Quantum Acoustics: Deterministic Single-Electron–Single-Photon Conversion

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Seok-Kyun Son is an Associate Professor in the Department of Physics at Kyung Hee University, Republic of Korea, and serves as Executive Director of the International Centre for Quantum Matter. His primary research field is quantum devices and hybrid quantum systems, focusing on solid-state platforms that enable deterministic control, coupling, and transduction of quantum states.

He received his Ph.D. in Physics from the University of Cambridge in 2015, where he conducted doctoral research at the Cavendish Laboratory on surface acoustic wave (SAW)–driven single-electron transport and light emission in semiconductor quantum structures. This work established a strong experimental foundation for SAW-based quantum devices operating at cryogenic temperatures and GHz frequencies.

Following his Ph.D., Professor Son worked as a Research Associate at the National Graphene Institute, University of Manchester, gaining extensive experience in two-dimensional-material-based quantum and nanoelectronic devices, including electrical, optical, and spectroscopic characterization of van der Waals heterostructures. From 2019 to 2023, he served as an Assistant Professor at Mokpo National University, where he developed device-oriented research programs in nanoelectronics and optoelectronics based on 2D materials and compound semiconductors.

Since joining Kyung Hee University, Professor Son has been leading and participating in multiple national and international quantum research projects, centered on SAW-driven quantum devices and hybrid quantum architecture. His current research aims to realize deterministic single-electron–single-photon transducers, serving as key building blocks for scalable quantum communication and quantum information processing. He also holds a Visiting Senior Research Fellow position at the National University of Singapore, fostering sustained international collaboration in quantum devices and hybrid quantum systems.