

# Dempsey Rogers

Physicist, Mathematician, Machine  
Learning Scientist

(208)705-2666

dempsey.rogers@gmail.com

Highly driven physicist with 3 years of experience modeling turbulent transport dynamics in tokamak plasmas, and two prior years building and studying Navier-Stokes and magnetohydrodynamic models. Research and Development oriented ML Scientist focused unsupervised anomaly detection.

## EDUCATION

### Master of Science, Physics, University of Alaska Fairbanks

08/2018 — 07/2021

- Thesis: Phase Effects on the Turbulent Transport in the Magnetic Confinement of Plasmas for Nuclear Fusion

### Dual Bachelors of Arts, Mathematics and Physics, Carroll College

08/2012 — 05/2016

- Senior Thesis: 2D Computational Study of MHD Instabilities for Nuclear Fusion Energy

## WORK EXPERIENCE

### Data Scientist, Idaho National Laboratory

05/2023 — Current

- Research and develop new technologies and applications for anomaly detection through machine learning, including deep learning architectures and novel methods
- Keep abreast of state of the art technologies and techniques for modeling, analyzing, manipulating, and storing data
- Provide imaginative, thorough machine learning solutions to a wide range of complex, ambiguous, and difficult problems related to protecting American critical infrastructure
- Develop and produce deep learning models related to autonomous nuclear fission reactor controls
- Clearances: DOE Q 08/2022, DHS/CISA Suitability 07/2023, and DOE SCI 10/2023

### Classification Analyst, Idaho National Laboratory

02/2022 — 05/2023

- Utilize engineering theory and principles in the development, interpretation, and administration of approved Department of Energy (DOE) Classification, Controlled Unclassified Information Programs, applicable Information Security Department Programs, and working groups
- Provide guidance on classification and sensitive information matters to INL Derivative Classifiers. Provide classification and declassification reviews for INL and Idaho Cleanup Project potentially classified materials
- Apply DOE classification principles and concepts to assure that documents within potentially classified subject areas are reviewed for classified and sensitive information and are properly protected
- Develop a machine learning model for Natural Language Processing (NLP) to aid in the classification of documents
- Research state of the art NLPs, build question answering and summarizing models, and develop and fine-tune models using the INL's High Performance Computing facility
- Generate question and answering data sets to fine tune models towards classification vernacular

### Computational Physics RA., UAF

12/2019 — 12/2021

- Applied skills in mathematics, statistics, and physics on UAF's High Performance Computer (HPC) to study nuclear fusion devices
- Investigated a proposed thermal transport control mechanism for tokamak plasmas in the I-mode confinement regime
- Computationally modeled the turbulent transport dynamics from phase effects in the thermal transport of tokamak plasmas

- Verified model fidelity by modeling observed transport dynamics from D-IIID
- Investigated hysteresis free control mechanisms to increase core ion temperature and decrease core density
- Compiled and publicly defended a master's thesis based on findings

## Physics Lab TA., UAF

08/2018 — 12/2019

- Prepared experiments demonstrating key concepts from the course lectures
- Provided short lectures at the being of lab sections to highlight concepts demonstrated in the experiment
- Developed distance learning labs, materials, as well as interactive remote test prep, homework, and lab support for students
- Assisted in course projects, daily assignments, and illustrated parallels between course work and real world applications

## SKILLS

|                  |   |
|------------------|---|
| Physics          | Nonlinear Dynamics, Geophysical Fluid Dynamics, Mathematical Physics, Classical Mechanics, Quantum Mechanics, Computational Methods, Electricity and Magnetism, and Computational Plasma Physics RA         |
| Mathematics      | Applied Optimization, Nonlinear and Partial Differential Equations, Numerical Methods, Statistics, Discrete Mathematics, Real and Complex Analysis, Abstract Algebra and Non-Euclidean Geometry             |
| Machine Learning | Research and Development: Iterated, documented, and deployed HSI, NN, CNN, and LSTM models leveraging Python, PyTorch, PSQL, Splunk, BASH, Slurm, MATLAB, $\text{\LaTeX}$ , Beamer, and the Microsoft Suite |
| Other            | WFR, CPR, First Aid and Lifeguarding, and Winter Wilderness Survival  |

## REFERENCES

### Ashley Shields, Idaho National Laboratory

12/2024 — Current

Computational Data Science, Senior Manager

- (208) 526-5479
- Ashley.Shields@inl.gov

### John Koudelka, Idaho National Laboratory

05/2023 — 12/2024

Scientific Visualization, Senior Manager

- (208) 526-8591
- John.Koudelka@inl.gov

### Neil Walker, Idaho National Laboratory

02/2022 — 05/2023

Information Security, Senior Manager

- (208) 526-5641
- Neil.Walker@inl.gov