

# Jules van Irsel

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## EDUCATION

### Dartmouth College

*Doctor of Philosophy in Physics*

Hanover, NH

*Since Sep. 2019*

### University of Calgary

*Bachelor of Science (Honours), Major in Astrophysics*

Calgary, AB

*Sep. 2014 – June 2018*

### Southern Alberta Institute of Technology

*Mechanical Eng. Tech. (Honours), Major in Design and Development*

Calgary, AB

*Sep. 2012 – June 2014*

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## PROFESSIONAL EXPERIENCE

### Graduate Student

*Dartmouth College – K. A. Lynch – 603 646 9311*

Hanover, NH

*Since Sep. 2019*

- Approved thesis proposal on electric current closure in ionospheric plasmas. Defense: July 2025
- Proposed to, and selected for graduate funding from, NASA's 2022 FINESST solicitation
- Aided in developing NASA's 2022 HLCAS selected proposal: *Geophysical Non-Equilibrium Ionospheric System Science* (GNEISS, PI: K. A. Lynch) sounding rocket mission
- Aided in developing NASA's 2019 MIDEX proposal and through its Phase A Concept Study Report: *Auroral Reconstruction CubeSwarm* (ARCS, PI: K. A. Lynch)
- Produced a catalog of multi-fluid ionospheric 3D plasma simulations using the Geospace Environment Model of Ion-Neutral Interactions (GEMINI, [github.com/gemini3d](https://github.com/gemini3d))
- Developed tools for driving GEMINI from multi-sourced, heterogeneous data products, as well as tools to visualize the resulting rich output data volumes ([github.com/317Lab/aurora\\_gemini](https://github.com/317Lab/aurora_gemini))
- Implemented methods for advanced impact ionization to the GEMINI source code
- Vacuum/plasma tested, and wrote GSE software for, Petite Ion Probes and oversaw their integration onto NASA's *Loss through Auroral Microburst Pulsations* (LAMP, PI: A. Halford) sounding rocket mission
- Teaching Assistantship for both graduate and undergraduate classes, and mentoring of undergraduate students in the *Lynch Rocket Lab*

### Instrument Design & Assembly Assistant

*University of Calgary – J. K. Burchill – 403 220 8108*

Calgary, AB

*May 2018 – Aug. 2019*

- Mechanically and electrically redesigned the rocket Miniature Plasma Imager (rMPI) lowering its power consumption and introducing ion baffling
- Assisted in rMPI environment testing (vacuum, vibration, plasma) and oversaw its integration onto NASA's *Cusp-Region EXperiment 2* (C-REX 2, PI: M. Conde) sounding rocket mission
- Oversaw integration of rMPIs onto NASA's *VISualizing Ion Outflow via Neutral atom Sensing 2* (VISIONS 2, PI: D. Rowland) sounding rocket mission

### Mechanical Design Engineer & MWD Technician

*QCD Technologies – T. Russell – 403 235 0720*

Calgary, AB

*May 2014 – Oct. 2014*

- Designed vertical shock absorber servicing tools used in Measurements While Drilling (MWD) technology

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## LEADERSHIP ROLES & COMMUNITY INVOLVEMENT

### Van Irsel Medical Board Member

Consult on product and software development, including machine learning methods

[vanirselmedical.com](https://vanirselmedical.com)

*Since Feb. 2025*

<b>Department Graduate Student Treasurer</b>	Dartmouth College
Propose community funding, generate/manage yearly budgets and reimbursements	<i>Since Feb. 2024</i>
<b>Department Building Committee Liaison</b>	Dartmouth College
Restore and refurbish community spaces, reorganizing and redesigning office spaces	<i>Since Oct. 2024</i>

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#### SELECTED PUBLICATIONS

- van Irsel, J., Lynch, K., Mule, A., Zettergren, M., Burchill, J., (2025), Data-Driven 3D Simulations of Auroral Arc Systems, *Journal of Geophysical Research: Space Physics*. Manuscript in preparation.
- van Irsel, J., Lynch, K., Mule, A., Zettergren, M., (2024), Generation of top boundary conditions for 3D ionospheric models constrained by auroral imagery and plasma flow data, *Journal of Geophysical Research: Space Physics*.

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#### AWARDS & SCHOLARSHIPS

<b>NASA FINESST:</b> Future Investigators in NASA Earth and Space Science and Technology	2023
<b>NSERC USRA:</b> Undergraduate Student Research Award (Declined)	2018
<b>PURE Award:</b> Program for Undergraduate Research Experience Award	2017

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#### COURSES

<b>Incoherent Scatter Radar Summer School</b>	Virtual
Theory, concepts, and hands-on experiment design for incoherent scatter radars	<i>July 2020</i>
<b>Machine Learning</b>	Virtual
Coursera class on <i>Supervised Machine Learning: Regression and Classification</i>	<i>Dec. 2019</i>

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#### SELECTED CONFERENCES

<b>2025 AGU Chapman Meeting</b>	Melbourne, AUS
Oral: <i>Current Continuity in Auroral System Science: Data-Driven Auroral GEMINI 3D Simulation</i>	
<b>2024 AGU Fall Meeting</b>	Washington, DC
Oral: <i>Current Continuity in Auroral System Science: 3D Data-Driven Auroral GEMINI Simulation</i>	
<b>2024 CEDAR Workshop</b>	San Diego, CA
Poster: <i>Current Continuity in Auroral System Science: Data-Driven Auroral GEMINI Simulations</i>	

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#### TECHNICAL SKILLS

**Software:** Autodesk Inventor and Showcase, Solidworks, Solidworks Visualize, Paraview, VisIt, Dipstrace

**Programming Languages:** Python, MATLAB, Mathematica, FORTRAN, HTML/CSS/JavaScript, C

**Developer Tools:** Git, VS Code, Windows Subsystem for Linux, high performance computing, multi-threading, Slurm Workload Manager, Portable Batch System

**Other:** Computer Aided Design, surface-mount soldering, prototyping, Geometric Dimensioning and Tolerancing, precision machining

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#### PERSONAL INTERESTS

**Analog Photography:** Experimenting with film photography, including developing negative film

**Coding projects:** E.g. personal finance tool for organizing transactions and generating reports, PyTorch based convolutional, sequential neural network model for denoising

**Website design:** I have thoroughly enjoyed building my website from the ground up while learning HTML, CSS, and JavaScript

**Traveling:** I am always happy to travel and explore; from Melbourne, Australia to Ny-Ålesund, Svalbard