Johnathan Dimitrios Georgaras

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CURRENT POSITION

- **Ph.D. Candidate**, Materials Science and Engineering, Stanford University, Jornada Group (Sept/2020 – Present)
  - *Advisor:* Prof. Felipe H. da Jornada
  - *Expected Ph.D. completion:* March 29, 2027

EDUCATION

- M. S. in Materials Science and Engineering, Stanford (2020 – 2022).
  - *Advisor:* Felipe H. da Jornada
- M. S. in Applied Physics, Stanford (2019 – 2021).
- B. S. in Physics, University of Waterloo, Canada (2014-2019).
  - *Advisor:* Jeff Z. Y. Chen
  - *Major:* CO-OP Honours with Applied Physics Specialization
  - *Minor:* Combinatorics and Optimization

MAIN RESEARCH INTERESTS

- Inference and control of driven, non-equilibrium states in moiré and van der Waals interfaces, including interlayer excitons and phonon populations, grounded in first-principles calculations and inverse modeling of ultrafast experiments.
- First-principles and many-body approaches to quantum materials, including DFT, GW, Bethe-Salpeter equation methods, phonons, electron-phonon coupling, and non-equilibrium dynamics.
- Excited electronic, optical, phononic, and thermal transport properties of moiré and van der Waals heterostructures, especially stacked transition metal dichalcogenides.
- Machine-learned interatomic potentials, scalable atomistic simulation, and validation frameworks for linking density-functional theory to large-scale molecular dynamics and device-relevant length scales.
- High-performance computing and agentic research harnesses for automated first-principles workflows, job monitoring, error recovery, and reproducible data analysis.

HONORS AND AWARDS

- *Robert A. Huggins Award* from the Department of Materials Science and Engineering, Stanford University (2026): The department's highest student academic award, recognizing a significant contribution to materials research in the previous 18 months; nominated by advisors and collaborators and selected by a faculty committee.

- *Recipient of the Post-Graduate Scholarship – Doctoral Award* from the Natural Science and Engineering Research Council of Canada (NSERC) (2021 - 2025): Federal fellowship award to high-caliber Canadian students engaged in a doctoral program in the natural sciences.
- *Scholarship for Academic Achievement – National Award* from the American Hellenic Education Philanthropic Association National Scholarship Program (2019): Award for undergraduate studies based on the quality of undergraduate research and academic standing to Canadian students of Greek descent.
- Scientific Discovery Tools Problem Pitch Competition 1st Prize from the Quantum Valley Investments Waterloo (2018): Winner of a competition involving over a hundred students at the University of Waterloo based on quality of research and clarity of presentation in innovative problem solving, which was judged by a panel of local entrepreneurs and university researchers.

PUBLICATIONS IN JOURNALS

1. **J. D. Georgaras***, A. Ramdas*, …, F. H. da Jornada, Accurate, Transferable, and Verifiable Machine-Learned Interatomic Potentials for Layered Materials. *Nature Communications*, 17, 9291 (2026). doi:10.1038/s41467-026-74482-2
2. **J. D. Georgaras***, E. Chen, A. Ramdas, E. Simmerman, Y. Shi, S. Pokawanvit, J. B. Haber, A. Altman, Z. Mauri, A. Wang, S. Kundu, C. Ciccarino, F. H. da Jornada, Structural, Electronic, and Optical Properties of Moiré Materials: A Computational Modeling Handbook. *Annual Review of Materials Research*, 56, 25–65 (2026). doi:10.1146/annurev-matsci-072924-102520. *Led the article: organized the project, set its scope, drafted the introduction and conclusions, and designed the "Moiré Metro" overview figure (Fig. 1).*
3. T. S. Arnaud, R. W. Spangler, **J. D. Georgaras**, J. B. Haber, …, T. G. Folland, A. Paarmann, P. E. Hopkins, F. H. da Jornada, J.-P. Maria, & J. D. Caldwell, Tailoring Phonon-Driven Responses in α-MoO_3 through Isotopic Enrichment. *Advanced Materials*, 38(39), e73629 (2026). doi:10.1002/adma.73629
4. A. C. Johnson*, **J. D. Georgaras***, …, A. Sood, T. F. Heinz, A. M. Lindenberg, F. H. da Jornada, D. Luo, F. Liu, Hidden Phonon Highways Promote Photoinduced Interlayer Energy Transfer in Twisted Transition Metal Dichalcogenide Heterostructures. *Science Advances*, 10(4), eadj8819 (2024).
5. A. Sood, J. B. Haber, J. Carlström, E. A. Peterson, E. Barré, **J. D. Georgaras**, … & A. Raja, Bidirectional Phonon Emission in Two-Dimensional Heterostructures Triggered by Ultrafast Charge Transfer. *Nature Nanotechnology*, 18, 29–35 (2023).
6. O. Karni*, E. Barré*, V. Pareek*, **J. D. Georgaras***, M. K. Man*, C. Sahoo*, … & M. K. Dani, Structure of the Moiré Exciton Captured by Imaging its Electron and Hole. *Nature*, 603(7900), 247–252 (2022).

*First or equal-contribution first author.

