Curriculum Vitae

PERSONAL INFORMATION

Name	Franklin Hyunil Cho
Address	Center for Quantum Nanoscience, Institute for Basic Science Ewha Womans University 52 Ewhayeodae-gil, Seodaemun-gu, Seoul, South Korea 03760

EDUCATION

Aug. 2009 – Aug. 2015	Doctor of Philosophy in Physics Dissertation: *Development of High-Frequency Electron Paramagnetic Resonance (EPR) Spectrometer and Investigation of Paramagnetic Defects and Impurities in Diamonds by Multi-Frequency EPR Spectroscopy* University of Southern California Los Angeles, CA, U.S.A.
Sept. 2005 – Sept. 2009	Bachelor of Science in Physics University of California, Santa Barbara Santa Barbara, CA, U.S.A.

RESEARCH EXPERIENCE

May 2019 – Current	*Postdoctoral Researcher* Center for Quantum Nanoscience, Institute for Basic Science Ewha Womans University, Seoul, South Korea Advisor: Prof. Fabio Donati and Prof. Andreas J. Heinrich
Oct. 2015 – Mar. 2019	*Postdoctoral Fellow* Institute for Quantum Computing & Department of Physics and Astronomy University of Waterloo, Waterloo, ON, Canada Advisor: Prof. Jonathan Baugh and Prof. Raymond Laflamme
Aug. 2011 – Aug. 2015	*Research Assistant* Department of Physics and Astronomy University of Southern California, Los Angeles, CA, U.S.A. Advisor: Prof. Susumu Takahashi
May 2011 – Aug. 2011	*Research Assistant* Department of Biomedical Engineering Ulsan National Institute of Science and Technology, Ulsan, South Korea

Advisor: Prof. HyungJoon Cho

May 2010 – May 2011 *Research Assistant*
Superconducting Material and Devices Group
Jet Propulsion Laboratory, Pasadena, CA, U.S.A.
Advisor: Dr. Pierre M. Echternach

HONORS AND AWARDS

2013 College Merit Fellowship
University of Southern California

2012 College Merit Fellowship
University of Southern California

2007 UCSB Foundation – Various Donor Scholarship
University of California, Santa Barbara

2006 J & I Campbell Scholarship
University of California, Santa Barbara

PUBLICATIONS

1. *A continuous-wave and pulsed X-band electron spin resonance spectrometer operating in ultra-high vacuum for the study of low dimensional spin ensembles*
   F. H. Cho, J. Park, S. Oh, J. Yu, Y. Jeong, L. Colazzo, L. Spree, C. Hommel, A. Ardavan, G. Boero, and F. Donati
   Accepted to Review of Scientific Instruments (2024)

2. *Investigation of near-surface defects of nanodiamonds by high-frequency EPR and DFT calculation*
   Z. Peng, T. Biktagirov, F. H. Cho, U. Gerstmann, and S. Takahashi
   The Journal of Chemical Physics **150**, 134702 (2019)

3. *Gradient-based closed-loop quantum optimal control in a solid-state two-qubit system*
   G. Feng, F. H. Cho, H. Katiyar, J. Li, D. Lu, J. Baugh, and R. Laflamme
   Physical Review A **98**, 052341 (2018)

4. *Estimating the Coherence of Noise in Quantum Control of a Solid-State Qubit*
   G. Feng, J. J. Wallman, B. Buonacorsi, F. H. Cho, D. K. Park, T. Xin, D. Lu, J. Baugh, and R. Laflamme
   Physical Review Letters **117**, 260501 (2016)

5. *Electron spin resonance spectroscopy of small ensemble paramagnetic spins using a single nitrogen-vacancy center in diamond*
   C. Abeywardana, V. Stepanov, F. H. Cho, and S. Takahashi

Journal of Applied Physics **120**, 123907 (2016)

6. *Direct Evidence of Solution-Mediated Superoxide Transport and Organic Radical Formation in Sodium-Oxygen Batteries*
   C. Xia, F. Russel, F. H. Cho, N. Sudhakar, B. Buonacorsi, S. Walker, M. Xu, J. Baugh, and L. Nazar
   Journal of the American Chemical Society **138**, 11219 (2016)

7. *230/115 GHz electron paramagnetic resonance/double electron-electron resonance spectroscopy*
   F. H. Cho, V. Stepanov,C. Abeywardana, and S. Takahashi
   Methods in Enzymology **563**, 95 (2015)

8. *High-frequency and high-field optically detected magnetic resonance of nitrogen-vacancy centers in diamond*
   V. Stepanov, F. H. Cho, C. Abeywardana, and S. Takahashi
   Applied Physics Letters **106**, 063111 (2015)

9. *Magnetic resonance spectroscopy using a single nitrogen-vacancy center in diamond*
   C. Abeywardana, V. Stepanov, F. H. Cho, and S. Takahashi
   Proceedings of Society of Photo-Optical Instrumentation Engineers **9269**, 92690K (2014)

10. *A high-frequency electron paramagnetic resonance spectrometer for multi-dimensional, multi-frequency, and multi-phase pulsed measurements*
    F. H. Cho, V. Stepanov, and S. Takahashi
    Review of Scientific Instruments **85**, 075110 (2014)

