

Education

2022 - Present	Doctor of Philosophy in Condensed Matter Physics Physics department, University of Alberta, Canada Supervisor: Prof. Frank Hegmann	GPA 4/4
2017 - 2020	Master of Science in Optics and Laser Physics department, Shiraz University, Iran Thesis: Experimental investigation of nonlinear effects in random lasers and possibility of producing the resonant feedback in them. Supervisor: Prof. Abbas Ghasempour Ardakani	GPA 17.17/20 3.72/4 last year 4/4
2013 - 2017	Bachelor of Science in Physics Physics department, Shiraz University, Iran	GPA 16.80/20 3.51/4 last two years 3.73/4

Awards and Honors

2024	Awarded the Alberta Innovates Graduate Student Scholarship	University of Alberta
2023	Admitted to the ATUMS Research Training Group (Alberta/TUM International Graduate School for Hybrid Functional Materials)	
2022	Fully Funded Ph.D. Admission in Condensed Matter Physics	University of Alberta
2022	Fully Funded Ph.D. Admission in Physics and Astronomy (Declined)	University of Victoria
2022	Fully Funded Ph.D. Admission in Physics (Declined)	City University of New York
2022	Fully Funded Ph.D. Admission in Physics (Declined)	Temple University
2022	Fully Funded Ph.D. Admission in Physics and Astronomy (Declined)	University of Kansas
2019	Ranked 2 nd among the graduate students in Optics and Laser	Shiraz University
2019	Ranked 3 rd among the graduate students in Physics	Shiraz University
2017	Admission to M.Sc. Program in Optics and Laser as an Elite Student	Shiraz University
2017	Awarded scholarship (tuition-waiver) M.Sc. in Physics (Declined)	Shahid Beheshti University
2017	Ranked within the top 2% The University Entrance Exam for M.Sc.	
2017	Ranked 2 nd among the undergraduate students in Physics	Shiraz University
2013	Awarded scholarship (tuition-waiver) B.Sc. in Physics	Shiraz University
2013	Ranked within the top 3% The University Entrance Exam for B.Sc.	

Selected Courses

• Nanotechnology		A+	• Spectroscopy		19.80/20	A+
• Advanced Laser	18.70/20	A+	• Optics Lab		19.60/20	A+
• Quantum Electronics	18.90/20	A+	• Solid State Physics		16.50/20	A
• Applied Optics	17/20	A	• Optics		18.40/20	A+
• Laser Physics	18.50/20	A+	• Modern Physics Lab		19.30/20	A+
			• Computational Physics		20/20	A+

Research Experience

University of Alberta (**PhD**)

Scanning Tunneling Microscopy and Spectroscopy (STM and STS)

Taking IV, dIdV, IZ

Terahertz Scanning Tunneling Microscopy and Spectroscopy (THz-STM)

Taking IE, EV

Terahertz Generation and THz Detection by Electro-Optic Sampling
Autocorrelation | Photoemission | Pump-Probe THz-STM

Tip preparation: chemical etching process, field electron emission, electron bombardment

Materials: Functionalized Silicon Nanocrystals, Silicon (100), Gallium Arsenide, Gold, HOPG

Experience working with Ultra High Vacuum system and cooling the system with liquid Nitrogen or Hydrogen

Shiraz University (**MSc and BSc**)

Z-scan Technique

Measurement of Nonlinear Refractive Index and Nonlinear Absorption Coefficients

Random Lasers (RLs)

Fabrication | Study of Emission Spectra | Resonant and non-resonant RLs

Optical Measurement

Transport mean free path | Coherent Backscattering Technique

Refractive index | Michelson Interferometer

Absorption Coefficient | Beer-Lambert law and UV-vis Spectrum

Materials

Molybdenum Oxide | Zinc Oxide | Graphene Oxide | Graphene Quantum Dots

Titanium Dioxide | Rhodamine B and 6G

Fabrication

Electrodeposition | Pyrolysis

Characterization

Scanning Electron Microscopy (SEM) | X-ray Diffraction (XRD)

UV-vis Spectrophotometry

Hands-on Experience:

Class III and IV Lasers | Laser Alignment | Sample Preparation | Clean-room

Publications

Conference Proceedings

- 2025 **N. Sadeghi**, H. R. J. Simpson, J. Washington, Ch. H. Strilets, J. Trach, J. B. Erdei, J. G. C. Veinot, and F. A. Hegmann, "Terahertz Scanning Tunneling Microscopy of Silicon Nanocrystals", 2025 50th International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz). IEEE, 2025. (Accepted)
- 2025 H. R. J. Simpson, **N. Sadeghi**, T. Chutora, R. A. Wolkow, F. A. Hegmann, "Ultrafast Terahertz Dynamics of Dangling Bonds on the Si(100)-2x1 Surface", 2025 50th International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz). IEEE, 2025. (Accepted)

Journal Papers

- 2021 A. Ghasempour Ardakani and **N. Sadeghi**, "Fabrication of molybdenum oxide thin films with different Kerr nonlinearities and using them in random lasers," *Applied Optics* 60(2), 367-374 (2021). [Abstract]

Conference Papers

- 2021 **N. Sadeghi** and A. Ghasempour Ardakani, "Investigation of Random Lasers Consisting of Scattering Particles with Nonlinear Effects," ICOP & ICPET. 2021.
- 2019 A. Ghasempour Ardakani and **N. Sadeghi**, "Fabrication of random lasers with a resonant feedback based on a thin film including Molybdenum Oxide nanorods grown by electrochemical method," ICOP & ICPET. 2019; 25 :709-712.
- 2019 A. Ghasempour Ardakani, **N. Sadeghi**, H. Haghighi and Z. Hasani, "Measurement of linear and nonlinear optical properties of a thin film including Molybdenum Oxide nanorods grown by electrochemical deposition method," ICOP & ICPET. 2019; 25 :705-708.
- 2018 A. Ghasempour Ardakani, F. Keshavarznasab, **N. Sadeghi**, M. Ebrahimi and A. Zakery, "Measurement of linear and nonlinear optical properties of Zinc Oxide sheets grown by electrochemical deposition method," ICOP & ICPET. 2018; 24 :421-424

Presentations

- 2024 “Terahertz Scanning Tunneling Microscopy of Functionalized Silicon Nanocrystals”
GPSA Symposium (Poster), UAlberta
- “Ultrafast Electron Dynamics of Functionalized Silicon Nanocrystals”
ATUMS Annual Meeting in Venice, Italy
- 2023 “Terahertz Scanning Tunneling Microscopy of Functionalized Silicon Nanocrystals”
ATUMS Annual Meeting in Canmore, AB
- 2021 “Investigation of Random Lasers Consisting of Scattering Particles with Nonlinear Effects”
The 27th Iranian Conference on Optics and Photonics (ICOP)
- 2019 “Random Lasers and Applications” | Seminar, Shiraz University
- “Measurement of linear and nonlinear optical properties of a thin film including Molybdenum Oxide nanorods grown by electrochemical deposition method”
The 25th Iranian Conference on Optics and Photonics (ICOP)

Teaching Experience

- 2022-2024 **Teaching Assistant** | University of Alberta
PHYS Lab 126 | PHYS Lab 124 | PHYS 124 | PHYS 130
- 2018 **Modern Physics Laboratory Workshop** for High School Physics Teachers (Volunteering)
19th National Conference on Physical Education | Shiraz University, Iran
- 2018-2019 **Teaching Assistant** | Shiraz University (Volunteering)
Physics 1 | Physics Laboratory 4 | Modern Physics Laboratory | Mathematical Physics 3

Workshops

- 2020 **Radiation Protection** | Radiation Research Center Shiraz University, Iran
- 2019 **LabVIEW** | Training Center Shiraz Technology University, Iran
- Zemax OpticStudio** | Physics department Shiraz University, Iran
- 2018 **MATLAB** | Open and Specialized Training Center Shiraz University, Iran
- 2017 **LaTeX** | Physics department Shiraz University, Iran

Community Services Volunteering

- 2024-Present CMP Representative at **The Graduate Physics Student Association (GPSA)**
- 2019 Executive committee member of **Iranian Conference on Optics and Photonics (ICOP)**
- 2016 Executive committee member of **The Annual Physics Conference of Iran**

Skills

Computer	Python MATLAB C++ LabVIEW Wolfram Mathematica LaTeX		
Languages	Persian	English	French
	Native	Advanced	Basic

References

- Prof. Frank **Hegmann**[†] | Professor hegmann@ualberta.ca
- Prof. Robert **Wolkow**[†] | Professor rwolkow@ualberta.ca
- Prof. Abbas **Ghasempour Ardakani**[‡] | Associate Professor aghasempour@shirazu.ac.ir
- Prof. Abdolnasser **Zakery**[‡] | Professor zakery@physics.susc.ac.ir

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