

Daniel KORCHINSKI

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EDUCATION

<i>Ongoing</i> MAY 2019	PhD in PHYSICS, The University of British Columbia Mesoscale modelling of the yielding transition. Advisor: Prof. Jörg Rottler
MAY 2019 JUNE 2017	Masters of Science in PHYSICS, The University of Calgary Thesis Title: “The Universal Critical Dynamics of Noisy Neurons”, Advisor: Prof. Jörn Davidsen
JUNE 2017 SEPT 2013	Honours Bachelor of Science in PHYSICS, The University of Calgary Full honours. 3.96 GPA. Thesis: “Neuronal Avalanches Under Coarse Graining in Realistic Brain Models”. Advisor: Prof. Jörn Davidsen
JUNE 2017 SEPT 2013	Bachelor of Science in GENERAL MATHEMATICS, The University of Calgary Awarded with distinction. Subject GPA 4.0
WINTER 2016	Exchange Semester The University of Oslo

RESEARCH EXPERIENCE

ONGOING MAY 2019	PhD Candidate and QuEST Fellow, University of British Columbia Developed highly optimized numerical routines for the simulation of mechanically and thermally driven mesoscale amorphous solids. Published results and presented at international conferences. Collaborated with renowned artist through the ARS SCIENTIA program, leading to media interviews, internal and public seminars, and an invited colloquium talk. Led graduate student reading group on stochastic calculus.
MAY 2019 JUN 2016	Research Assistant in THE COMPLEXITY SCIENCE GROUP, Calgary Statistical Physics of Neuronal Systems Derived a mapping between biological data and neuron simulations. Developed and deployed massively parallel simulations of neurons to a distributed computing cluster. Wrote custom software to analyze the resulting activity pattern. Completed award winning Masters thesis and published results in high-impact journal (PRX).
FEB 2015	CaNoRock Telemetry Team Lead, Andøya, Norway Travelled to the Norwegian Arctic to launch a decommissioned surface-to-air missile repurposed into a scientific sounding rocket. Led small international team of Canadians and Norwegians, who assembled and operated the telemetry electronics.
AUG 2015 JUL 2014	Research Assistant at the EXPERIMENTAL IMAGING CENTRE, Calgary Operated the magnetic resonance imaging system unsupervised (the only undergraduate to be permitted to do so), which I used to collaborate with other researchers. Developed a data acquisition and analysis pipeline for a near-infrared spectroscopy system examining metabolic markers in mice. Attended weekly neuroscience seminars at the Hotchkiss Brain Institute. Published papers and spoke at conferences.
AUG 2013 JUN 2012	Summer high-school researcher at the QC2 LAB, Calgary For two summers, developed experiment control software for entangled photon generation and quantum cryptography. Resulted in a conference display and publication.

PUBLICATIONS

- 2022 | **Korchinski, D. J.**; Rottler, J., Dynamic phase diagram of plastically deformed amorphous solids at finite temperature ([ArXiv: 2204.07545](#)) *Under review at Physical Review E*
- 2021 | **Korchinski, D. J.**; Orlandi, J. G.; Son, S.W.; Davidsen, J. A., Criticality in spreading processes without time-scale separation and the critical brain hypothesis. *Physical Review X* 2021, 11 (2)
- Korchinski, D. J.**; Ruscher, C.; Rottler, J., Signatures of the spatial extent of plastic events in the yielding transition in amorphous solids. *Physical Review E* 2021, 104 (3)
- 2019 | **Korchinski, D. J.**; Orlandi, J. G.; Son, S.W.; Davidsen, J. A., Universality of spreading processes with spontaneous activity. *Physics in Canada* 2019, 75 (2).
- 2017 | Yang, R.; Sarkar, S.; **Korchinski, D. J.**; Wu, Y.; Yong, V. W.; Dunn, J. F., MRI monitoring of monocytes to detect immune stimulating treatment response in brain tumor. *Neuro-Oncology* 2017, 19 (3), 364-371.
- 2015 | Valivarathi, R.; Lucio-Martinez, I.; Chan, P.; Rubenok, A.; John, C.; **Korchinski, D.**; Duffin, C.; Marsili, F.; Verma, V.; Shaw, M. D.; Stern, J. A.; Nam, S. W.; Oblak, D.; Zhou, Q.; Slater, J. A.; Tittel, W., Measurement-device-independent quantum key distribution: from idea towards application. *Journal of Modern Optics* 2015, 62 (14), 1141-1150.
- Korchinski, D. J.**; Taha, M.; Yang, R.; Nathoo, N.; Dunn, J. F., Iron Oxide as an MRI Contrast Agent for Cell Tracking. *Magnetic Resonance Insights* 2015, 8 (Suppl 1), 15.
- 2014 | V.R.R. Valivarathi, P. Chan, I. Lucio-Martinez, **D. Korchinski**, C. Duffin, J.A. Slater, and W. Tittel. *Measurement-Device Independent Quantum-Key Distribution with id210 Detectors* Application Note, ID Quantique

