

DONGCHEL SHIN

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RESEARCH INTERESTS

I pursue **quantum and precision measurement research** at the intersection of fundamental physics and quantum-enabled technologies. My work combines experimental quantum optics, quantum optomechanics, and nonlinear optics, while my theoretical efforts focus on stochastics, signal processing, and estimation.

EDUCATION

- 2022.09 - Present **PhD**, Massachusetts Institute of Technology, USA
Advisor: Professor Vivishek Sudhir
- 2016.09 - 2018.08 **Master of Engineering**, 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
Mentor: Dr. Myoung-Gyun Suh and Dr. Edwin Ng
Project: Quantum-enhanced frequency comb metrology
- 2022.09 - Present **Graduate Research Assistant**, Massachusetts Institute of Technology, USA
Mentor: Prof. Vivishek Sudhir
Project: Quantum measurement and control of macroscopic torsional oscillators
- 2018.11 - 2022.08 **Research Associate**(military duty), Korea Advanced Institute of Science & Technology, South Korea
Mentor: Prof. Seung-Woo Kim and Prof. Young-Jin Kim
Project: Optical frequency comb-enabled precision measurements

PUBLICATIONS

- Active laser cooling of a centimeter-scale torsional oscillator
D.-C. Shin^{*}, T. M. Hayward, D. Fife, R. Menon, V. Sudhir^{*}, *Optica* **12**, 4, 473 (2025)
 - [MIT News](#): "A cool new way to study gravity"
- Temperature stabilization of a lab space at 10mK-level over a day
D. Fife^{*}, **D.-C. Shin**, and V. Sudhir^{*}, *Review of Scientific Instruments* **95**, 095116 (2024)

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

SELECTED PRESENTATIONS

- 2025.03 Active radiation pressure cooling of a cm-scale torsion pendulum
APS Global Physics Summit 2025, CA, USA
- 2024.03 Broadband quantum-noise-limited interferometric optical lever
GRC Mechanical Systems in the Quantum Regime, CA, USA
- 2022.05 Terahertz frequency synthesizer referenced to an ultra-stable optical cavity
Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, USA

HONORS AND AWARDS

- 2024.09 - 2026.09 MathWorks Fellowship
- 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