

# Joseph Jeesung Suh

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## RESEARCH INTERESTS

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Integrated silicon photonics, optoelectronics, thin film piezoelectric actuators, nanophotonic inverse design

## EDUCATION

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<b>University of California at Berkeley</b> Ph. D. in Electrical Engineering and Computer Sciences	Aug. 2023 – Present
<b>Seoul National University</b> B.S. in Electrical and Computer Engineering GPA: Overall 4.25/4.30, Major 4.26/4.30 Thesis topic: Soliton dynamics in nonlinear fibers (Spring 2022, advisor: Prof. Yoonchan Jeong)	Mar. 2017 – Feb. 2023
<b>Gyeonggi Science High School</b>	Mar. 2014 – Feb. 2017

## PUBLICATIONS AND PREPRINTS

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“Photonic topological spin pump in synthetic frequency dimensions,” **Joseph Suh**, Gyunghun Kim, Hyungchul Park, Shanhui Fan, Namkyoo Park<sup>†</sup>, and Sunkyu Yu<sup>\*</sup>, *Physical Review Letters* **132**, 033803 (2024).

“Long-range-interacting topological photonic lattices breaking channel-bandwidth limit,” Gyunghun Kim, **Joseph Suh**, Dayeong Lee, Namkyoo Park<sup>†</sup>, and Sunkyu Yu<sup>\*</sup>, *under review*

## CONFERENCE PROCEEDINGS

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“Berry Curvature Engineering in Optical Resonator Networks Using Long-range Hopping,” Gyunghun Kim, **Joseph Suh**, Ikbeom Lee, and Sunkyu Yu, *Optica Advanced Photonics Congress NoTh2C.4*, Busan, Republic of Korea, July 2023

“Topological Photonic Molecule with Time-Varying Modulations,” **Joseph Suh**, Gyunghun Kim, Hyungchul Park, and Sunkyu Yu, *Optical Advanced Photonics Congress JTU4A.17*, Busan, Republic of Korea, July 2023

“Dark Soliton Analysis in Highly Nonlinear Fiber with Optical and Raman Gain,” Juhwan Kim, **Joseph Suh**, Kyoungyoon Park, and Yoonchan Jeong, *Frontiers in Optics + Laser Science JTU5B.31*, Rochester, NY, Oct. 2022

## RESEARCH EXPERIENCE

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<b>Graduate Student Researcher</b> , Integrated Photonics Laboratory, UC Berkeley Advisor: Prof. Ming C. Wu • <b>Silicon photonic switches for a next-generation datacenter</b> <ul style="list-style-type: none"><li>◦ Design and prototyping of a high-radix silicon photonic switch with an unexplored type of actuation mechanism</li></ul>	Aug. 2023 – Present
<b>Undergraduate research intern</b> , Intelligent Wave Systems Laboratory, SNU Advisor: Prof. Sunkyu Yu • <b>Photonic analogy of a two-dimensional electronic gas with synthetic frequency dimensions</b> <ul style="list-style-type: none"><li>◦ Proposed a coupled ring resonator model with engineered synthetic gauge fields that simulates Laughlin’s topological pump</li></ul> • <b>Sensing of memory state in HZO ferroelectric memristor via plasmon resonance</b> <ul style="list-style-type: none"><li>◦ Contributed to numerical simulations and an early-stage setup of free-space optics</li></ul>	July 2022 – July 2023

- **Real-space topological invariants applied to nonperiodic photonic systems**

- Based on Kitaev / Bianco formula, developed a code that calculates real-space topological invariants for general nonperiodic systems

**Undergraduate research intern**, SNU Laser Laboratory, SNU

Apr. 2021 – June 2022

Advisor: Prof. Yoonchan Jeong

- **Analytical description of modulational instability and dark soliton formation in Ytterbium-doped HNL-PCF**

- Described dark soliton dynamics and the critical field for the onset of modulational instability both numerically and analytically

## HONORS and AWARDS

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**Overseas Ph.D. Scholarship**, *Korea Foundation for Advanced Studies*

Aug. 2023 – Present

- Full tuition, fees, and stipend of USD 20,000 annually (around 40 students selected nationally)

**Presidential Science Scholarship**, *Korea Student Aid Foundation*

Mar. 2017 – Aug. 2022

- Full tuition and academic incentives of USD 4,000 annually, awarded by the president of South Korea

33<sup>th</sup> Korea Olympiad in Informatics, 10<sup>th</sup> place, *Korean Institute of Information Scientists and Engineers* 2016

1<sup>st</sup> Samsung Junior Software Cup, Gold Prize, *Samsung* 2015

## TEACHING EXPERIENCE

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**Undergraduate tutor, Basic Physics**, Dept. of Physics, SNU Fall/Spring 2022, Fall/Spring 2021, Fall 2020, Fall 2018

**Undergraduate tutor, Introduction to Data Structures**, Dept. of ECE, SNU Fall 2020

**Undergraduate teaching assistant, Programming Methodology**, Dept. of ECE, SNU Fall 2018

## WORK EXPERIENCE

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**Republic of Korea Army**

Jan. 2019 – Aug. 2020

- (Honorable discharge) Sergeant, air defense operation supporter, Capital Defense Command

## SKILLS

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Programming languages C/C++, Python, Java, Verilog, MATLAB

Tools Ansys Lumerical, COMSOL, Vivado, Gdsfactory