Le Bin Ho, Ph.D.

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EDUCATION

Osaka University   Osaka, Japan
Doctor of Philosophy (Ph.D.) *in Quantum Physics*   *Apr. 2015 – Mar. 2018*

University of Science   HCMC, Vietnam
Master of Science (M.Sc.) *in Theoretical and Mathematical Physics*   *Oct. 2012 – Jun. 2014*

University of Education   HCMC, Vietnam
Bachelor (B.Ed.) *of Education Physics*   *Oct. 2007 – Jun. 2011*

EXPERIENCE

Researcher   Jan. 2012 – Present
Ho Chi Minh City Institute of Physics, VAST (on leave)   *Hochiminh, Vietnam*
- Investigated electronic structures of two-dimensional materials.
- Investigated the topological phase and quantum transport properties of two-dimensional materials.

Postdoctoral Researcher   Apr. 2020 – Mar. 2022
Research Institute of Electrical Communication, Tohoku University   *Sendai, Japan*
- Investigated uncertainty principle of quantum measurements.
- Investigated the uncertainty in sequential measurements under prediction and retrodiction.
- Quantum-enhanced quantum metrology and quantum state tomography using Neural Network.
- Developed toolbox for quantum measurement and others.

Postdoctoral Researcher   Apr. 2018 – Mar. 2020
Kindai University   *Osaka, Japan*
- Developed and applied the direct state measurements to reconstruct unknown quantum states and evaluate the statistical errors and systematic errors.
- Applied the Neural Networks with TensorFlow programming package to supervise the experimental data to reconstruct the quantum state.
- Investigated various types of quantum metrology to enhance the sensitivity of the estimation process.
- Studied the quantum-enhanced metrology using post-selection measurements for both single and multiple parameters estimations.
- Studied magnetic sensors in noisy environments using NMR systems.
- Verified fundamental quantum physics with superconducting circuits.

Student Research Assistant   Oct. 2014 – Mar. 2015
Osaka University   *Osaka, Japan*
- Researcher quantum information and quantum computation: quantum gates and quantum circuits such as NOT gate, Controlled-NOT gate,....
- Currently, supervise students to perform these quantum circuits in the IBM-Q with the python programming package Qiskit.

PROJECTS

Grants-in-Aid for Scientific Research (KAKENHI):
Nonlocal quantum metrology based on entanglement and weak measurement   Apr. 2020 – Mar. 2022
- Developed nonlocal measurements for quantum metrology.
- Investigated quantum errors end disturbance in sequential measurements.

Grants-in-Aid for Scientific Research (KAKENHI):
Characterization of systematic errors in direct quantum state measurements   Apr. 2019 – Mar. 2020
- Investigated the systematic operational errors in the direct state measurements (DSM) with a quantum controlled interaction framework.
- Characterized the errors caused by various methods when measuring quantum states directly.
- Applied machine learning technique with a standard supervised learning procedure for quantum state tomography.

National Foundation for Science and Technology Development (NAFOSTED):   Apr. 2019 – Mar. 2020
- Investigate the topological phase and quantum transport properties of two-dimensional silicene using first-principle and tight-binding methods.

Skills

Programing Languages: Python (expert), Fortran (expert)
Language: Vietnamese (native), English (fluent), Japanese (beginer)
Teaching skill:
Supervising: supervised some Master students in Japan and Vietnam

Scholarship and Awards

2020-2022: JSPS Postdoctoral Fellowship for Foreign researchers.
2015-2018: MEXT Scholarship for Ph.D. candidate.
2014-2015: MEXT Scholarship for research student.

Publishcations

Book:

1. <u>Le Bin Ho</u> (editor), *Hilbert spaces: Properties and Applications*, Nova Science Publisher (2020).

Journal articles:

1. Chuong Nguyen Quoc, <u>Le Bin Ho</u> , Lan Nguyen Tran, Hung Q. Nguyen, *Qsun: an open-source platform towards practical quantum machine learning applications*, arXiv:2107.10541 (2021).

2. Kieu Quang Tuan, Hung Q Nguyen, and <u>Le Bin Ho</u> , *Direct state measurements under state-preparation-and-measurement errors*, Quantum Information Processing **20**, 197 (2021).

