

Kevin Karan Singh Multani

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🐙 <https://github.com/kvmu>

Education

- Sept. 2018 – June 2023 🎓 **PH.D. CANDIDATE IN PHYSICS**
Stanford University
Stanford, California, United States of America.
- Sept. 2012 – May 2018 🎓 **B.ASC. ENGINEERING PHYSICS WITH DISTINCTION**
University of British Columbia
Vancouver, British Columbia, Canada.
Specialization: Electrical Engineering
Minor: Honors Mathematics
- Sept. 2007 – June 2012 🎓 **HIGH SCHOOL DIPLOMA**
Enver Creek Secondary School
Surrey, British Columbia, Canada.

Research Experience

- May 2017 – Aug. 2018 🏛️ **RESEARCH ASSISTANT**
Statistics, Biostatistics
University of British Columbia Department of Statistics
Vancouver, British Columbia, Canada.
Supervisor: Dr. Gabriela Cohen-Freue
- Conducting exploratory statistical analyses using R, on urine metabolites to determine if a low-cost kidney disease diagnosis procedure for child kidney transplantation patients is possible.
- May 2016 – Aug. 2016 🏛️ **APPLICATIONS OF QUANTUM COMPUTING CO-OP**
Quantum Computing, Statistical Mechanics
D-Wave Systems
Burnaby, British Columbia, Canada.
Supervisor: Dr. Jack Raymond
- Identified relevant regions of the *D-Wave 2X* Quantum Annealer parameter space to determine its equilibration time and compared it against the classical competition: Quantum Monte-Carlo, Simulated Quantum Annealing, using *Python*.
 - Investigated different solution projection methods of a 40 variable NAE3SAT (Not-All-Equal 3 Satisfiability) problem and how they affected the β value of the projected solution distribution (Boltzmann Distribution). This was a reproduction and extension of Supplementary Materials §4.5, 📄 <https://goo.gl/M5FpHz>.

Research Experience (continued)

Aug. 2015 – Nov. 2015

 **RESEARCH ASSISTANT**

Accelerator Physics, Data Science

Kyoto Research Reactor Institute (KURRI)

Kumatori, Osaka Prefecture, Japan.

Supervisor: Dr. Yoshiharu Mori

- Installed diagnostic equipment (such as beam monitors) on a 150 MeV FIXED-FIELD ALTERNATING GRADIENT (FFAG) proton accelerator, and operated the accelerator to collect data for beam loss experiments.
- Determined new metrics to characterize beam loss by performing time-series data analysis and modeling of the beam signal, using *Python*.

May 2015 – Jan. 2016

 **RESEARCH ASSISTANT**

High Energy Physics, Data Science

Simon Fraser University Department of Physics

Burnaby, British Columbia, Canada

Supervisor: Dr. Bernd Stelzer

- Analyzed CERN (ATLAS) and Monte-Carlo simulated proton-proton collision data with *Python* (PyROOT) and C++ to classify signal and background events for the Vector-Boson Fusion Higgs production into $H \rightarrow WW^*$ decay.
- Implemented the Matrix Element Method (MEM) – a first-principles collision event classification technique on a GPU (PyCUDA) – achieved a $\times 20$ speed up, as compared to the in-house CPU.

Jan. 2014 – May 2014

 **BEAM OPTICS CO-OP**

Accelerator Physics, Magnet Design

Canada's Particle Accelerator Center (TRIUMF)


Vancouver, British Columbia, Canada.

Supervisor: Dr. Thomas Planche

- Set up an in-house magnet measurement system which mainly consisted of a high-voltage power supply, cooling systems, and a multi-channel Gaussmeter (Lakeshore 460 3-Channel).
- Discovered an issue with one type of magnet and saved weeks of commissioning time for the *Advanced Rare Isotope Laboratory (ARIEL)* electron linear accelerator.
- Demagnetized the ARIEL e -linac hall, using a demagnetization technique verified by experimentation using the magnet testing system [1].