PRESENTATIONS & CONFERENCES

- 2022 | “Thermal effects and scaling theory for the yielding transition in amorphous solids” **Korchinski, D. J.**; Rottler, J. (Talk for APS March Meeting 2022, 14/03/2022)
- “Ars Scientia: An artist and a physicist walked into a glassblowing studio...” **Korchinski, D. J.** (Invited colloquium talk, University of British Columbia, 02/17/2022)
- 2021 | “Collective and finite-size effects on local yield distributions in mesoscopic models of amorphous plasticity” **Korchinski, D. J.**; Ruscher, C.; Rottler, J. (Talk for APS March Meeting 2021, 19/03/2021)
- “Signatures of Spatial Extent in Microstructure of Plastic Yielding in Amorphous Solids” **Korchinski, D. J.**; Ruscher, C.; Rottler, J. (Poster for the Advanced School in Soft Condensed Matter 2021, 05/07/2021)
- 2020 | “Criticality without time-scale separation between avalanche initiation and spreading” **Daniel J. Korchinski**, Javier G. Orlandi, Seung-Woo Son, Jörn Davidsen (Submitted talk for Brain Criticality Virtual Workshop 2020, 06/10/2020)
- 2019 | “Universal Critical Dynamics of Noisy Neurons” **Daniel J. Korchinski**, Javier G. Orlandi, Seung-Woo Son, Jörn Davidsen (Poster presentation for Beg Rohu workshop 2019, Saint Pierre, Brittany, France, 24/06/2019)
- “Universality of Spreading Processes with Spontaneous Activity” **Daniel J. Korchinski**, Javier G. Orlandi, Seung-Woo Son, Jörn Davidsen (Submitted talk for Canadian Association of Physicists 2019 Congress, **1st place in oral competition**. Burnaby, British Columbia, 05/06/2019)
- “The Universality of Neurons Driven by Noise” **Daniel J. Korchinski**, Javier G. Orlandi, Seung-Woo Son, Jörn Davidsen (Conference talk for the International Workshop on Function, Information Spreading, and Percolation in Brain Networks, Pohang, South Korea, 13/05/2019)
- 2018 | “Unveiling Criticality in Noisy Non-equilibrium Systems” **Daniel J. Korchinski**, Javier G. Orlandi, Rashid Williams-Garcia, Jörn Davidsen (Conference talk for The Canadian Association of Physicists 2018 Congress, Halifax, Nova Scotia, 13/06/2018)
- “Signatures of Griffiths Phases in Noisy Neuronal Systems” **Daniel J. Korchinski**, Jörn Davidsen (Talk, *3rd* annual PHAS DGA Research Symposium, 21/02/2018)
- “Smearred Phase Transitions in Noisy Neural Systems” **Daniel J. Korchinski**, Jörn Davidsen (Poster presentation for UCalgary GSA Peer Beyond Symposium, Calgary, Alberta, 20/02/2018)

