011, Jackson Hole, Wyoming, USA.

3. Transient Quantum Optics with Laser Pulses via Exact Langevin Solutions, International Conference on Quantum Optics and Quantum Communications, ICQOQC 2011, 24-26 March 2011, Jaypee Institute of Information Technology, Noida, India (invited, sponsored).

4. Controllable nonclassical light with high intensity from an array of emitters, The 6-th CAS Cross-Strait and International Conference on Quantum Manipulation, 11-12 Dec. 2010, Insitute of Physics, Chinese Academy of Sciences, Beijing, China (plenary).

5. Superconductor dielectric photonic crystal with nanostrips, National Physics Conference (PERFIK) 2010, Lumut, Perak, Malaysia (27-30 November 2010).

6. Role of Photonic Science and Technology on ICT in Malaysia, EU-Malaysia Trade & Investment Forum, Crowne Plaza Mutiara, Kuala Lumpur (15 April 2010).

7. Coherent Antistokes Raman Scattering (CARS) for new generation laser spectroscopy and microscopy: 3rd International Meeting on Frontiers of Physics (IMFP 2009), Awana Genting Highlands, Malaysia (12-16 January 2009).http://fizik.um.edu.my/IMFP/

8. Quantum noise and commutation relation: Member of the program Mathematical Horizons in Quantum Physics, Institute of Mathematical Sciences, National University of Singapore (28 July-21 Sep 2008) http://www.ims.nus.edu.sg/Programs/mhqp08/

9. How do pulsed lasers affect photon correlation and entanglement?: Frontiers of Quantum and Mesoscopic Thermodynamics, Prague, Czech Republic, (28 July - 2 August 2008). http://www.fzu.cz/activities/conferences/fqmt08/

10. Quantum correlation from quantum noise of atoms and photons in extended medium with quantum coherence: Summer School on Quantum Optics and Molecular Physics, Casper, Wyoming (July 15-21, 2007).

11. Physics of Excimer Laser Ablation on Cornea: 3rd Asian Symposium on Intense Laser Science (ASILS), Cameron Highlands, Malaysia (July 2- July 6, 2007). http://foe.mmu.edu.my/asils2007/
Citation for the Award (within 30 words)
For contributions to quantum optics, laser science and optical materials, particularly, seminal works on controllable nonclassical photon correlations using double-Raman scheme, backscattered coherent nonlinear spectroscopy, and superconducting photonic bandgap structures.
Description of the work

AP Dr Raymond Ooi is an outstanding physicist who has been working on various topics of quantum optics, laser interactions and nonlinear photonics, having published up to 55 ISI journal papers to date with a total of 380 citations and a h-index of 10. Most of his publications are in Tier 1 ISI journals, especially in Physical Reviews, including two Physical Review Letters.
Below are three of his most significant contributions:

1. *Raymond introduced the first superconducting photonic bandgap structure.*
The concept of photonic bandgap structure was first introduced in 1987 in analogy with electronic bandgap. The structure has been realized and has found wide applications in optics and photonics. However, dielectric materials were usually used. In 1999, Raymond et. al. (Ref. 1) introduced superconducting material into the structure which enables the use of magnetic field and temperature to control of the dispersion of light in the microwave, terahertz and far infrared regimes (Ref. 2). This paper has been cited nearly 50 times, pioneering many subsequent works incorporating superconductors with photonic crystals and other materials. This merges superconducting electronics with optics, opening up new possibilities in superconducting photonics. Since then, many works followed on using superconductors in photonic crystal and the recently popularized metamaterials and negative index materials. Recently, Raymond extended the idea to short pulse propagation in layers with linear and nonlinear materials (Ref. 30). The superconducting-dielectric photonic bandgap structure opens up potential integration into superconducting optoelectronics and photonics.

2. *Raymond co-discovered and developed the first controllable nonclassical correlation of photon pairs using a double Raman scheme and proposed it for use in quantum microscopy. A nonclassical properties of light such as photon antibunching was found in resonance fluorescence. So far such property could not be controlled. Raymond and Marlan Scully pioneered the study of photon correlation in double Raman scheme which provides a way to coherently control the quantum properties of light such as antibunching (Ref. 7). They used two lasers to form a sequence of spontaneous Raman and resonant Raman transitions. The correlated photon source provides a much smaller effective wavelength, corresponding to a resolution beyond the Rayleigh limit as the result of entangled nature of the photon pairs. They extended the scheme to bulk medium (such as amplifier) containing many atoms where spatial propagation is included (Ref. 15). Here, Raymond was the key person to develop the first semianalytical solutions for full quantum Langevin theory with noise operators and spatial propagation, The theory was developed in an elegant manner. This work leads to better understanding of how spatial propagation and control laser field on nonclassical photon correlations. This work can be regarded as a significant achievement to a challenging theoretical problem because the*