3. <u>Le Bin Ho</u>, Kieu Quang Tuan, and Hung Q Nguyen, *tqix: A toolbox for Quantum in X: Quantum measurement, quantum tomography, quantum metrology, and others*, Computer Physics Communications **263**, 107902 (2021).

4. <u>Le Bin Ho</u> and Yasushi Kondo, *Multiparameter quantum metrology with postselection measurements*, Journal of Mathematical Physics **62**, 012102 (2021).

5. <u>Le Bin Ho</u>, Hideaki Hakoshima, Yuichiro Matsuzaki, Masayuki Matsuzaki, and Yasushi Kondo, *Multiparameter quantum estimation under dephasing noise*, Physical Review A **102**, 022602 (2020).

6. <u>Le Bin Ho</u>, Yuichiro Matsuzaki, Masayuki Matsuzaki, and Yasushi Kondo, *Nuclear Magnetic Resonance model of an entangled sensor under noise*, Journal of the Physical Society of Japan **89**, 054001 (2020).

7. <u>Le Bin Ho</u>, *Systematic errors in direct state measurements with quantum controlled measurements*, Journal of Physics B: Atomic, Molecular and Optical Physics **53**, 115501 (2020).

8. <u>Le Bin Ho</u>, Yuichiro Matsuzaki, Masayuki Matsuzaki, and Yasushi Kondo, *Realization of controllable open system with NMR*, New Journal of Physics **21**, 093008 (2019).

9. <u>Le Bin Ho</u> and Tran Nguyen Lan, *Tunable cloaking of mexican-hat confined states in bilayer silicene*, Communications in Physics **29**, 215-224 (2019).

10. <u>Le Bin Ho</u>, *Continuous-monitoring measured signals bounded by past and future conditions in enlarged quantum systems*, Quantum Information Processing **18**, 206 (2019).

11. <u>Le Bin Ho</u>, *Improving direct state measurements by using rebits in real enlarged Hilbert spaces*, Physics Letter A **383**, 289 (2019).

12. <u>Le Bin Ho</u> and Yashushi Kondo, *Modular-value-based metrology with spin coherent pointers*, Physics Letter A **383**, 153 (2019).

13. <u>Le Bin Ho</u> and Nobuyuki Imoto, *Various pointer states approaches to polar modular values*, Journal of Mathematical Physics **59**, 042107 (2018).

14. <u>Le Bin Ho</u> and Nobuyuki Imoto, *Quantum weak and modular values in enlarged Hilbert spaces*, Physical Review A **97**, 012112 (2018).

15. <u>Le Bin Ho</u> and Nobuyuki Imoto, *Generalized modular-value-based scheme and its generalized modular value*, Physical Review A **95**, 032135 (2017).

16. <u>Le Bin Ho</u> and Nobuyuki Imoto, *Full characterization of modular values for finite-dimensional systems*, Physics Letter A **380**, 2129-2135 (2016).

17. <u>Le Bin Ho</u> and Tran Nguyen Lan, *Photoenhanced spin/valley polarization and tunneling magnetoresistance in a ferromagnetic-normal-ferromagnetic silicene junction*, Journal of Physics D: Applied Physics **49**, 375106 (2016).

18. Tran Nguyen Lan, <u>Le Bin Ho</u>, and Tran Hoang Hai, *Electronic, magnetic, and spin-polarized transport properties of hybrid graphene/boron-nitride nanoribbons having 5-8-5 line defects at the heterojunction*, Physica Status Solidi B **252**, 573 (2015).

19. <u>Le Bin Ho</u>, Tran Nguyen Lan, and Tran Hoang Hai, *Monte Carlo simulations of core/shell nanoparticles containing interfacial defects: Role of disordered ferromagnetic spins*, Physica B **430**, 10 (2013).

Oral Presentations

1. <u>Le Bin Ho</u> and Keiichi Edamatsu, *Error-disturbance relation through the backaction of postselection measurements*, 76th JPS meeting, Online, Japan (2020).

