

# Curriculum Vitae of Kevin S. Rozmiarek

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## Current Research:

My work is generally categorized as being in atmospheric science and ice core science. In atmospheric science I develop and implement large fixed-wing drone air sampling systems coupled to high precision laser-based technology in order to characterize the stable isotopic content of high-altitude water vapor over the Greenlandic ice sheet. Through modeling, these measurements aim to constrain and better understand the role of water vapor transport in the Greenlandic hydrological system. In addition, I measure the isotopic content of carbon dioxide and methane as part of the National Oceanic and Atmospheric Administration's (NOAA) Global Monitoring Division's team for later implementation in global circulation models.

In ice core science, I use diffusion models to understand complexity metrics (specifically, weighted permutation entropy; WPE) measured on high-resolution ice core data. Already proven useful in data quality assurance, WPE also details the net "flux" of information as it is deposited and changes in an ice core. In the future, we may be able to back out novel climate signals through information metrics such as WPE.

## Education:

**Masters: Colorado School of Mines, Golden, Colorado, USA**

**May 2016**

**Degree:** Master's of Applied Physics

**Advisor:** Dr. Tim Ohno

**Thesis Topic:** *Numerical Optimization of Ion Transport in Electrospray Mass Spectrometer Sources*

**Bachelors: Colorado School of Mines, Golden, Colorado, USA**

**May 2015**

**Degree:** Bachelor of Science in Engineering Physics

**Senior Design Topic:** *Laser Ablation-Combustion Instrument Interface for Carbon Isotope-Ratio Mass Spectrometry*

**Relevant Coursework:** Computational Physics, Introduction to Scientific Computing, Extracting Signal from Noisy Data, Thermal Physics, Graduate Mathematical Physics

## Professional Experience:

**Professional Scientist II at INSTAAR Stable Isotope Lab, University of Colorado**

April 2017–Present

- Operated and maintained NOAA's Global Monitoring Division's measurement network for stable isotopes of carbon dioxide and methane
- Developed and operated INSTAAR's water vapor isotope drone program at EGRIP
- Applied complexity analytics to characterize high resolution water isotope records in ice cores

## **Research Contractor at United States Geological Survey Crustal Geophysics and Geochemistry Center**

May 2015 – September 2016

- Performed mass analysis on aquifer water samples
- Characterized the isotope signature of these across the noble gas spectrum to approximate aquifer recharge rate with the USGS Noble Gas Stable Isotope Lab as a lab technician
- Operated and maintained sample prep-line and mass spectrometer instrument

## **Research Assistant at Colorado School of Mines Department of Physics**

August 2014 – May 2015

- Designed and built a laser ablation to combustion furnace sample preparation device for integration into a magnetic-sector mass spectrometer in collaboration with USGS for use in stable isotope research
- Worked both on instrumentation design and construction
- Devised and performed novel experimental design for future studies with the instrumentation

## **Research Assistant at Colorado School of Mines Department of Applied Mathematics & Statistics**

August 2013 – May 2014

- Developed as part of the Pankavich group a multi-compartmental population model for stage 1 HIV-1 infections within the gut associated lymphatic tissue, bronchus associated lymphatic tissue, and the peripheral blood
- Performed work as a CSM Undergraduate Research Fellow

## **Technical Skills and Experience:**

### **Computational Experience:**

My current work involves analytics and management of large datasets. When doing scientific programming I prefer Mathematica or MATLAB depending on the application. I use Python or C++ for front end development and embedded software.

**Proficient with:** Mathematica, MATLAB, Python, LaTeX, C++, Linux, numerical methods for solving ordinary and partial differential equations, parallelization methods, Microsoft Office Suite

**Experienced with:** Labview, Solidworks, EAGLE, Inkscape, Lua, SIMION, Java

### **Instrumental Experience:**

I design, build, and maintain my own instruments as part of the scope of many of my current and past projects. I am comfortable with mechanical, electrical, and embedded design and fabrication for scientific applications.

**Proficient with:** Mass spectrometry including magnetic sector, quadrupole, and ion trap; vacuum technology; embedded system design including microcontrollers and circuit design/PCB fabrication, 3D printing

**Experienced with:** Scintillation counters and their implementation; machine shop fabrication including basic operation of end mill and engine lathe conventional, climb, plunge, slot milling and threading; basic linear optical apparatus design

## **Invited Talks and Presented Posters:**

**Talk:** Front Range Isotope Day 2019. Golden, Colorado, USA. *Flying Higher: An update to INSTAAR's water vapor isotope program and what it could mean for understanding the Greenland hydrological cycle.*

**Poster:** Front Range Isotope Day 2017 University of Wyoming, Wyoming, USA. *Progress Toward Measurement of Hydrogen Isotopic Ratios of Atmospheric Methane at INSTAAR*

**Poster:** Colorado School of Mines Senior Project 2015 Golden Colorado, USA. *Laser Ablation-Combustion Instrument Interface for Carbon Isotope-Ratio Mass Spectrometry*.  
Awarded CSM Department of Physics Senior Design “Best Poster Presentation”

## **Teaching:**

### **Teaching Assistant at Colorado School of Mines Department of Physics**

January 2016 – May 2016

- Advanced Lab II, a junior level physics laboratory methods course at CSM
- Topics include nuclear physics instrumentation operation and associated subject matter
- Lectured to students and oversaw safety

### **Teaching Assistant at Colorado School of Mines Department of Physics**

August 2015 – December 2015

- Advanced Lab I, a junior level physics laboratory methods course at CSM
- Topics included modern physics, optics, and acoustics
- Lectured to students, oversaw lab operation, and evaluated student performance

### **Lead Teaching Assistant at Colorado School of Mines Department of Physics**

May 2014 – July 2014

- Vacuum system technology and mass spectrometry portion of the “field session” junior level course at CSM
- Topics included fundamentals of vacuum science, gas transport and introduction to mass spectrometry and deposition methods
- Designed curriculum, lectured to students, evaluated student performance

## **Field Work:**

(2019) EGRIP Ice Core Camp – Drone team lead - Northeast Greenland

(2017) South Pole Ice Core - SIL Processing Line Manager (oversaw 6 undergrads) - National Ice Core Laboratory (NICL) - Golden, Colorado, USA

(2015) Meeker aquifer sampling – Technician – Meeker, Colorado, USA

## **Outreach:**

(2016) Colorado School of Mines Graduate Student Government - Physics department acting chair

(2012-2015) Society of Physics Students - Little Shop of Physics – Visited a dozen low income secondary schools introducing students to physics topics as a presenter and demonstrator.

(2014-2016) Equality through Awareness – Helped implement mentorship programs for underrepresented identity group in Colorado School of Mines Physics department.