11. *Ultrafast 3D spin-echo acquisition improves Gadolinium-enhanced MRI signal contrast enhancement*
    S. H. Han, F. H. Cho, Y. K. Song, J. Paulsen, Y. Q. Song, Y. R. Kim, J. K. Kim, G. Cho, and H. Cho
    Scientific Reports **4** (2014)

12. *Grafting nitroxide radicals on nanodiamond surface using click chemistry*
    E. E. Romanova, R. Akiel, F. H. Cho, and S. Takahashi
    Journal of Physical Chemistry A **117**, 11933 (2013)

13. *Magnetic field anisotropy based MR tractography*
    S. H. Han, Y. K. Song, F. H. Cho, S. Ryu, G. Cho, Y. Q. Song, and H. Cho
    Journal of Magnetic Resonance **212**, 386 (2011)

TEACHING EXPERIENCE

Summer 2014	*Laboratory Teaching Assistant* PHYS 135A Physics for Life Sciences
Summer 2013	*Laboratory Teaching Assistant* PHYS 151 Fundamentals of Physics I: Mechanics and Thermodynamics
Spring 2012	*Teaching Assistant*

	PHYS 152 Fundamentals of Physics II: Electricity and Magnetism
	Laboratory Teaching Assistant PHYS 153 Fundamentals of Physics III: Optics and Modern Physics
Fall 2011	*Laboratory Teaching Assistant* PHYS 135A Physics for the Life Sciences
	Teaching Assistant PHYS 438B Introduction to Quantum Mechanics and its Applications
Spring 2010	*Laboratory Teaching Assistant* PHYS 151 Fundamentals of Physics I: Mechanics and Thermodynamics
Fall 2009	*Laboratory Teaching Assistant* PHYS 151 Fundamentals of Physics I: Mechanics and Thermodynamics

ORAL PRESENTATIONS

1. F. H. Cho, S. Oh, J. Park, J. Yu, L. Colazzo, L. Spree, C. Hommel, Y. Jeong, J. J. Liu, A. Ardavan, G. Boero, A. J. Heinrich, and F. Donati
   Development of an ensemble electron spin/paramagnetic resonance spectrometer in ultra-high vacuum for surface spins
   2023 Korean Magnetics Society Summer Conference
   Jeju, South Korea (May 24 – 26, 2023)

2. F. H. Cho
   Double resonance techniques in electron spin resonance spectroscopy
   The 11th International Conference on Advanced Materials and Devices
   Jeju, South Korea (Dec. 10 – 13, 2019)

3. F. H. Cho, V. Stepanov, S. Takahashi, Y.-J. Jeong, L. Colazzo, A. J. Heinrich, and F. Donati
   High-frequency (HF) electron spin resonance (ESR) spectroscopy
   73th Shinchon Solid Physics Workshop, Yonsei University
   Seoul, South Korea (Nov. 15, 2019)

4. F. H. Cho, G. Feng, J. Baugh, and R. Laflamme
   Toward realizing algorithmic cooling in electron-nuclear system
   Technion – Israel Institute of Technology
   Haifa, Israel (Dec. 26 – 30, 2017)

5. F. H. Cho, V. Stepanov, C. Abeywardana, R. Akiel, and S. Takahashi
   High-frequency EPR and DEER spectroscopy to study impurities in nanodiamonds
   Max Planck Institute for Biophysical Chemistry
   Göttingen, Lower Saxony, Germany (Feb. 12, 2014)

6. F. H. Cho, V. Stepanov, C. Abeywardana, R. Akiel, and S. Takahashi
   High-frequency EPR and DEER spectroscopy to study impurities in nanodiamonds
   56th Rocky Mountain Conference on Magnetic Resonance
   Denver, CO, U.S.A. (July 13 – 17, 2014)

7. F. H. Cho and S. Takahashi
   Impurities and spin relaxations in nanodiamonds studied by multi-frequency electron spin resonance
   American Physical Society March Meeting 2014
   Denver, CO, U.S.A. (Mar. 3 – 9, 2014)

TECHNICAL SKILLS

Extensive experience in programming and data acquisition using LabVIEW and MATLAB
Proficiency in data analysis using MATLAB, Mathematica, and Origin
Skillful in AutoCAD and hands-on experience with various machine shop tools
Working knowledge of cryogenics, ultra-high vacuum technology, and surface characterization tools (scanning tunneling microscopy, atomic force microscopy, low-energy electron diffraction, Auger spectroscopy)

REFERENCES

1. Dr. Fabio Donati (donati.fabio@qns.science)
   Associate Professor
   Center for Quantum Nanoscience, Institute for Basic Science & Department of Physics
   Ewha Womans University, Seoul, South Korea

2. Dr. Andreas J. Heinrich (heinrich.andreas@qns.science)
   Director & Distinguished Professor
   Center for Quantum Nanoscience, Institute for Basic Science & Department of Physics
   Ewha Womans University, Seoul, South Korea

3. Dr. Susumu Takahashi (susumuta@usc.edu)
   Associate Professor
   Department of Chemistry & Department of Physics and Astronomy
   University of Southern California, Los Angeles, CA, U.S.A.

4. Dr. Jonathan Baugh (baugh@uwaterloo.ca)
   Professor
   Institute for Quantum Computing & Department of Chemistry
   University of Waterloo, Waterloo, ON, Canada