MANUSCRIPTS UNDER REVIEW AND IN PREPARATION

1. H. Suchiang*, …, **J. D. Georgaras***, …, T. F. Heinz, F. H. da Jornada, J. Madéo, M. K. L. Man, K. M. Dani, *Bright Trions Have a Dark Exciton Core: Internal Structure Revealed by Time-Resolved Momentum Microscopy*. *Nature*, under review (2026).
2. A. Zimmerman*, **J. D. Georgaras***, Y. Pan, F. Caruso, F. H. da Jornada, A. Raja, F. Liu, *Long-Lived Non-Equilibrium Phonons in Twisted Van der Waals Heterostructures*, in preparation (2026).
3. **J. D. Georgaras**, A. Zimmerman, A. Raja, F. Liu, F. H. da Jornada, *Diffuse Scattering Signatures of Moiré Phonon Dynamics from First-Principles and Machine-Learned Potentials*, in preparation (2026).
4. M. Obst, D. Braaten, **J. D. Georgaras**, …, F. H. da Jornada, D. Li, J. D. Caldwell, *Near-Field Study Revealing Signatures of Polariton Chirality in Multiwalled Boron Nitride Nanotubes*, in preparation (2026).
5. J. Hawker*, **J. D. Georgaras***, O. Karni, …, K. M. Dani, F. H. da Jornada, *Exciton-Density-Driven Band Renormalization in a Semiconductor Heterobilayer*, in preparation (2026).

SELECTED PRESENTATIONS AND POSTERS

1. **J. D. Georgaras**, A. Zimmerman, A. Raja, F. Liu, F. H. da Jornada, *Sustaining Nonequilibrium Zone-Boundary Phonons in Twisted $MoSe_2/WSe_2$*. SPIE Optics + Photonics, San Diego, CA (2026).

2. **J. D. Georgaras**, A. Ramdas, F. H. da Jornada, *Accurate, Transferable, and Verifiable Machine-Learned Interatomic Potentials for Twisted Layered Materials*. Office of Naval Research Multidisciplinary University Research Initiative Grant Review Year 3, Poster Presentation, Nashville, TN (2026).
3. **J. D. Georgaras**, A. Zimmerman, A. Raja, F. Liu, F. H. da Jornada, *Long-Lived Non-Equilibrium Phonons in Twisted van der Waals Heterostructures*. APS Global Physics Summit, MAR-G23, Denver, CO (2026).
4. **J. D. Georgaras**, A. Ramdas, F. H. da Jornada, *Computationally Trackable and Transferable Validation of MLIPs for Moiré Materials through Topologically-Exhaustive 1D Moiré Paths*. APS Global Summit, Anaheim, CA (2025).
5. **J. D. Georgaras**, F. H. da Jornada, *Anharmonic Enhancement of Interfacial Phonon-Phonon Coupling in Twisted TMD Bilayers*. APS March Meeting, Minneapolis, MN (2024).
6. **J. D. Georgaras**, F. H. da Jornada, *Dynamics, Hybridization, and Thermalization of Phonons in Optically Excited Twisted TMD Bilayers*. APS March Meeting, Las Vegas, NV (2023).
7. **J. D. Georgaras**, *Spectroscopic Signatures of Moiré-Confined Excitons in Bilayer TMDCs from First Principles*. APS March Meeting, Chicago, IL (2022).

COMPUTATIONAL EXPERTISE AND HPC

- **Code development:** Bethe–Salpeter kernel code (MBX); machine-learned interatomic potential training and validation pipeline for layered and moiré materials; developer of the time-dependent Boltzmann equation (TDBE) solver in EPW for coupled electron–phonon and phonon–phonon dynamics.

- **HPC allocations:** NERSC (DOE) and TACC Frontera (NSF, DMR21077). Co-wrote the successful Frontera allocation renewal proposals, supporting three years of large-scale DFT, many-body perturbation theory, and MLIP calculations.

LEADERSHIP, MENTORING, TEACHING, AND SERVICE

Leadership & Service

- **President**, *Dean's Graduate Student Advisory Council (DGSAC)*, Stanford School of Engineering (2023–2025). Led council of graduate student representatives across ten SoE departments and institutes; authored a cross-departmental Qualifying Exam Communication Memo and rubric; launched a centralized Graduate Student Resource Website; advanced the "Every Research Group Has a Handbook" initiative; administered $25K+ in Student Excellence Awards recognizing 40+ students and student organization; and presented findings to the SoE Executive Committee including the Dean, department chairs, and senior administration.

- **Organizer**, biweekly *Stanford 2D Materials Meeting* (2023–present). Convene computational and experimental groups across departments to bridge theory and device-fabrication challenges in 2D materials research.
- **Co-chair**, *Rising Stars in Materials Science Colloquium*, Stanford Department of Materials Science and Engineering (2023). Organized a cross-institutional symposium showcasing early-career researchers.
- **Professional Development Co-chair**, *Materials Research Society Stanford* (2023). Designed and ran career-development programs for students, including industry panels and skill-building workshops.

Mentoring

- **Research Mentor**, six undergraduate and community college students (2021–2026), through Stanford's First-Generation/Low-Income Summer Research Program and the Research Experience for Undergraduates (REU) program. Mentees came from the University of Toronto, Foothills College, and partner institutions; introduced students to high-performance computing, density functional theory, and machine-learning interatomic potentials. *Two mentees have since matriculated into PhD programs.*

Teaching

- **Course Assistant**, MATSCI 205: *Waves and Diffraction in Materials* (graduate-level), Stanford (2022, 2023). Held office hours, graded problem sets and exams, and supported instruction for ~30 first-year graduate students per offering.

PROFESSIONAL EXPERIENCE

- **Data Scientist/Software Engineer** – ContextLogic (Wish), San Francisco (May–Aug 2018): built a logistics simulation framework in R and Python data pipelines for MongoDB and SQL databases.
- **Data Researcher** – Communications Security Establishment, Government of Canada (Sept–Dec 2017): applied graph theory and link prediction to a Neo4j knowledge graph for threat-attribution inference.