JonathanMiller
Young Researcher and Professor of the Graduate Faculty

contact

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0002-7992-8033
https://github.com/jonmiller3

languages
english mother tongue

technical
Fortran, Python,
Boost, OpenCV,
Grid Computing,
C++, OpenCL,
ROOT, SQL, LMDB,
TensorFlow, Caffe,
Docker
& Mathematica

research interests
Neutrino Physics,
& Machine Learning

references
Prof. Will Brooks
william.brooks @ usm.cl
Dr. Gabriel Perdue
perdue @ fnal.gov
Prof. Roman Pasechnik
rpasech @ gmail.com

education

2002–2009 **Doctor** of Philosophy   University of Maryland, College Park (USA)
Measurement of the Electric Form Factor of the Neutron at High Momentum Transfer
Prof. Elizabeth Beise, Experimental Nuclear Physics

1998–2002 **Bachelor** of Arts   Gustavus Adolphus College, Minnesota (USA)
Mathematics and Honors Physics

experience (condensed)

2013–Now **Universidad Tecnica Federico Santa Maria**   Valparaiso, Chile
Leader of the neutrino research group at UTFSM
- Worked to revolutionize reconstruction in modern neutrino experiments by using evolutionary algorithms to determine the hyper-parameters for the application of deep convolutional neural networks and initiated the study of representation transfer and domain adaption in this context.
- Supervised and directed research into domain adversarial training.
- Lead effort to use semantic segmentation for event reconstruction.
- Developed software infrastructure for producing images from physics data and doing interference with Caffe/Tensorflow within software frameworks.
- Supervised PhD students Roger Galindo and Barbara Yaeggy.
- Local Organizing Committee member for the 17th International workshop on Advanced Computing and Analysis Techniques (ACAT), and the 5th/6th International Workshops on High Energy Physics in the LHC Era.
- Taught courses in experimental particle physics and scientific computing.

2012–2012 **Vrije Universiteit Brussel,**   Brussels, Belgium
Postdoctoral Researcher
- Began development of a new multi-class classifier in OpenCL.

2009–2011 **Uppsala University,**   Uppsala, Sweden
Postdoctoral Researcher
- Introduced proposal to take calibration runs with flasher LEDs to measure the quantum efficiency of the detector modules buried in the ice.
- Led efforts to take this calibration data, wrote steering scripts and files and improved the modules used to acquire and analyze this data.
- Used this data to study the light propagation properties of ice, and to test the sensitivity of buried detector modules.
- Investigated photon transport, in particular Mie scattering in the ice.
- Introduced new scattering function which has been key to improvements in understanding of photon transport in the ice.

2002–2009 **University of Maryland,**   College Park, Maryland
Teaching and Research Assistant
Measurement of the electric form factor of the neutron at Jefferson Laboratory.
- Commissioned and served as analysis and detector expert for the large (over 400 counters) neutron detector over the course of the experiment.
- Led tutorial and laboratory sections for Engineers and Life Scientists.

academic awards and presentations (selected)

2018	**FONDECYT-CONICYT 1181481 REGULAR (DECLINED)**	CONICYT, Chile

Prime Investigator on Exploring the Universe with Neutrinos during 2018-2021. Total offered 228.000k CLP (378k USD in January 2018) over four years ending March 2022.

2017	**ASCR Leadership Computing Challenge (ALCC) award**	Oakridge, USA

Co-Prime Investigator (Prime Investigator G. Perdue) on Large scale deep neural network optimization for neutrino physics. Allocation of 58,000,000 processor hours on the Titan supercomputer in 2017/2018.

2013	**FONDECYT-CONICYT 11130133 INICIACION EN INVESTIGACION**	CONICYT, Chile

Prime Investigator on Analysis within the MINERvA experiment during 2013-2016. Total award 133.328k CLP (255k USD in November 2013) over four years ending October 2017.

2017	**Oral Presentation**	Division of Particles and Fields Meeting, Fermilab

Exploration of Deep Convolutional and Domain Adversarial Neural Networks in MINERvA.

2015	**Oral Presentation**	Quarks and Nuclear Physics, invited, Chile

Probing nuclei with neutrinos.

2014	**Oral Presentation**	KITP Present and Future Neutrino Physics, invited, California

Quantum Gravity Effect on Neutrino Oscillation.

publications (selected)

article

Reducing model bias in a deep learning classifier using domain adversarial neural networks in the MINERvA experiment
G. N. Perdue et al.
JINST 13.11 (2018) P11020. 2018

Evolving Deep Networks Using HPC
Steven R. Young, Derek C. Rose, Travis Johnston, William T. Heller, Thomas P. Karnowski, Thomas E. Potok, Robert M. Patton, Gabriel Perdue, Jonathan Miller
Proceedings of the Machine Learning on HPC Environments, 2017, Denver, CO, USA

Quasi-Classical Gravity Effect on Neutrino Oscillations in a Gravitational Field of a Heavy Astrophysical Object
Jonathan Miller, Roman Pasechnik
Adv. High Energy Phys. 2015 (2015) p. 381569. 2015

Evidence for High-Energy Extraterrestrial Neutrinos at the IceCube Detector
M. G. Aartsen et al.
Science 342 (2013) p. 1242856. 2013

Measurement of South Pole ice transparency with the IceCube LED calibration system
M. G. Aartsen et al.
Nucl. Instrum. Meth. A711 (2013) pp. 73–89. 2013

Measurements of the Electric Form Factor of the Neutron up to $Q^2 = 3.4 GeV^2$ using the Reaction $^3He^{-}>(e^{-}>, e'n)pp$
S. Riordan et al.
Phys. Rev. Lett. 105 (2010) p. 262302. 2010