variables to be solved are quantum operators and not complex numbers. His subsequent paper in 2007 (Ref. 21) also shed light on the roles of the boundary condition operators and the quantum noise on quantum correlations of photons. Raymond showed that both elements have significant contributions that should not be neglected. Furthermore, Raymond has also successfully obtained exact solutions of transient photon correlation of an atom driven in double Raman scheme by arbitrary laser pulses using a combination of analytical and numerical technique (Ref. 42).

3. *Raymond proposed and analyzed the feasibility of backscattered nonlinear spectroscopic signal excited by laser pulses for remote and real-time detection of molecular species.*
Backward scattered signal from a submicron particle was thought to be too weak for nonlinear optical spectroscopic detection of chemicals. Raymond and coworkers found (Refs. 8), unexpectedly, that this is not so for microparticles due to enhanced backscattering of coherent Raman signal by focusing effect. The result stands in a more rigorous theory valid for typical molecules and arbitrary laser pulses (Ref. 26) published in Journal of Raman Spectroscopy. Here, Raymond presented a unified theory that combines the main features of molecules such as molecular potential and vibrational modes, and laser pulse shape, bandwidth and spectral content.
This work has led to widespread development of effective screening technology for surveillance and national security since it is a promising tool for remote sensing and rapid detection of hazardous chemicals and microparticles that incorporates ultrafast nonlinear optical spectroscopy into LIDAR technology.

Raymond has published solutions to several challenging problems including a laser cooling scheme for molecules. Nevertheless, this work has not acquired significant number of citations yet. In 2003, Raymond introduced the first laser cooling scheme for molecules. Laser cooling of atoms has been realized then, which led to the 1997 Nobel. However, the cooling technique for atoms cannot be applied to molecules due to the presence of many vibrational and rotational energy levels with more complicated molecular transitions.. Thus laser cooling of molecules was considered to be impossible or impractical by the quantum/ultracold gases community. In 2003 Raymond and his thesis advisors proposed the first laser cooling scheme for molecular gas using only a few lasers (Ref. 5). Recently, Raymond developed (Ref. 35) an improved version of the cooling scheme for molecular gases that requires a much shorter cooling time. He has performed detailed analysis on the practical aspects using the parameters of real molecules and found that the implementation of proposed cooling scheme is feasible.

Finally, his work with Marlan Scully on directed spontaneous emission published in PRL has acquired the highest number of citations, nearly 94 times. His review paper with a number of authors including Nobel laureate, Wolfgang Ketterle has been cited 36 times.

Key references (up to 3 key publications*)

1) M. O. Scully and C. H. Raymond Ooi, "Improving quantum microscopy and lithography via Raman photon pairs: II. Analysis", Journal of Optics B: Quantum Semiclassical Optics 6, S816 (2004).

2) C. H. Raymond Ooi, Au Yeung T. C., Kam C. H. and Lim T. K., "Photonic band gap in a superconductor-dielectric superlattice", Physical Review B 61, 5920 (2000).

3) C. H. Raymond Ooi, Guy Beadie, George W. Kattawar, John F. Reintjes, Y. Rostovtsev, M. Suhail Zubairy, and Marlan O. Scully, "Theory of Femtosecond Coherent anti-Stokes Raman Backscattering Enhanced by Quantum Coherence for Standoff Detection of a Bacterial Spore", Physical Review A 72, 023807 (2005).

**) Copy of the publications are attached.*

Nominator (name, affiliation, email, telephone and relation to the candidate)

Prof Dr. Kurunathan Ratnavelu
Deputy Vice-Chancellor (Development)
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50603 Kuala Lumpur
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Fax: 60-3-7967 7733

