

Curriculum Vitae

Postdoctoral Scholar, University of California, Berkeley

Incoming Assistant Professor of Electrical Engineering and Simons Foundation Professor, University at Buffalo

+1 (347) 459-4413 • schand@berkeley.edu • [Google Scholar](https://scholar.google.com/citations?user=sarojc23) • sarojc23.github.io

Research Interests

Quantum information science and engineering; solid-state spin qubits and quantum sensing (NV centers, hBN VB⁻ and related defects); coherent spin control, quantum noise spectroscopy, and optical/ODMR spectroscopy; 2D quantum materials and correlated quantum matter (TMDs, hBN with color centers, magnetic vdW systems); quantum photonics/nanophotonics for spin–photon interfaces and quantum instrumentation; microwave/RF engineering and cryogenic platforms for quantum control; high-performance computing and first-principles (DFT) modeling for quantum materials and device design.

Education and Training

- **Postdoctoral Scholar**, University of California, Berkeley, Nov 2023–*Present*
Advisor: **Prof. Shimon Kolkowitz**
- **Ph.D. in Physics**, The Graduate Center, City University of New York (CUNY), Oct 2023
Dissertation: *Exciton Dynamics, Interaction, and Transport in Monolayers of Transition-Metal Dichalcogenides*
Advisor: **Prof. Gabriele Grosso**
- **M.Phil. in Physics**, The Graduate Center, CUNY, Nov 2022
- **M.Sc. in Physics**, Tribhuvan University, Kathmandu, Nepal, 2016
- **B.Sc. in Physics**, Tribhuvan University, Kathmandu, Nepal, 2013

Research Experience

Incoming Assistant Professor of Electrical Engineering and Simons Foundation Professor

University at Buffalo, The State University of New York

Starting Jan 2027

Postdoctoral Scholar, University of California, Berkeley (Berkeley, CA)

Nov 2023 – Present, Faculty Advisor: Prof. Shimon Kolkowitz

- **Built** a multiplexed wide-field NV microscope **with 100+ individually resolved single-defect control and readout for scalable magnetometry (featured in Phys. Rev. X 15, 031015 (2025))**.
- Deployed **ODMR, dynamical decoupling, state tomography** in high-throughput workflows → higher sensitivity & reproducibility.
- Engineered **optical (SLM/AOD/EMCCD, cryo)** and **microwave** chains; added **automation/feedback** to stabilize alignment & boost throughput.
- **Mentored** undergrad/grad researchers; coordinated photonics–electronics–cryo builds to accelerate **build–measure–analyze** cycles.

Graduate Research Assistant, Advanced Science Research Center (CUNY) (New York, NY)

Aug 2018 – Oct 2023, Faculty Advisor: Prof. Gabriele Grosso

- Studied exciton dynamics and quantum emitters in TMDs and hBN; integrated van der Waals heterostructures into photonic structures and identified emergent excitonic states in **phase-engineered 1H/1T monolayer**.
- Led the development of a **cryogenic confocal single-photon microscope** (APDs/HBT + spectrometers) for low-temperature PL/absorption (4–300 K); **expanded** to a **dual-galvo** scanner and a **wide-field** imaging path.
- Led/contributed collaborations (Photonics Initiative, national labs, Flatiron Institute, engineering department) on metamaterials, plasmonics, photonic structures, and DBRs, enabling strong light–matter coupling → **4 publications + 4 manuscripts under review/prep**.
- Designed and fabricated plasmonic/dielectric nanostructures (e-beam lithography, etch, atomic-layer deposition) and integrated automated control for high-throughput optical measurements.

Guest Researcher (External Collaborator), Flatiron Institute – Simons Foundation (New York, NY)

Aug 2019 – Dec 2023, Collaborator: Prof. Johannes Flick

- Performed **DFT/DFPT & excited-state** calculations (VASP, QE, Wannier90) on HPC for 2D & wide-bandgap materials.
- Modeled **excitons & electron–phonon coupling**; interpreted PL/absorption and defect signatures.
- Built scalable **HPC workflows** (job arrays, auto-convergence, post-processing) for large-supercell/defect studies.

