

Richard Charette

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Professional Summary

Skilled mathematician/scientist with expertise in topology, abstract algebra, differential geometry, and computational physics. Proficient in MATLAB, Python, and C/C++ with extensive experience in physics-based software and data analysis. Passionate about leveraging mathematical and computational techniques to drive innovation and improvements.

Education

M.S. Physics , University of Massachusetts Dartmouth GPA: 3.79	May 2021
B.S. Mathematics , University of Massachusetts Dartmouth GPA: 3.54	May 2017
B.S. Economics , Bridgewater State University GPA: 3.33	May 2013

Professional Experience

BAE Systems/Donatech, Hudson, NH <i>Image Processing Software Engineer/Mathematician</i>	Nov 2024 – Feb 2025
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- Designed and implemented Cooley-Tukey FFT algorithms for efficient decomposition of large FFTs, utilizing C++ object-oriented programming to structure complex software components in a Linux environment.
- Developed OpenCL-based high-throughput compute kernels for FPGA acceleration in radar signal processing, incorporating multi-threading and synchronization for parallel execution.
- Integrating algorithms into existing systems and debugging with Linux tools to ensure functionality.
- **Tools used:** MATLAB, C/C++, Linux, Python, BitHub, Image Processing.

NAVSEA, Newport, RI <i>Software Engineer/Staff Scientist</i>	Sep 2022 – Feb 2023
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- Provided technical expertise on submarine communication system development, designing and testing C++ software components in a Linux environment for real-time integration and deployment.
- Collaborated with engineers and scientists to define system requirements, using MATLAB to model antenna data and Python for additional analysis, adapting to new tools as needed.
- **Tools used:** MATLAB, C/C++, Linux, Python, LaTeX.

Lockheed Martin, Marion, MA <i>Software/Manufacturing Engineer</i>	May 2021 – Feb 2022
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- Developed CAD schematics for SUBCOMs and wiring systems, integrating C++-based machine vision software in a Linux environment to identify cable shortages, driving a site-wide redesign.
- Contributed to a research team, using GitHub for version control and RabbitMQ/StormMQ for distributed coordination, debugging a machine learning model to pinpoint algorithmic bias.
- Adapted to SolidWorks and 3D printing workflows, drafting new models and collaborating with manufacturing teams to implement updated designs.
- **Tools used:** MATLAB, SolidWorks, GitHub, Linux, Machine/Computer Vision, 3D Printing Modeling, RabbitMQ, StormMQ.

University of Massachusetts Dartmouth, Dartmouth, MA	Aug 2019 – May 2021
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Graduate Researcher

- Researched Type Ia supernovae dynamics, developing C++ and Python simulation wrappers in a Linux environment to model star sequences and the Chandrasekhar limit, using multi-threading for data processing.
- **Tools used:** MATLAB, C/C++, Linux, FORTRAN, GitHub, TORCH, Python, SciPy, NumPy, Moby, R, Slack.

Fellowships

Tufts University *Fellowship*

Mar 2023 – Jun 2024

- Executed an end-to-end GeoMx-NGS gene expression analysis workflow, developing C++11 and Python scripts in a Linux environment to process raw data, incorporating parallel programming for efficiency.
- Prepared gene-level data for clustering and visualization (UMAP, t-SNE, heatmaps), adapting to new bioinformatics tools and collaborating with researchers via GitHub.
- Analyzed a GeoMx mouse lungs and kidney dataset with the Whole Human Transcriptome Atlas, profiling diabetic kidney disease and healthy samples.
- **Tools used:** MATLAB, C++11, C/C++, Linux, FORTRAN, GitHub, Python, Moby, R, Slack, Machine/Computer Vision.

Wolfram Summer School *Fellowship*

Jun 2022 – Jul 2022

- Enumerated axiom systems and computed entailment cones using Wolfram Mathematica, quickly adapting to its symbolic computation framework to model topological properties.
- Investigated proof paths with homology and homotopy theory
- **Tools used:** Wolfram Mathematica.

Boston University/Mathematics Department, Boston, MA *Fellowship*

Aug 2017 – May 2018

- Analyzed neuronal spike-LFP relationships, developing C++ and MATLAB tools in a Linux environment to model stimuli responses with Fourier analysis, using parallel processing to filter noise.
- Programmed a custom compiler and filter, adapting to Simulink for real-time simulation and collaborating with neuroscientists to validate models.
- **Tools used:** MATLAB, C/C++, Linux, Python, Simulink.

Biogen Idec Inc., Cambridge, MA *Fellowship*

May 2010 – Aug 2010

- Investigated gene transfer in E. coli for bioluminescence, using MATLAB to analyze data and produce summaries, adapting to gene editing tools and team workflows.
- Collaborated with researchers to refine experimental methods, presenting results to supervisors for biotechnological insights.
- **Tools used:** Gene editing, MATLAB.

Additional Information

Clearance: Active Top-Secret Clearance

Technical Skills:

Computer: MATLAB, LaTeX, Mathematica, STATA, R, R Studio, FORTRAN, Python, GitHub, Machine/Computer Vision, Artificial Neural Networks, C/C++, Integrated Systems, Large Data Computation, Linux/Unix, Oriented Programming, Team Software Development, RabbitMQ, StormMQ, AutoCAD, SolidWorks, 3D Printing Modeling, APL, Structured Programming, Moby, Firmware, OpenCL, CUDA, Git, Real-Time Software/Hardware, Software Documentation, C++11

Mathematics: Topology, Abstract Algebra, Cryptography, Differential Geometry, Number Theory, Combinatorics, Discrete Geometry, Numerical Analysis, Complex Systems, Axiom Systems, Fourier Series Equations, Fourier Transformations, Proof Paths, Proof Space, Two-Way Proofs, Signal Processing, x86 Processing

Physics: Statistical Mechanics, Stellar Physics, Mathematical Physics, Computational Physics

Grants & Awards: Bits to Bytes Grant (2023-2024), Massachusetts Space Grant Consortium (2020-2021), Dean's List, University of Massachusetts Dartmouth (Graduate) (2019-2021), Dean's List, University of Massachusetts Dartmouth (Undergraduate) (2015-2017), Dean's List, Bridgewater State University (2011-2013), John and Abigail Adams Scholarship (2011-2013), Adrian Tinsley Undergraduate Research Scholarship (2012), Presenter, National Conference for Undergraduate Research (2012)

Links: Pastebin: pastebin.com/u/UF6 · GitHub: github.com/UraniumHexafluoride · LinkedIn: linkedin.com/in/richard-c-5a2b6262/