

DONGCHEL SHIN

PhD Candidate, Quantum & Precision Measurements Group
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EDUCATION

- 2022.09 - Present Ph.D., Massachusetts Institute of Technology, USA
Advisor: Professor Vivishek Sudhir
- 2016.09 - 2018.08 Master of Information Sci. & Tech., The University of Tokyo, Japan
Advisor: Professor Shoji Takeuchi
- 2013.04 - 2016.09 Bachelor of Engineering, Tokyo Institute of Technology, Japan
Summa Cum Laude in 3.5 years

EXPERIENCES

- 2025.05 - 2025.09 Graduate Intern, NTT Research Inc., USA
Advisor: Dr. Myoung-Gyun Suh and Dr. Edwin Ng
Project: Theory and experiment for quantum-enhanced frequency comb metrology
- 2022.09 - Present Graduate Research Assistant, Massachusetts Institute of Technology, USA
Advisor: Prof. Vivishek Sudhir
Project: Quantum measurement and control of macroscopic torsional oscillators
- 2018.11 - 2022.08 Research Associate (military duty), KAIST, South Korea
Advisor: Prof. Seung-Woo Kim and Prof. Young-Jin Kim
Project: Optical frequency comb-enabled precision measurements

PUBLICATIONS

- D.-C. Shin**^{*}, E. Ng, M.-G. Suh, V. Sudhir, “Continuum-field quantum optics of frequency comb metrology,” [arXiv](#) (2026).
- G. Kang, J. Kim, M.-R. Kim, Y. Lee, **D.-C. Shin**, J. Jeon, H. Kim, D. H. Kim, J. Lee, S. Park, Y.-J. Kim^{*}, “Nanometre-precision terahertz interferometry for battery electrode metrology,” [Nature Communications](#) (2026).
- D.-C. Shin**[†], J. Yang[†], D. I. Lee, G. Kang, S.-W. Kim^{*}, Y.-J. Kim^{*}, “Compact, robust all-fiber platform for 1-Hz-linewidth synchronization of optical frequency combs using single comb line extraction,” [Optics & Laser Technology](#) **203**, 115526 (2026).
- D.-C. Shin**^{*}, T. M. Hayward, D. Fife, R. Menon, V. Sudhir^{*}, “Active laser cooling of a centimeter-scale torsional oscillator,” [Optica](#) **12**, 4, 473 (2025).
 - Featured in [MIT News](#): “A cool new way to study gravity.”
- D. Fife^{*}, **D.-C. Shin**, V. Sudhir^{*}, “Temperature stabilization of a lab space at 10 mK-level over a day,” [Review of Scientific Instruments](#) **95**, 095116 (2024).

6. D. A. Nguyen[†], D. H. Kim[†], G. H. Lee, S. Kim, **D.-C. Shin**, J. Park, H.-J. Choi, S.-W. Kim, S. Kim*, Y.-J. Kim*, “Real-time monitoring of fast gas dynamics with single-molecule resolution by frequency-comb-referenced plasmonic phase spectroscopy,” *PhotonIX* **5**, 22 (2024).
7. **D.-C. Shin**, B. S. Kim, H. Jang, Y.-J. Kim*, S.-W. Kim*, “Photonic comb-rooted synthesis of ultra-stable terahertz frequencies,” *Nature Communications* **14**, 1, 790 (2023).
8. J. Yang, D.-I. Lee, **D.-C. Shin**, J. Lee, B. S. Kim, H. J. Kang, Y.-J. Kim*, S.-W. Kim*, “Frequency comb-to-comb stabilization over a 1.3-km free-space atmospheric optical link,” *Light: Science & Applications* **11**, 253 (2022).
9. **D.-C. Shin**, Y. Morimoto, J. Sawayama, S. Miura, S. Takeuchi*, “Centrifuge-based step emulsification device for simple and fast generation of monodisperse picoliter droplets,” *Sensors & Actuators: B. Chemical* **301**, 127164 (2019).

SELECTED CONFERENCE PRESENTATIONS

1. **D.-C. Shin**, T. M. Hayward, D. Fife, R. Menon, V. Sudhir, Quantum-limited readout and feedback cooling of a centimeter-scale torsional oscillator, *Conference on Lasers and Electro-Optics (CLEO 2026)*, Charlotte, NC, USA (2026)
2. **D.-C. Shin**, T. M. Hayward, D. Fife, R. Menon, V. Sudhir, Active radiation-pressure cooling of a cm-scale torsion pendulum, *APS Global Physics Summit*, Anaheim, CA, USA (2025)
3. **D.-C. Shin**, B. S. Kim, H. Jang, Y.-J. Kim, S.-W. Kim, Terahertz frequency synthesizer referenced to an ultra-stable optical cavity, *Conference on Lasers and Electro-Optics (CLEO 2022)*, San Jose, CA, USA (2022)
4. **D.-C. Shin**, Y. Morimoto, S. Takeuchi, Generation of Monodisperse Droplets from Tens of μL Sample Volume using Centrifuge-Based Microfluidic Device, *The 32nd IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2019)*, Seoul, South Korea (2019)
5. **D.-C. Shin**, S. Yoshida, Y. Morimoto S. Takeuchi, Centrifuge-based membrane emulsification toward high-throughput generation of monodisperse liposomes, *The 19th International Conference on Solid-State Sensors, Actuators and Microsystems (Transducers 2017)*, Kaohsiung, Taiwan (2017)

HONORS AND AWARDS

2024.09 - 2026.05	MathWorks Fellowship, USA
2016.09 - 2018.09	Kwanjeong Educational Foundation Scholarship, South Korea
2013.04 - 2016.08	Korea-Japan Joint Government Scholarship
2017.03	Hatakeyama Award, The Japan Society of Mechanical Engineers (JSME), Japan