Signature _____ Date 27/3/13

President
Malaysian Institute of Physics

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)
Ying-Jer Kao **Contact Information** Department of Physics,National Taiwan University No. 1, Sec. 4, Roosevelt Rd. Taipei, Taiwan 106 Email: yjkao@phys.ntu.edu.tw Tel: +886-2-33665183 Nationality: Taiwan **Education** • 2001 M.S., Ph.D., Department of Physics, University of Chicago Thesis Advisor: Prof. Kathryn Levin Thesis: Probing the mechanism of high-temperature superconductivity: spin dynamics and pair-breaking effects • 1993 B.S., Department of Physics, National Taiwan University **Positions** • 08/2009 – present Associate Professor, Department of Physics, National Taiwan University • 02/2005 – 08/2009 Assistant Professor, Department of Physics, National Taiwan University. • 09/2003 – 01/2005 Postdoctoral Fellow, Department of Physics, University of Toronto, Canada. • 10/2001 – 08/2004 Postdoctoral Fellow, Department of Physics and Astronomy, University of Waterloo, Canada. **Honors** • 2008 Young Investigator Merit Award, National Science Council of Taiwan • 2009 Young Theorist Award, National Center of Theoretical Sciences, Taiwan • 2010 Research Award for Junior Research Investigators, Academia Sinica, Taiwan • 2011 Ta-You Wu Memorial Award, National Science Council of Taiwan
Citation for the Award (within 30 words)
For his contribution in the numerical studies of strongly correlated systems with disorders.

Description of the work
In Phys. Rev. Lett. 109, 157202 (2012), Prof. Kao and his collaborator study the interplay of superfluidity, glassy, and magnetic orders in the XXZ model with random Ising interactions on a three dimensional cubic lattice. In the classical limit, this model reduces to a +/-J Edwards-Anderson Ising model with concentration p of ferromagnetic bonds, which hosts a glassy-ferromagnetic transition at a critical concentration $p_{cl} \sim 0.77$. Their quantum Monte Carlo simulation results show that quantum fluctuations stabilize the coexistence of superfluidity and glassy order (super- glass), and shift the (super)glassy-ferromagnetic transition to $p > p_{cl}$. In contrast, antiferromagnetic order coexists with superfluidity to form a supersolid, and the transition to the glassy phase occurs at a higher p.
Key references (up to 3 key publications*)
1. Yu-Chun Chen, Roger G. Melko, Stefan Wessel, **Ying-Jer Kao**, Supersolidity from defect-condensation in the extended boson Hubbard model, Phys. Rev. B 77, 014524 (2008). 2. Cheng-Wei Liu, Shiu Liu, **Ying-Jer Kao**, A. L. Chernyshev, Anders W. Sandvik, Impurity-induced frustration in correlated oxides, Phys. Rev. Lett. 102, 167201 (2009). 3. Derek Larson and **Ying-Jer Kao**, Tuning the disorder in superglasses, Phys. Rev. Lett. 109, 157202 (2012). *) Copy of one most significant publication should be attached.
Nominator (name, affiliation, email, telephone and relation to the candidate)
Ching-Ray Chang Dean, College of Science and Professor, Department of Physics,National Taiwan University No. 1, Sec. 4, Roosevelt Rd. Taipei, Taiwan 106 Email: crchang@phys.ntu.edu.tw Tel: +886-2-3366-5176 Relation: colleague
Signature  Date March, 30, 2013

Nomination form for the 2013 Nishina Asia Award

Candidate (name, affiliation, curriculum vitae including the date of the degree of Ph.D., nationality, address, email and telephone)

Jian-Wei Pan
National Lab. for Physical Sciences at the Microscale
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Personal data

Born on March 11, 1970 in Dongyang, Zhejiang Province, China
Married to Xiao-Qing Lou, two children: Tanya Du-Ruo (2004), Leo Zhi-Yuan (2007)

Education

10/1996-11/1999	Institute for Experimental Physics, University of Vienna, Austria Ph.D. in Experimental Physics (11/1999)
09/1987-07/1995	Department of Modern Physics, USTC, Hefei, Anhui, PR China B.Sc. degree (07/1992); M.Sc. degree (07/1995)

Professional Experience

12/2010 - present	Chief Scientist for the Quantum Science Satellite
02/2009 - present	Honorary Professor, University of Heidelberg
11/2008 - present	Chair Professor on Quantum Optics and Quantum Information, USTC
05/2005 - 10/2008	Group Leader with Marie Curie Excellence Chair, University of Heidelberg
11/2004 - 04/2005	Group Leader (C3), University of Heidelberg
03/2004 - 10/2004	Group Leader (C2), University of Heidelberg
07/2003 - 02/2004	Visiting scientist and project leader, University of Heidelberg
10/2002 - 09/2007	Yangtze Professor of Quantum Physics, USTC
11/2001 - 06/2003	Co-PI and senior research associate, University of Vienna
03/2001 - 10/2002	Project leader and professor titular, USTC
11/1999 - 11/2001	Postdoctoral research associate, University of Vienna
07/1995 - 09/1996	Instructor, University of Science and Technology of China

Citation for the Award (within 30 words)

For his pioneering works on experiments of optical quantum communication, quantum computation, and multi-photon entanglement.