- 2017 “Research in the Complexity Science Group” **Daniel J. Korchinski**, Jörn Davidsen (Invited talk at PASA Research Day, Calgary, Alberta, 23/11/2017)
- 2015 “Imaging inflammatory cell infiltration in brain tumors using iron base contrast and 9.4T MRI” Runze Yang, Susobhan Sarkar, **Daniel J. Korchinski**, Ying Wu, V. Wee Yong, Jeff F. Dunn (Non-peer reviewed abstract for Cummings Radiology Research day, Calgary, Alberta 05/21/2015)
- “Absolutely Quantified NIRS” **Daniel Korchinski**, Thomas Johnson, Jeff Dunn (Rapid fire talk at Alberta Imaging Symposium, 05/2015)
- “Detection of the mitochondrial enzyme cytochrome c oxidase in the brain of a mouse model”. **Korchinski DJ**, Johnson T, Dunn JF (Conference talk, 16th Annual Alberta Biomedical Engineering Conference, Banff Alberta, 10/2015)
- 2014 “Developing an Optical Measure of in Vivo Mitochondrial Redox Status in Rodent Brain” **Daniel Korchinski**, Thomas Johnson, Jeff Dunn (Conference Poster, 15th Annual Alberta Biomedical Engineering Conference, Banff, Alberta, 10/2014)
- “Developing a Comprehensive Noninvasive Metabolic Imaging Suite” **Daniel Korchinski**, Thomas Johnson, Jeff Dunn. (Conference Talk, Hotchkiss Brain Institute Summer Student Symposium, Calgary, Alberta, 08/2014)
- 2013 “Measurement-Device-Independent QKD – The Next Generation” P. Chan, C. Duffin, **D. Korchinski**, I. Lucio-Martinez, A. Rubenok, J. A. Slater, R. Valivarthi, W. Tittel (Conference Poster, at QCrypt 2013, Waterloo, Ontario, 08/13)

SCHOLARSHIPS AND CERTIFICATES

- 2022 President’s Academic Excellence Initiative PhD Award (1300 CAD)
- 2021 2nd Place, McGill Phys Hackathon | Fracl Frost Spreading Dynamics (175 CAD)
- 2021 President’s Academic Excellence Initiative PhD Award (1300 CAD)
- 2021 NSERC CGS: D Fellowship (35,000 CAD/year, 3 years)
- 2020 2nd Place, McGill Phys Hackathon | Relativistic Raytracing Demoscene (175 CAD)
- 2020 President’s Academic Excellence Initiative (1300 CAD)
- 2020 UBC Four Year Doctoral Fellowship (18,200 CAD/year, received once before NSERC CGS:D)
- 2019 Chancellor’s Graduate Silver Medal, MSc Thesis Prize
- 2019 QuEST Fellow Travel Grant for Beg Rohu 2019 Workshop (3000 CAD)
- 2019 2019 CAP Congress Best Oral Presentation (600 CAD)
- 2019 Stewart Blossom Quantum Material’s Institute QuEST Scholarship (30000 CAD/year)
- 2019 Alberta Graduate Student Scholarship (3000 CAD)
- 2018 Alberta Innovates Graduate Student Scholarships (12000 CAD)
- 2018 Profiling Alberta’s Graduate Students (Travel Award) (750 CAD)
- 2018 Nathoo Family Scholarship (2000 CAD)
- 2018 NSERC Canadian Graduate Scholarships – Master’s (17500 + 500 departmental CAD)
- 2018 University of Calgary PHAS Major Scholarships Award Holder Top-Up (5000 CAD)
- 2018 Queen Elizabeth II Graduate Scholarship (18000 CAD, declined in favour of NSERC)
- 2017 GRE®: Q:170;V:170 (97th/99th percentile); AWA: 6.0/6.0 (99th percentile)
- 2017 GRE: PHYSICS®: 970 (92nd percentile)

