Danika MacDonell

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Education

University of Victoria — Victoria, Canada
Ph.D. in Experimental Particle Physics — 2018–2022

- Thesis: "Search for Dark Matter Produced in pp Collisions with the ATLAS Detector"

University of British Columbia — Vancouver, Canada
M.S. in Experimental Particle Physics — 2016–2018

- Thesis: "Calibration of SuperCDMS Dark Matter Detectors for Low-Mass WIMPs"

University of Victoria — Victoria, Canada
B.S. with Distinction in Honours Physics (Minor in Mathematics) — 2011–2016

- Thesis: "Photon Entanglement: The Search for Einstein's Hidden Variables"

Experience

University of Victoria — Victoria, Canada
Graduate Research Assistant (Doctoral) — Sept. 2018 - July 2022

- Authorship qualification work and PhD dissertation with the UVic ATLAS group
- Developed containerized cloud computing infrastructure for the ATLAS collaboration. Served as primary analyst and contact person for a 7-person international team of scientists searching for dark matter using of particle collision data from the Large Hadron Collider at the CERN laboratory.

ATLAS Collaboration — Remote
Analysis Preservation Contact — Feb. 2020 - Oct. 2021

- Analysis preservation contact person for the ATLAS collaboration (5,000 members)
- Developed numerous analysis preservation workflows using a framework developed for high-energy physics that incorporates Docker, GitLab CI and Kubernetes. Provided technical assistance, liaison, hands-on training events and documentation to support analysis teams in developing their own analysis preservation frameworks.

University of British Columbia and TRIUMF Laboratory — Vancouver, Canada
Graduate Research Assistant (Master's) — Sept. 2016 - Aug. 2018

- DAQ development and detector calibration
- Designed a real-time 'baseline control' algorithm to maintain signal integrity for data collected by solid-state SuperCDMS detectors at the SNOLAB facility. Analyzed calibration data to improve the modelling of ionization yield from nuclear recoil events in the detectors.

Teaching

- **Organizer and Instructor** at CERN — March 2021
  ATLAS Analysis Preservation Tutorial

- **Instructor** at CERN — Summer 2019+2020
  US-ATLAS Computing Bootcamp
- **Instructor** at CERN — February 2020
  ATLAS+CMS Analysis Preservation Bootcamp
- **Lab Instructor** at University of Victoria — Fall 2018-2020
  Physics 102A/110/120

Skills

- **Programming:** Python | C++ | Bash | ROOT | MATLAB | HTML | LaTeX
- **Version Control:** GitHub | GitLab | Git CI/CD
- **Software Virtualization:** Docker | OpenStack | Kubernetes | Terraform
- **Database Management:** MySQL | MariaDB

Languages

- **English:** Fluent
- **French:** Conversational

Recent Projects

- **Dark Matter Search (2019-2022)**

  Analyzed particle collision data to search for evidence of dark matter using the Python, C++ and ROOT programming environments.

- **Solar-powered BC (2019)**

  Used big data techniques (HDFS+PySpark) to estimate energy storage capacity needed for British Columbia to satisfy its energy demand using solar power without curtailment.

- **Kubernetes Computing Site (2018-2020)**

  Developed an automated deployment of a Kubernetes cluster as a grid computing site using Openstack cloud computing infrastructure.

Scholarships and Awards

- University of Victoria Graduate Awards (total value: $15,000) — 2018–2022
- Best Particle Physics Division Poster at Canadian Association of Physicists Congress (value: $300) — 2021
- Charles S. Humphrey Graduate Student Award (value: $2,500) — 2021
- Nora & Mark Degoutiere Memorial Scholarship (value: $13,000) — 2020
- Eric Forster Graduate Scholarship (value: $1,900) — 2019
- UVic Graduate Entrance Awards (value: $14,000) — 2018
- NSERC USRA (value: $4,500) — 2015

Extracurricular Activities

- Physics and Astronomy Graduate Student Association (PAGSA) Sports Representative — Sept. 2020 - Oct. 2021
  Organized weekly runs and bicycle rides, and maintained a slack workspace for planning sports activities.
- Volunteer at UVic ATLAS Masterclass — April 2019 and 2021
  Performed lab demonstrations and mentored high school students, with the aim of introducing students to the field of high energy particle physics.
- Volunteer at Explore UVic — Jan. 2019
  Shared my experience as a student in the Physics and Astronomy department at UVic with prospective students.