

# Dempsey Rogers

Physicist, Mathematician, Machine Learning  
Scientist

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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 on 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 anomaly detection models for use in cyber security tasks supporting DHS/CISA.
- 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

- 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, and Electricity and Magnetism
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	Python: Research and Development, PyTorch, Transformers, SciPy, SciKit, Pandas, NumPy, Matplotlib, Seaborn, Jupyter, Spyder, PSQL, splunk, BASH, Python, MATLAB, $\text{\LaTeX}$ , Beamer, and Microsoft Suite
Other	WFR, CPR, First Aid and Lifeguarding, and Winter Wilderness Survival

## EXTRACURRICULARS

### Carroll Adventure and Mountaineering Program (CAMP), Guide, President 08/2012 — 09/2015

- Organized, prepared, and led groups of fellow peers into the wilderness
- Maintained a fluid plan in order to ensure the safety and protocol in changing conditions
- Managed dynamic expeditions as to ensure a high quality experience for all members of the group, ranging from amateur to expert
- Guided trips, including but not limited to, rock climbing, mountain biking, skiing, backpacking, and many other sports
- Completed training in wilderness medicine: Attained Wilderness First Responder certification (WFR), certified in CPR, Trained in winter wilderness survival
- Implemented WFR training in the field for hypothermia, skiing, and rock climbing related trauma

### Volunteer Litter Collection

05/2016 — Current

- More than 150 hours per year