Description of the work

Jian-Wei Pan has done pioneering research in the frontier of quantum foundation and quantum information, including test of quantum nonlocality, practical quantum key distribution, quantum teleportation and optical quantum computing. He is the primary inventor of multi-photon entanglement with three-, four-, five-, six-, and most recently, eight-photon entanglement. Jian-Wei Pan is a Member of the Chinese Academy of Sciences (CAS) and a Fellow of the Academy of Sciences for the Developing World (TWAS). He has given invited talks at numerous international conferences, and has co-authored over 120 refereed publications in the field of quantum optics and quantum information, including 1 in Revs. Mod. Phys., 1 in Phys. Rep., 11 in Nature, 6 in Nature Physics, 6 in Nature Photonics, 1 in Nature Nanotechnology, 3 in Proceedings of the National Academy of Sciences (PNAS), and 49 in Phys. Rev. Lett. Of 104 out of his 128 refereed publications Jian-Wei Pan was the corresponding author. His above work has been cited more than 9400 times, while 17 of his publications have been cited more than 100 times.

Jian-Wei Pan received his Ph. D. in 1999 from the University of Vienna, Austria, where his dissertation was on Experimental Quantum Teleportation and Multi-photon Entanglement, and further stayed in the group as a senior scientist until 2003. Together with his colleagues, he created systematically a seminal series of experiments on quantum foundation: His quantum teleportation experiment in 1997 [Nature 390, 575 (1997)] has been cited 2303 times. His paper on entanglement swapping [Phys. Rev. Lett. 80, 3891 (1998)] has been cited 542 times. He developed the first three-photon [Phys. Rev. Lett. 82, 1345 (1999), 607 cites] and four-photon [Phys. Rev. Lett. 86, 4435 (2001), 385 cites] entanglement, and further tested the violation of local realism with multi-photon entanglement [Nature 403, 515 (2000), 463 cites]. He theoretically proposed [Nature 410, 1067 (2001), 260 cites] and experimentally demonstrated [Nature 423, 417 (2003) (Cover Story), 201 cites] entanglement purification with linear optics for quantum communication.

Later Jian-Wei Pan joined the University of Heidelberg, Germany, building up his own group with three research awards: Emmy Noether Research Award from the German Research Foundation, Sofja Kovalevskaja Award from the Alexander von Humboldt Foundation, and Marie Curie Excellence Research Award from the European Commission. There, he has built up the new apparatus, which enabled a full series of studies on quantum memory both experimentally and theoretically. In particular, he realized memory-built-in quantum teleportation with photonic and atomic qubits [Nature Physics 4, 103 (2007), 80 cites], in which information from a flying qubit is teleported to a stationary qubit, stored and further read out; a millisecond quantum memory for scalable quantum networks [Nature Physics 5, 95 (2009), 82 cites]; and most recently the quantum memory with the best over-all quality so far – high retrieve efficiency and long storage time [Nature Physics 8, 517 (2012)]. In addition to experiments he also worked on the conceptual formulation of a novel quantum repeater schema [Phys. Rev. Lett. 98, 240502 (2007), 81 cites], which relaxes the severe phase stability problem in the original DLCZ scheme. This theoretical work was the basis of the first demonstration of quantum repeater with functions of storage and read-out [Nature 454 1098 (2008), 114 cites], which was the first step towards realization of this

novel protocol.

In the meantime, Jian-Wei Pan was appointed in 2002 as a Yangtze Chair Professor of Physics by the Chinese Ministry of Education. At that position he has brought the research on multi-particle entanglement and quantum communication in China to the world level. Within a very short time, he was able to manipulate world first five-photon entanglement, based on which a so-called open-destination teleportation [Nature 430, 54 (2004), 332 cites] has been demonstrated, where the teleported state is encoded to multiple particles at different location and can be eventually read out from any one of them. Further he has experimentally generated the first six-photon [Nature Physics 3, 91 (2007), 314 cites], and eight-photon [Nature Photonics 6, 225 (2012)] entanglement sources. Based on these multi-photon entanglements, he has been able to teleport a two-qubit composite system [Nature Physics 2, 678 (2006) (Cover Story), 83 cites] and to demonstrate the topological quantum error correction [Nature 482, 489 (2012)].