Research Activity




Conference Proceedings

- 1 Planche, T., Koscielniak, S., Baartman, R., Arias, G., LeRoss, T., **Multani, K.**, ... Zuiderveen, T. (2016). Demagnetization of an Entire Accelerator Vault. In *Proceedings, 7th International Particle Accelerator Conference (IPAC 2016)*. Busan, South Korea. 
<https://goo.gl/kxnZyB>




Projects

- Sept. 2017 – Mar. 2018  **EXPERIMENTAL INVESTIGATIONS OF MATERIALS BY ULTRAFAST PHOTOEMISSION SPECTROSCOPY**
Condensed Matter Physics, Quantum Materials
Stewart Blusson Quantum Matter Institute
Vancouver, British Columbia, Canada.
Supervisors: Michael Stewart, Dr. Andrea Damascelli
- Commissioning and testing an Angular Resolved Photoemission Spectroscopic (ARPES) system (<2 meV resolution) that will allow for time-resolved measurements (TR-ARPES) at multiple photon energies. Tests include studying the electronic structure of polycrystalline gold and the topological insulator Bi₂Se₃.
 - Commissioning activities include: assembly of the experiment, precision leak checks of the ultra-high vacuum ($\approx 10^{-12}$ Torr), wiring the electrical and measurement systems, and machining small parts.
- Jan. 2017 – Apr. 2017  **STAT 450: STUDENT FINAL EXAM PERFORMANCE AND EXAM SCHEDULING**
Statistical Consulting, Statistics
University of British Columbia
Vancouver, British Columbia, Canada.
Clients: Dr. Jackie Stewart, Dr. Gregory Dake
- Showed statistically significant effects of exam-scheduling on students' final exam performance, using a *Mixed Effect Model* with *R* on 2nd and 3rd year UBC CHEM course data from 2010 to 2015.
 - Presented results of the study at the UBC Science Education Open House poster session.
- May 2017 – May 2017  **WORKSHOP: LIGHTCURVE CLASSIFICATION**
Astrostatistics, Machine Learning
North Carolina State University
Raleigh, North Carolina, United States.
 <https://goo.gl/6ApCpq>
- Achieved a 81.59% classification accuracy (near/at state-of-the-art) on 16 classes of stars using a Random Forest classifier, using data from the Catalina Real-time Transient Survey with a combined *R* and *Python* pipeline.
- Sept. 2016 – June 2018  **Senior Design Project II: EQUATIONARY**
Entrepreneurship, Co-Founder
University of British Columbia
Vancouver, British Columbia, Canada.
 <https://equationary.com/> (link may be broken)
- Assisted with the full-stack development isomorphic React web-application – an online dictionary of equations.
 - Populated website database (*MongoDB*) with 622 equations in mathematics and physics.

Projects (continued)

- Sept. 2015 – Apr. 2016  **SENIOR DESIGN PROJECT I: CANCER IMAGING TECHNIQUE USING ULTRASOUND TIME SERIES**
Ultrasound Physics, Machine Learning
University of British Columbia
Vancouver, British Columbia, Canada.
- Supervisor: Dr. Purang Abolmaesumi
- Applied Support Vector Machine (SVM) classification techniques to investigate acoustic noise in ultrasound Radio-Frequency Time-Series (RFTS) based tissue classification, using *MATLAB* and *Python*.
 - Developed a bio-physical model to gain insight into the physical mechanisms of how different media interact uniquely with ultrasound signals.
- May. 2014 – Aug. 2014  **ENPH 253: UBC ENGINEERING PHYSICS ROBOTICS COMPETITION**
Engineering Design, Robotics
University of British Columbia
Vancouver, British Columbia, Canada.
-  <https://goo.gl/LDfTnB>
- Prototyped and assembled a zip-lining robot and placed 3rd out of 14 teams in the UBC Engineering Physics Robotics Competition.
 - Integrated and tested the robot's mechanical, electrical and software systems, as the Systems Integration Lead.
 - Assisted in the mechanical and electrical design and fabrication of the robot. Mechanical fabrication included the usage of Water Jet, Laser Cutter, and 3D printing technologies.