Publications

Peer-reviewed

1. M. Cambria*, **S. Chand*** (co-first authors), C. Reiter, S. Kolkowitz, “Scalable Parallel Measurement of Individual Nitrogen-Vacancy Centers,” **Phys. Rev. X** 15, 031015 (2025). *Featured in Physics*
2. **S. B. Chand**[†], J. M. Woods, J. Quan, E. Mejia, T. Taniguchi, K. Watanabe, A. Alù, G. Grosso[†], “Phonon-Dressed States of Dark Excitons in Transition Metal Dichalcogenides” *Advanced Optical Material* (2026). [†]*Corresponding Authors*
3. **S. B. Chand**, J. M. Woods, J. Quan, E. Mejia, T. Taniguchi, K. Watanabe, A. Alù, G. Grosso, “Interaction-driven transport of dark excitons in 2D semiconductors with phonon-mediated optical readout,” **Nat. Commun.** 14, 3712 (2023).
4. **S. B. Chand**, J. M. Woods, E. Mejia, T. Taniguchi, K. Watanabe, G. Grosso, “Visualization of dark excitons in semiconductor monolayers for high-sensitivity strain sensing,” **Nano Letters** 22(7), 3087–3094 (2022).
5. J. M. Woods*, **S. B. Chand*** (co-first authors), E. Mejia, T. Taniguchi, K. Watanabe, J. Flick, G. Grosso, “Emergence of a low-energy excitonic state in single-layer WS₂ with 1H/1T phase mixture,” **ACS Photonics** 11(9), 3784–3793 (2024).
6. J. Quan, M. Cotrufo, **S. B. Chand**, Z. Liu, D. Huang, T. Taniguchi, K. Watanabe, G. Grosso, X. Li, A. Alù, “Plasmonic Heterostructure for On-Site Enhancement and Control of Spin-Forbidden Dark Excitons in Monolayer Semiconductors,” **Nature Photonics** (2025).
7. S. Guddala, S. Kiriushchikina, Y. Kawaguchi, A. Vakulenko, **S. B. Chand**, E. M. Hobuss, G. Grosso, A. Alù, A. B. Khanikaev, “Topological Polaritonic Metamaterials Realized in Bulk Transition Metal Dichalcogenide Crystals,” **Small Structures** (2025).
8. M. Cho, B. Datta, K. Han, **S. B. Chand**, P. C. Adak, S. Yu, F. Li, K. Watanabe, T. Taniguchi, J. Hone, J. Jung, G. Grosso, Y. D. Kim, V. M. Menon, “Moiré exciton polaron engineering via twisted hBN,” **Nano Letters** 24, XX (2024).

9. J. Pelliciari, E. Mejia, J. M. Woods, Y. Gu, J. Li, **S. B. Chand**, S. Fan, K. Watanabe, T. Taniguchi, V. Bisogni, G. Grosso, “Elementary excitations of quantum emitters in hexagonal boron nitride,” **Nature Materials** 23, 1230–1236 (2024)
10. E. A. Mejia, J. M. Woods, **S. B. Chand**, E. Ramjattan, T. Taniguchi, K. Watanabe, J. Pelliciari, G. Grosso, “General algorithm for characterization of donor–acceptor pair recombination processes in solid-state materials,” **Opt. Materials Express** 14(9), 2122–2133 (2024).
11. M. Wang, G. Hu, **S. B. Chand**, M. Cotrufo, Y. Abate, K. Watanabe, T. Taniguchi, G. Grosso, C.W. Qiu, A. Alù, “Spin–orbit-locked hyperbolic polariton vortices carrying reconfigurable topological charges,” **eLight** 2, 12 (2022).

Under review / in preparation

12. **S. B. Chand**, S. Kolkowitz, “*Multiplexed tomography of the ^{13}C spin environment of hundreds of individual NV centers*” – *In preparation* (2025).
13. M. Wang, S. Yin, **S. B. Chand**, J. Quan, X. Jiang, K. Watanabe, T. Taniguchi, G. Grosso, A. Alù, “*Mid-Infrared Long-Range Surface Polaritons in Two-Dimensional van der Waals Materials*,” – *Under Review* (2025).
14. X. Jiang, J. Quan, S. Yin, **S. Chand**, S. Guo, Z. Liu, M. Cotrufo, G. Grosso, X. Li, A. Alù, “*Deep-Subwavelength Bucket Nanocavity for Ultralow-Threshold Interlayer Exciton Lasing*” – *In Preparation* (2025).

Presentations

Invited Talks & Research Seminars

1. “**What Can 1,000 Quantum Sensors See That One Cannot?: Building Scalable Quantum Hardware with Individually Resolved NV Centers.**” Quantum Gathering, UC Berkeley, May 2026.
2. “**Multiplexed Quantum Sensing with Solid-State Spins and Quantum Materials.**” Florida International University, Colloquium, April 2026.
3. “**Multiplexed Quantum Sensing with Solid-State Spins and Quantum Materials.**” Louisiana State University, Colloquium, March 2026.
4. “**Multiplexed Quantum Sensing with Solid-State Spins and Quantum Materials.**” University at Buffalo, SUNY, Colloquium, February 2026.
5. “**Multiplexed NV Centers and Solid-State Emitters in 2D Materials.**” Center for Nanoscale Materials, Argonne National Laboratory, NST Division, 2025. Invited in-person seminar.
6. “**Exciton Dynamics and Transport in TMD Monolayers.**” Pritzker School of Molecular Engineering, University of Chicago, 2023. Invited special seminar.
7. “**Exciton Dynamics and Transport in 2D Semiconductors.**” Virtual research seminars, 2023:
 - California Institute of Technology, Hadt Lab
 - University of Washington, Kai-Mei Fu Group
8. “ **$1\text{H}/1\text{T}$ Phase Engineering in WS_2 : Pathways to Novel Optical Response.**” CUNY ASRC Science Café, 2021. Public outreach talk.