Towards the goal of global quantum network, Jian-Wei Pan has systematically performed practical quantum communication experiments in free-space or fiber channel, e.g. entanglement distribution over 13 km free space channel [Phys. Rev. Lett. 94, 150501 (2005), 98 cites], which for the first time proved that entanglement can still survive after penetrating the effective thickness of the aerosphere and quantum teleportation over 16 km [Nature Photonics 4, 376 (2010) (Cover Story)]. He realized the decoy state quantum key distribution with unconditional security over 100 km [Phys. Rev. Lett. 98, 010505 (2007), 102 cites] and later over 200 km, and further constructed an all-pass-type metropolitan quantum communication network in China. As field tests of the feasibility of satellite-based quantum communications, he succeeded in teleporting individual quantum state and distributing entangled photon pairs in free space over 100 km scale [Nature 488, 185 (2012)]. He has further performed direct and full-scale experimental verifications towards ground-satellite quantum key distribution [Nature Photonics, in press (2013)].

For his pioneering works on quantum information and quantum optics, Jian-Wei Pan has received numerous prizes from various academic institutions, such as the Erich Schmid Prize from the Austrian Academy of Sciences (2003), the Fresnel Prize from the European Physical Society (2005), the Outstanding Scientist Prize from the Qiushi Science and Technologies Foundation (2005), the Outstanding Science and Technology Achievement Prize from the CAS (2005), Top-Ten Chinese Young Scientist Prize from the CAS (2006), “Beller’s Lectureship” from the APS (2007), the 2012 International Quantum Communication Award from the International Organization for Quantum Communication, Measurement and Computing.

Jian-Wei Pan’s work was revolutionary and systematic. To summarize the impact of his major achievements, let me briefly mention the following facts: His work on quantum teleportation was recognized by the Nature magazine as one of the 21 classics in physics published in Nature in 20th Century, and was recognized by the Science magazine as a “breakthrough of the year” in 1998; his work on quantum teleportation and entanglement distribution over 100-km free-space channel was recognized by the Nature journal as one of the “Features of the Year” in 2012; his work in the

field of quantum foundation and quantum information was four times recognized by the Physics News Update as "The top physics stories of the year", five times recognized by the Physics Web as "Highlights of the year", and seven times selected as "the Top Ten Annual Scientific and Technological Progresses in China" by the academicians of the CAS and the Chinese Academy of Engineering (CAE).

In 2008, he was enrolled in the Recruitment Program of Global Experts in China and full time returned back to China, establishing a world-leading research team on tests of quantum foundation; practical quantum key distribution; memory-assisted scalable optical quantum communication, computation and high precision measurement; solid-state quantum computation; quantum simulation with ultra-cold atoms; quantum experiments at space scale. In 2010, he was appointed as the Chief Scientist for the Quantum Science Satellite belonging to CAS Strategic Priority Research Program in Space Science. His team aims at the creation of satellite-ground quantum channel, based on which the distance of quantum communication and tests of quantum foundation is expected to be extended to global scale. For the time being, the satellite has been fully designed and the manufacturing is ongoing.

Key references (up to 3 key publications*)

1. Z. Zhao, Y.-A. Chen, A.-N. Zhang, T. Yang, H. Briegel, and **J. -W. Pan**, *Experimental demonstration of five-photon entanglement and open-destination quantum teleportation,* **Nature** 430, 54 (2004).

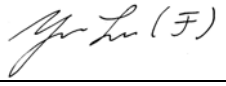
2. J. Yin, J. -G. Ren, H. Lu, Y. Cao, H. -L. Yong, Y. -P. Wu, C. Liu, S. -K. Liao, F. Zhou, Y. Jiang, X. -D. Cai, P. Xu, G. -S. Pan, J. -J. Jia, Y. -M. Huang, H. Yin, J. -Y. Wang, Y. -A. Chen, C. -Z. Peng & **J. -W. Pan**, *Quantum teleportation and entanglement distribution over 100-kilometre free-space channels*, **Nature** 488, 185 (2012).

3. **J.-W. Pan**, Z.-B. Chen, C.-Y. Lu, H. Weinfurter, A. Zeilinger and M. Zukowski, *Multi-photon Entanglement and Interferometry*. **Reviews of Modern Physics**, 84, 711 (2012).

*) Copy of one most significant publication should be attached.

Nominator (name, affiliation, email, telephone and relation to the candidate)

Lu Yu, Institute of Physics, Chinese Academy of Sciences, lyu@iphy.ac.cn, Phone:86-10-8264-9325, Fax:86-10-8264-0073, not related.

Signature  Date 29 March, 2013