Teaching

- Sept. 2017 – Dec. 2017  **MATH 180 RECITATION INSTRUCTOR**
University of British Columbia
Vancouver, British Columbia, Canada.
- Calculus I (Differential).
- Jan. 2018 – Apr. 2018  **MATH 101 VANTAGE RECITATION INSTRUCTOR**
University of British Columbia
Vancouver, British Columbia, Canada.
- Calculus II (Integral).
-  **STAT 450 TEACHING ASSISTANT**
University of British Columbia
Vancouver, British Columbia, Canada.
- Case Studies in Statistics (project-based).

Honours and Awards

- May 2017  **NSERC UNDERGRADUATE STUDENT RESEARCH AWARD, *University of British Columbia Department of Statistics.* Vancouver, British Columbia, Canada.**

Honours and Awards (continued)

- Nov. 2016 **■ \$10,000 BYCAST AWARD TO PROMOTE ENTREPRENEURSHIP, *University of British Columbia Department of Engineering Physics*. Vancouver, British Columbia, Canada.**
- May 2016 **■ NSERC INDUSTRIAL UNDERGRADUATE STUDENT RESEARCH AWARD, *D-Wave Systems*. Burnaby, British Columbia, Canada.**
- May 2015 **■ UNDERGRADUATE STUDENT RESEARCH AWARD, *Simon Fraser University Department of Physics*. Burnaby, British Columbia, Canada.**
- June 2013 **■ GOVERNOR GENERAL'S ACADEMIC MEDAL (BRONZE), *Government of Canada, Surrey, British Columbia, Canada*.**
- Sept. 2012 **■ CHANCELLOR'S SCHOLAR, *University of British Columbia, Vancouver, British Columbia, Canada*.**
- June 2012 **■ TRIUMF HIGHSCHOOL FELLOWSHIP, *TRIUMF*. Vancouver, British Columbia, Canada.**
- BCIC SCIENCE ACHIEVEMENT AWARD, *BC Innovation Council*. Surrey, British Columbia, Canada.**

Professional Development

- May 2017 **☑ INTERDISCIPLINARY WORKSHOP FOR UNDERGRADUATES, *North Carolina State University, Raleigh, North Carolina, United States*. 5-day workshop fully funded by The Statistical and Applied Mathematical Sciences Institute (SAMSI) and The Canadian Statistical Sciences Institute (CANSSI). [🔗 https://goo.gl/vhqnx6](https://goo.gl/vhqnx6).**
- Apr. 2017 **☑ SCIENCE EDUCATION OPEN HOUSE, *University of British Columbia, Vancouver, British Columbia, Canada*. Poster session showcasing the results of my *final exam-student performance* project. [🔗 https://goo.gl/YoxRV7](https://goo.gl/YoxRV7).**
- Oct. 2016 **☑ CAL HACKS 3.0, *University of California Berkeley, Berkeley, California, United States*. Funded Hackathon event, created social-strategy mobile application with group of 5 people. [🔗 https://goo.gl/z3493t](https://goo.gl/z3493t).**
- Sept. 2015 **☑ FFAG '15 CONFERENCE, *Kyushu University, Fukuoka, Fukuoka Prefecture, Japan*. International conference for Fixed-Field Alternating-Gradient Accelerators (FFAG). Attended the FFAG mini-school and the workshop as a student.**
- Sept. 2013 **☑ CYC '13 CONFERENCE, *TRIUMF, Vancouver, British Columbia, Canada*. International conference for cyclotrons. Attended the workshop as a student. [🔗 https://goo.gl/MLVC11](https://goo.gl/MLVC11)**
- Oct. 2012 **☑ TEDxKIDSBC, *Telus Sphere of Science, Vancouver, British Columbia, Canada*. An independently organized TED event as children as the main speakers. Attended as a Workshop Coordinator to lead a workshop in "how to most effectively bringing ideas into reality". [🔗 https://goo.gl/zJk9mr](https://goo.gl/zJk9mr)**