Mina Papahn Zadeh

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SUMMARY OF QUALIFICATIONS

Master graduated in Physics and Engineering Physics specializing in particle-in-cell simulations of plasma systems, including Hall thrusters, Penning discharges, and magnetic nozzles. Proficient in developing and applying open-source and commercial PIC codes for multi physics plasma modeling, with strong expertise in Python, C, C++, Fortran, and Linux-based workflows, and GPU-accelerated high-performance computing. Expertise in analytical/numerical evaluation of plasma dispersion relations and data-driven modeling with a growing interest in leveraging physics-informed machine learning to accelerate plasma research. Collaborated with industry and national laboratories (Applied Materials Inc., Princeton Plasma Physics Laboratory) to address applied plasma challenges. Over 14 years of physics teaching experience, combining deep technical knowledge with strong communication, mentoring, and project management skills.

TECHNICAL SKILLS

- **Programming & Scripting:** Python (NumPy, Pandas, Matplotlib, Seaborn, Plotly, PyTorch), Fortran, C++, Bash, Linux (shell scripting), Java
- **Simulation Frameworks:** WarpX, EDIPIC, VSim, XOOPIC, XES1
- **Scientific Computing:** MUSIC spectra, FFT, Dispersion solvers, Numerical integration/differentiation
  High-Performance Computing: GPU acceleration (CUDA, GPU-enabled codes), SLURM job scheduling, Cluster setup, parallel computing (MPI/OpenMP)
- **Data Analysis & Visualization:** Signal processing, Phase space visualization, Mode decomposition
- **Version Control:** Git/GitHub workflows for simulation deployment
- **Independent Machine Learning Study:** Physics-Informed Neural Networks (PINNs), MySQL
- **Web & IT Systems:** Cascade CMS (content management and customization), Wix web design & Development, Cengage WebAssign (digital courseware setup, integration, user support)
- **Tools & Platforms:** MATLAB, Mathematica, Jupyter Notebooks, PyCharm, Anaconda, MS office, MS windows, MS Excel, MS outlook

RELEVANT EXPERIENCE

Plasma Modeling and Simulation Researcher **Sep 2019 – Present**
University of Saskatchewan, SK, Canada

- Developed a computational setup and performed 2D/3D Monte Carlo kinetic simulations of plasma systems using VSim, WarpX, EDIPIC, and XOOPIC.
- Designed and maintained Python-based data analysis pipelines for large-scale simulations, ensuring reproducibility, automation, and efficient data reporting.
- Configured and managed Linux-based HPC systems, including authentication protocols, role management, and deployment workflows resembling CI/CD principles.
- Developed scripts for data-driven diagnostics, metadata handling, and visualization of plasma behavior.
- Collaborated with international research teams (Applied Materials, PPPL) on hybrid systems integration, bridging experimental platforms with computational modeling.

Industrial Research Collaboration **Jun 2022 – Present**
Applied Materials & Princeton Plasma Physics Laboratory (PPPL)-Remote

- Participated in the Landmark Benchmark Initiative, a collaborative effort involving 21 international institutions and 17 simulation codes to verify kinetic low-temperature plasma models.
- Modeled and performed 2D and 3D PIC simulations to computationally support experimental studies of cylindrical Penning discharges in the reflex configuration.

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- Collaborated closely with experimental teams at Applied Materials and PPPL to analyze electron and ion dynamics, characterize azimuthal and axial fluctuations, and identify mechanisms driving plasma instabilities and electron transport.
- Gained in-depth knowledge of industry-specific challenges and applied physics in commercial and national lab settings.

Lecturer in Physics **Sep 2023 – Present**

University of Saskatchewan, SK, Canada

- Developed course websites and integrated digital content using CMS and LMS platforms (Cengage WebAssign, Canvas)
- Designed engaging multimedia presentations informed by best practices in adult education.
- Synthesized complex technical information and presented it to general/non-specialist audiences.
- Coordinated with a team of three lecturers and two teaching assistants to ensure content delivery was standardized and aligned with department guidelines.
- Demonstrated exceptional communication and public speaking skills through weekly presentations.
- Developed and updated course materials, syllabi, and assessments, including quizzes, exams, assignments. and hands-on demonstrations to actively engage students.

Teaching Assistant **Sep 2019 – Present**

(Lab Demonstrator / Marker / Help Desk Assistant)

University of Saskatchewan, SK, Canada

- Supported courses through lab instruction, marking, and help desk assistance for students.
- Provided technical support for LMS systems and online learning tools.

Physics Teacher in High school **2008 - Aug 2019**

Ministry of Education, Iran

- Over a decade of experience teaching physics and managing digital content.
- Recognized for teaching excellence and served in curriculum leadership roles.

EDUCATION & TRAINING

- **PhD (Plasma Physics)** - University of Saskatchewan, Saskatoon, SK, Canada **(2021 -expected 2025)**
- **M.Sc. (Plasma Physics)** - University of Saskatchewan, Saskatoon, SK, Canada **(2019 - 2021)**
- **B.Sc. (Physics Teaching)** - Shahid Rajaee Teacher Training University, Tehran, Iran **(2001 - 2005)**

PUBLICATIONS & PRESENTATIONS

- Author of multiple peer-reviewed papers on computational modeling and large-scale simulation workflows (Physics of Plasmas, 2021–2025).
- Presented multiple oral and poster contributions at the APS Division of Plasma Physics (DPP) and the Gaseous Electronics Conference (GEC) on topics including plasma simulation models, diagnostics, and data analysis, and at the Iranian Conference on Physics Education on teaching innovation.
  (Full list of publications available on my ResearchGate profiles)

REFERENCES

Available upon request