Jules van Irsel

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Professional Summary

Experimental space plasma physicist adept in mechanical, electrical, and commercial product design, engineering, manufacturing, and testing. Proficient in understanding the core branches of physics, multilingual computational physics and large data management. a sentence in how im interested in almost everything which has made me pick up different skills quickly and something something interdisciplinary

Education

Dartmouth College — Hanover, NH
Doctor of Philosophy in Physics, — *Sep. 2019 – Present*

University of Calgary — Calgary, AB
Bachelor of Science (Honours), Major in Astrophysics, 4.00 — *Sep. 2014 – June 2018*

Southern Alberta Institute of Technology — Calgary, AB
Mechanical Eng. Tech. (Honours), Major in Design and Development, 3.96 — *Sep. 2012 – June 2014*

Experience

Graduate Student — Hanover, NH
Dartmouth College – K. A. Lynch – (603) 646 9311 — *Sep. 2019 – Present*

- Thesis proposed and accepted: "Current Continuity in Auroral System Science: A 3D Modelling Approach to Current Closure in Non-Sheetlike Auroral Arcs"
- Aided in developing NASA's ROSES-2022 HLCAS proposal: "Geophysical Non-Equilibrium Ionospheric System Science (GNEISS) Rocket"
- Aided in developing NASA's MIDEX-2019 proposal and through its Phase A Concept Study Report: "Auroral Reconstruction CubeSwarm (ARCS)"
- Ran multiple multifluid ionospheric 3D plasma simulations using the Geospace Environment Model of Ion-Neutral Interactions (GEMINI) and developed several tools for driving the model as well as visualizing the resulting rich data volumes
- machine learning stuff?
- planet + assymetry work?
- Vacuum/plasma tested Petite Ion Probes (PIP) and oversaw their integration onto NASA's LAMP sounding rocket mission

Instrument Design and Assembly Assistant — Calgary, AB
University of Calgary – J. K. Burchill – (403) 220 8108 — *May 2018 – Aug. 2019*

- Mechanically and electrically redesigned a Miniature Plasma Imager (MPI) lowering its power consumption and introducing optical baffling
- Assisted in MPI environment testing (vacuum, vibration, plasma, etc.) and oversaw its integration onto NASA's C-REX 2 sounding rocket mission
- Oversaw integration of an MPI onto NASA's VISIONS 2 mission

Research Internship — Calgary, AB
University of Calgary – J. K. Burchill – (403) 220 8108 — *May 2017 – Oct. 2017*

- Summer research into ionospheric upflow in the topside F-Region
- Used ESA's SWARM data to perform a superposed epoch analysis using electron temperature enhancements (as a probe for electron precipitation) and ion vertical flow

– Preliminary work for my BSc honours thesis

Mechanical Design Engineer & MWD Technician Calgary, AB
QCD Group of Companies – T. Russell – (403) 700 5355 *May 2014 – Oct. 2014*

– Helped maintain and service vertical shock absorbers used in measurements while drilling (MWD) technology
– Designed a first prototype of a bearing removal tool used in servicing the shock absorber

Publications

– van Irsel, J., Burchill, J. K., Knudsen, D. J., Buchert, S. C., (2023), Local, small scale, highly correlated ion upflows and electron temperatures in the high latitude topside ionosphere, *Journal of Geophysical Research: Space Physics.* Manuscript in preparation.

Conferences

2022 AGU Fall Meeting Chicago, IL
Poster: "Auroral System Science: Determining Geophysical Boundary Conditions for Multifluid Volumetric Simulations of Auroral Arcs"

2022 CEDAR Workshop Austin, TX
Oral: "Two Threads for 3D Auroral Modelling: How to Drive and How to See"
Poster: "Auroral System Science: Multifluid 3D GEMINI Simulations of Auroral Arc Ionospheric Current Closure"

2021 AGU Fall Meeting Virtual
Oral: "The Effect of Hall Conductance Gradients on Field-Aligned Currents in Non-Sheet-Like Auroral Arcs"

2021 CEDAR Workshop Meeting Virtual
Poster: "FAC Contributions from Hall Conductance Gradients in Non-Sheet-Like Auroral Arcs"

2020 CEDAR Workshop Virtual
Poster: "Auroral Ionosphere: Combining Swarm Ion Flows and THEMIS Imagery with Machine Learning"

2017 AGU Fall Meeting New Orleans, LA
Poster: "Multi-scale investigation of low-altitude ion upflow and electron temperature correlations in the cusp/cleft ionoshphere"

4th Swarm Science Meeting Banff, AB
Volunteering opportunity

Awards/Scholarships

NSERC USRA: Undergraduate Student Research Award (Declined) 2018

PURE Award: Program for Undergraduate Research Experience Award 2017

Skills Alberta: 4th place in Mechanical Computer Aided Design and Drafting 2012

Technical Skills

Software: Autodesk Inventor, Autodesk Showcase, Solidworks, Solidworks Visualize, Paraview, Dipstrace

Programming Languages: Python, MATLAB, Fortran, HTML/CSS, C

Developer Tools: Git, VS Code, Windows Subsystem for Linux, high performance computing, multithreading

Other: CAD, surface-mount soldering, prototyping, Geometric Dimensioning and Tolerancing