

David Alan Rimel

12627 Cloverwood Dr. Cypress, Tx 77429

✉ rimeldav@msu.edu

☎ 281-844-7859

EDUCATION

Michigan State University

M.S. Computational Mathematics, Science and Engineering

August 2018 – December 2020

- Cumulative GPA – **3.97/4.0**

University of Colorado at Boulder

B.S. Engineering Physics

Fall 2013 – Fall 2016

- Honors – **Summa Cum Laude.**
- Cumulative GPA – **3.89/4.0.**

EXPERIENCE

Graduate Teaching Assistant

August 2020 – December 2020

Michigan State University

Class: CMSE202 Computational Modeling Tools and Technology

Teaching Experience:

- Gained experience leading classroom discussions and organizing class structure.
- Taught students how to effectively use common data science libraries such as Pandas, Scikit-Learn, Keras, Numpy/Scipy, and Matplotlib.
- Taught basic Data Science and Machine Learning concepts such as linear regression, SVM, PCA, Deep Neural Networks, Perceptrons, K-Nearest Neighbors, Agent Based Modeling, and Logistic Regression.

Mentoring Experience:

- Guided many successful end of semester student projects such as weather prediction using LSTMs, and facial and astrological image classification.

Graduate Research Assistant

August 2018 – August 2020

Michigan State University

Advisor: Dr. Michael Murillo

Research Experience:

- Studied ultra-cold plasmas using a self developed Car-Parrinello molecular dynamics code.
- Studied the plasma dynamics of hypervelocity impact generated plasmas via quantum statistical potentials that are tuned using machine learning models.
- Developed a Genetic Algorithm to discover the set optimal model parameters for particle pair potentials in molecular dynamic codes run for specific material temperatures and densities. Using Gaussian Process Regression, the optimal modal pair potentials were then predicted for new material temperatures and densities without the need for running expensive explicit electron molecular dynamic simulations.
- Parallelized an open source molecular dynamics code written in python for current distributed memory computing architectures using Mpi4py and Numba.

Mentoring Experience:

- Mentoring an undergraduate research assistant who is using a symbolic neural network to discover effective pair potentials from more accurate simulation methods.

Computational Photonics Researcher

December 2016 - June 2018

TechX Corporation

Research Experience:

- Simulated integrated photonic devices, such as microring resonators, dielectric crystals and echelle gratings.
- Developed a computational method for dielectric mode extraction using phase-shifted periodic boundary conditions and the filter diagonalization method.

Software Experience:

- Contributed to commercial grade software by developing scientific analysis tools in python to calculate overlap integrals, power flux, s-parameters and dielectric fiber modes.
- Helped implement and test an FDTD sub-pixel smoothing algorithm which can simulate photonic devices with complex geometry with 2nd order accuracy.

Student Internship

May 2016 - December 2016

TechX Corporation

Research Experience:

- Optimized perfectly matched absorbing boundary conditions for multicore cpu architectures in commercial grade software.
- Developed algorithms to numerically calculate dielectric waveguide modes.
- Developed microring resonator simulations to study the transmission frequency spectrum.
- Developed photonic crystal simulations to calculate the photonic band gap.

Undergraduate Physics Research

Fall 2015 – October 2016

University of Colorado

Advisor: Dr. John Cary and Dr. Greg Werner

Research Experience:

- Successfully optimized the Particle-in-cell deposition method for multicore and vector cpu architectures.
- Successfully wrote and defended an undergraduate thesis on how to optimize the Particle-in-cell algorithm for speed through maximizing the use of novel architectural features of current cpus.

Software Experience:

- Gained experience with multithreading, vectorizing and principles of cpu optimization.
- Kept track of progress using an SVN repo.

Algorithm Development

October 2014 – August 2015

Laboratory for Atmospheric and Space Physics, LASP

Software Experience:

- Developed data correction algorithms for the solar instruments aboard the Upper Atmosphere Research Satellite.
- Used test based development practices to develop mathematical data analysis tools in Java.

CONFERENCE PAPERS

- **David A. Rimel**, Sergey Averkin, Carl A. bauer, Gregory R. Werner, Adam V. Higuera, Ben M. Cowan, Jonathan D.A. Smith, Sveta Shasherina, John R. Cary. *Using the Filter Diagonalization Method to compute modes of dielectric waveguides*. European Conference on Antennas and Propagation (EuCAP), London, UK, April 9-13 (2018)

UNDERGRADUATE HONORS THESIS

- **David A. Rimel**. CPU Optimization of Particle Deposition in PIC Simulation Code. Undergraduate Honors Thesis, January 1 (2016)

RELEVANT CLASSES

- **Parallel Computing**
- **Numerical Linear Algebra**
- **Introduction to Machine Learning**
- **Mathematical Foundations of Machine Learning**
- **Applied Machine Learning**
- **Computer Systems**
- **Introduction to Algorithms**
- **Data Structures**

COMPUTING SKILLS

Languages

- **Python, C/C++, Julia**

Libraries

- **MPI4py, OpenMPI, Numba, Numpy/Scipy, OpenMP, Cuda, Scikit-learn, Tensorflow**

Programs

- **Mathematica, Git, SVN, Solidworks, FreeCAD**

AWARDS

Award for Outstanding Early Graduate Student 2019

Engineering Physics Outstanding Graduate Award 2016

Outstanding Undergraduate Research Award 2016

Stephen Halley White Undergraduate Research Award 2016

Dean's List

University of Colorado at Boulder and Texas State University

Fall 2011 – Spring 2016

REFERENCES

Dr. Michael Murillo

✉ Professor

Michigan State University, Room 1508C, Engineering Building.

East Lansing, MI 48823

☎ (517)432-0196

@ murillom@msu.edu

Dr. John Cary

✉ Professor

University of Colorado at Boulder, DUAN F821.

Boulder, CO 80302

☎ (303)492-1489

@ cary@colorado.edu