2. <u>Le Bin Ho</u> and Yasushi Kondo, *Multiparameter quantum metrology with post-selection measurements*, 2020 International Workshop on Quantum Information, Quantum Computing and Quantum Control, Shanghai University, Shanghai, China (2020).

3. <u>Le Bin Ho</u> and Yasushi Kondo, *Tradeoffs in multiple-parameter estimations in postselection measurements*, 74th JPS meeting, Kyushu University, Fukuoka, Japan (2019).

4. <u>Le Bin Ho</u> and Nobuyuki Imoto, *Modular-value approach to nonlocal measurements*, Physics and information communication of quantum measurement Meeting, Tohoku University, Sendai, Japan (Mar. 2018).

5. <u>Le Bin Ho</u> and Nobuyuki Imoto, *Introduction to quantum modular values and implementation in NMR systems*, Kindai Meeting, Kindai University, Osaka, Japan (Feb. 2018).

6. <u>Le Bin Ho</u> and Nobuyuki Imoto, *Continuous pointer state approach to modular-value amplification*, 3rd International Conference on Quantum Foundations, National Institute of Technology, Patna, India (Dec. 2017).

7. <u>Le Bin Ho</u> and Nobuyuki Imoto, *Quantum weak values and modular values with an embedding quantum simulator*, 10th Vietnam-Japan Scientific Exchange Meeting, Shibaura Institute of Technology, Tokyo, Japan (Sep. 2017).

8. <u>Le Bin Ho</u> and Nobuyuki Imoto, *Modular value and its generalized form*, 36th Technical Committee on Quantum Information Technology, Kyoto University, Kyoto, Japan (May. 2017).

9. <u>Le Bin Ho</u> and Nobuyuki Imoto, *An understanding and usage of modular values*, 72nd JPS meeting, Osaka University, Osaka, Japan (Mar. 2017).

10. Vu Thi Ngoc Huyen, <u>Le Bin Ho</u>, Vu Cong Lap, and Nguyen Van Lien, *Channel-Facilitated Diffusion of a Charged Molecule across Cell Membranes*, The 2nd International Conference on Computational Science and Engineering, Ho Chi Minh City, Vietnam, (Aug. 2014).

11. Tran Nguyen Lan, <u>Le Bin Ho</u>, and Tran Hoang Hai, *Half-metallicity in hybrid Boron-Nitride/Graphene nanoribbon with 5-8-5 topological line defect*, the 39th National Conference on Theoretical Physics, Buon Ma Thuoc, Vietnam, (July 2014).

Poster Presentations

1. <u>Le Bin Ho</u> and Yasushi Kondo, *Quantum metrology of multiparameter using post-selection measurements*, 19th Asian Quantum Information Science Conference, Seoul, Korea (Aug. 2019).

2. <u>Le Bin Ho</u> and Yasushi Kondo, *Tradeoffs in postselection measurements*, 20th Anniversary of Superconducting Qubits, Tsukuba, Japan (May. 2019).

3. <u>Le Bin Ho</u> and Yasushi Kondo, *Quantum-enhanced metrology based on modular-value measurements with spin coherent pointers*, 18th Asian Quantum Information Science Conference, Nagoya, Japan (Sep. 2018).

4. <u>Le Bin Ho</u> and Yasushi Kondo, *Enhancement of Sensitivity in Measurements with Modular Values*, University of Tokyo, Kashiwa Campus, Japan (Aug. 2018).

5. <u>Le Bin Ho</u> and Nobuyuki Imoto, *Introduction to quantum weak values and modular values*, Okinawa School in Physics: Coherent Quantum Dynamics, Okinawa, Japan (Oct. 2017).

6. <u>Le Bin Ho</u> and Nobuyuki Imoto, *A general relation between modular values and weak values*, International conference for young quantum information scientists, Barcelona, Spain (Oct. 2016).

7. <u>Le Bin Ho</u>, Tran Nguyen Lan, and Tran Hoang Hai, *Monte Carlo simulations of ferromagnetic/antiferromagnetic core/shell nanoparticles: influences of vacancies and disordered spin*, the 1st International Workshop on Theoretical and Computational Physics, Da Nang, Vietnam, (Aug. 2013).