2017 University of Calgary Physics and Astronomy recruitment scholarship (5000 CAD)
2017 University of Calgary program in undergraduate research experience (6000 CAD)
2016 University of Calgary undergraduate merit awards (1100 CAD)
2015 University of Calgary general undergraduate scholarships (700 CAD)
2015 University of Calgary general undergraduate merit awards (2800 CAD)
2015 SUPER Work Bursary (1000 CAD)
2015 Jason Lang Scholarship (1000 CAD)
2015 University of Calgary program in undergraduate research experience (6000 CAD)
2015 NSERC Undergraduate Student Research Programme (5625 CAD)
2014 Students' Union Campus Involvement Awards (1040 CAD)
2014 Viscount Bennett Undergraduate Scholarship (1000 CAD)
2014 Markin USRP Fall-Winter Program (4000 CAD)
2014 McKinney Scholarship (2500 CAD)
2014 SUPER Work Bursary (1000 CAD)
2014 Alberta Innovates Health Solutions Studentship (4500 CAD)
2013 Presidents Admission Scholarship (3000 CAD)
2013 Alexander Rutherford Scholarship (2500 CAD)
2013 Margaret and Ted Newall Bursary (4025 CAD)
2013 Alberta Blue Cross 50th Anniversary Entrance Bursary (1500 CAD)
2013 PADI Open Water Diver

OUTREACH ACTIVITIES

- Volunteer at the University of British Columbia's "Physics Circle" program.
- Volunteered with the University of British Columbia's "Experience Science" program.
- Delivered lectures about my research to local high school students.
- Instructed at the University of Calgary's "Hands on Particle Physics Masterclass" which saw high school students analyze particle data from CERN and find a Higgs boson.
- Invited speaker to local high schools, teaching college preparedness.
- Fund-raised for "Project Mexico", and built a house in Tijuana for a family in need.
- Mentored several undergraduates and helped them secure research positions.
- Volunteered at the local science centre (the Telus Spark) for adult education night.
- Taught the physics AP curriculum at my high school when there was insufficient instructional capacity to run the course.

TECHNICAL SKILLS

- **Scientific Computing.** Have an extensive software development background, and am familiar with C, C++, C#, Fortran, Java, Mathematica, Python, R, Javascript, and Matlab. Experienced with parallelized scientific computing.
- **Abstract Algebra.** Completed graduate-level abstract algebra course, terminating in module theory and algebras. Wrote final paper on Lie algebras in the context of the standard model. Attended seminar series course in operator theory.
- **Experiment Design.** Experienced with typical optical and electrical lab equipment, and specialized medical imaging tools like magnetic resonance imaging. WHIMIS certified.
- **Experimental Analysis.** Extended a data processing pipeline for near-infrared spectroscopy at the Foothills Hospital's Experimental Imaging Centre. Conducted MRI data analysis.

- **Scientific Writing.** I possess a strong command of scientific English. Experienced in typesetting with \LaTeX and preparing figures in gnuplot.

EMPLOYMENT

ONGOING	Teaching Assistant at the University of British Columbia.
MAY 2019	Taught lab sections, graded course work for 2 nd , 3 rd , and 4 th year physics courses.
MAY 2018	Teaching Assistant at the University of Calgary.
SEPT 2017	Developed weekly tutorial lectures and marked papers for Statistical Mechanics I, a 3 rd year course.
MAY 2013	Contract Database Developer for the PLUMB-LINE GROUP, Calgary
MAR 2013	Developed custom database front-end to input and manage business tenders.

EXTRACURRICULAR ACTIVITIES

2015-2016	Physics Department Representative to the Undergraduate Science Council
2014-2016	VP Finance, Neuroscience Students' Association
2014-2015	Electrical team member, Solar Car team, Schulich School of Engineering
2014-2015	VP Society for Young Researchers
2013-2014	Liason for Chemistry Students' Chapter
2012 & 2013	Global Game Jam Competition Programmer

INTERESTS AND ACTIVITIES

Backpacking, Scrambling, Scuba Diving (PADI certified), Skiing, Bouldering
Game Design, Deep Learning, Fractal Visualization
Speculative fiction, Podcasts, Painting, Teaching