Contributed Conference Talks

5. “**Parallel Control and Measurement of Over 100 Nitrogen-Vacancy Centers in Diamond.**” APS DAMOP Meeting, 2025.
6. “**Visualizing Momentum-Forbidden Dark Excitons in Layered Semiconductors.**” CLEO: Conference on Lasers and Electro-Optics, 2023.

7. **“Interaction-Driven Transport of Dark Excitons in 2D Semiconductors.”** APS March Meeting, **2023**. (*oral*)
8. **“Visualizing Momentum-Forbidden Dark Excitons for Strain Sensing.”** ICSCE-11: International Conference on Spontaneous Coherence of Excitons, **2022**.

Posters

1. **“Scalable Parallel Measurement and Control of Individual Nitrogen-Vacancy Centers.”** CIQC Annual Retreat, **2025**.
2. **“Scalable Parallel Measurement and Control of Individual Nitrogen-Vacancy Centers.”** UC Berkeley Graduate Research Fair, **2024**.
3. **“Superlattices via Defect Engineering in Two-Dimensional Semiconductors.”** *Graphene for US* Workshop, **2019**.

Teaching and Mentoring Experience

- **UC Berkeley (2023–present):** Mentor to **2 Ph.D.** and **4 B.S.** students (quantum sensing & NV control).
- **CUNY ASRC (2019 Led the development2023):** Mentor to **1 Ph.D.** and **2 B.S.** students
- **Adjunct Lecturer**, City College of New York (CUNY), 08/2019–10/2023
 - Taught undergraduate lab courses: **Optics, Electronics, Classical Mechanics, Electromagnetism** (typical section size ~20–30; online cohort up to ~66).
 - Helped to modernize labs with simulation & analysis notebooks; coordinated multi-section grading & TA teams.

Honors and Awards

- Photonics Initiative **Tithe Fellowship** (Inaugural Recipient), CUNY Advanced Science Research Center – 2023
- **Early Research Initiative (ERI) Pre-Dissertation Science Award**, CUNY Graduate Center – 2021
- **“Converge to Transform” Twitter Poster Session Winner**, ASRC CUNY – 2020
- **CUNY Science Scholarship**, CUNY Graduate Center – 2018

Professional Service & Outreach

- **Peer Review:** *Physical Review Letter*, *Applied Physics Letter*, *Phys. Rev. Applied*, *ACS Omega*, *IEEE Sensors* and related journals (2022–present).
- **Session Chair**, *APS DAMOP 2025*, *Portland, OR, USA*, “Quantum Sensing & Metrology III” session.
- **Co-Organizer, Quantum Gatherings** (NSF CIQC): biweekly seminar & journal club; invite speakers, curate topics, lead discussions, cross-department outreach.
- **Doctoral Students’ Council Representative (Physics)**, CUNY Graduate Center (2019–2023): organized student seminars; advocacy & community building.
- Outreach: science cafés, public talks, and mentoring of first-gen & international students.

References

Shimon Kolkowitz (Postdoctoral Advisor)

Associate Professor and Herst Chair in Physics, Department of Physics, University of California, Berkeley

Email: kolkowitz@berkeley.edu · Tel: +1 (608) 262-2865

Gabriele Grosso (Ph.D. thesis advisor)

Associate Professor of Physics, Photonics Initiative, CUNY Advanced Science Research Center; Graduate Center of CUNY

Email: ggrosso@gc.cuny.edu · Tel: +1 (212) 413-3272

Andrea Alù (Collaborator/mentor)

Founding Director, Photonics Initiative, CUNY Advanced Science Research Center;

Einstein Professor of Physics, Graduate Center of CUNY; Professor of Electrical Engineering, City College of New York

Email: aalu@gc.cuny.edu · Tel: +1 (212) 413-3260

Dmitry Budker (Collaborator/mentor)

Professor Emeritus of the Graduate School, Department of Physics, University of California, Berkeley

Email: budker@berkeley.edu · Tel: +1 (608) 262-2865