Daine L. Danielson

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Education

B.S. Applied Physics
Emphasis Computational Physics
Minor Mathematics
University of California, Davis, 2017

Nuclear Science and Security Consortium Student 2012–2016
NSSC Summer School 2012, 2013; 2014 LANL School of Nukes

Work Experience

Entrepreneurship & Leadership

Cofounder, Chief Architect
Whitekoat, Inc.; 2014–present.

Building humane artificial intelligence technology for medical clinicians and researchers. Our customers include the University of California, Davis School of Medicine.

Founder, Chair
Los Alamos National Laboratory Distinguished Publication Committee; 2018–present.

Cofounder
Sacramento Startup Developers; 2017–present.

Theory

Post-Baccalaureate Researcher with Dr. Anna C. Hayes
Nuclear, Particle, Astrophysics and Cosmology Group; Theoretical Division; Los Alamos National Laboratory; 2018–present.

Demonstrated the robustness of reactor-based neutrino mass hierarchy experiments against the fine structure of reactor antineutrino spectra. Considered all individual beta decay components, calculated the response of a detector like JUNO, and compared the mass hierarchy and fine structure effects.

Modeling the quasi-degenerate transition into a Fermi plasma of deuterium and tritium in fusile conditions using reaction-in-flight neutron activation data from Lawrence Livermore National Laboratory's National Ignition Facility.

Experiment

Neutrino and Nuclear Physics Intern with Prof. Robert C. Svoboda and Prof. Christopher M. Mauger
Neutrino and Dark Matter Group; Dept. of Physics; University of California, Davis; 2011–2017.
Subatomic Physics Group, LANSCE, Physics Division, Los Alamos National Laboratory, 2014–2017.

Designed, built, and tested cryogenic in-situ photon detection system for mini-CAPTAIN liquid argon time-projection chamber. Designed, developed, installed, and maintained photonics data acquisition software and hardware for mini-CAPTAIN.

Performed first laser calibration and laser timing measurement for mini-CAPTAIN.
Diagnosed and mitigated severe wire-plane crosstalk in mini-CAPTAIN.

Deep Underground Neutrino Experiment (DUNE) detector and data acquisition research and development (CAPTAIN and mini-CAPTAIN liquid argon time-projection chambers, water-Cherenkov far detector).

CANDU reactor antineutrino monitoring science applications development (transportable liquid scintillator detector).

Application

Neutrino and Nuclear Physics Intern with Dr. Adam Bernstein
Rare Event Detection Group, Lawrence Livermore National Laboratory, 2013, 2015–2018.

Investigated new experimental and mathematical approaches to the neutrino mass hierarchy problem. Demonstrated applications for AIT / WATCHMAN (water-Cherenkov nonproliferation detector) in measuring the neutrino mass hierarchy at some baselines.

Derived two models, one analytical and one Monte-Carlo, for the inverse beta decay double-vertex distribution in Gadolinium doped liquid scintillator. Characterized sensitivity of a 1 kT Gadolinium doped liquid scintillator detector to detect an unknown low-power reactor proximal to a known energy reactor.

Student Researcher with Prof. Barbara J. Neuhauser
Cryogenic Electronics Group, Dept. of Physics and Astronomy, San Francisco State U., 2009–2010.

Developed next-generation tantalum-based and niobium-based superconducting tunnel junctions for X-ray spectroscopy at Lawrence Berkeley National Laboratory.

Investigated Gadolinium film based portable neutron detectors for San Francisco Police Department.

Publications

Authored

Reactor Neutrino Spectral Distortions Play Little Role in Mass Hierarchy Experiments.
Daine L. Danielson, A. C. Hayes, G. T. Garvey.
Phys. Rev. D (in preparation).

Detecting a Second, Unknown Reactor in the Mid-Field with a 1 kT Cylinder of GdLS.
D. L. Danielson for the AIT / WATCHMAN collaboration.
Phys. Rev. Applied (in review).

Design and Characterization of a Fast Neutron Beam Facility at the Crocker Nuclear Laboratory 76-inch Isochronous Cyclotron.
C. Grant, N. Walsh, A. Manalaysay, E. Pantic, R. Svoboda, K. Bilton, **D. Danielson**.
Nucl. Inst. Meth. Phys. Res. A (in preparation).

Neutron measurement with the mini-CAPTAIN Liquid Argon Time-Projection Chamber Detector.
C. E. Taylor, W. Sondheim, **D. L. Danielson**, *et al.* for the CAPTAIN collaboration.
Nucl. Inst. Meth. Phys. Res. A (in preparation).

CAPTAIN Electronics Technical Report.
Charles Taylor, Richard Van de Water, David Lee, Jacqueline Mirabal-Martinez, Walter Sondheim, Robert Cooper, **Daine Danielson**, and Peter Madigan.
Los Alamos Unlimited Release LA-UR-16-24370 (2016).

Study of Neutron Interactions in a Liquid Argon Time Projection Chamber.
E. Guardincerri, D. Cline, R. Svoboda, **D. Danielson**, *et al.*
Los Alamos Neutron Science Center Proposal NS-2016-7313-A (2016).

CAPTAIN-MINERνA: Neutrino-Argon Scattering in a Medium-Energy Neutrino Beam.
Los Alamos Unlimited Release LA-UR-15-28458, Fermilab Proposal 1061 (2015).

Large Reactor-Neutrino Mixing Angle Supports a Fourier Approach to the Mass Hierarchy Problem.
Daine L. Danielson.
Explorations: the UC Davis Undergraduate Research Journal 17 (2015).

The Long Baseline Neutrino Experiment (LBNE) Water Cherenkov Detector (WCD) Conceptual Design Report (CDR).
arXiv:1204.2295 [physics.ins-det] (2012)

Acknowledged

Development of Tantalum-Based Superconducting Tunnel Junction Detectors for X-Ray Absorption Spectroscopy.
Faustin Carter. *Master's Thesis, M.S. Physics, San Francisco State University (2009).*

Invited Talks

Physics

Status of the Field of Reactor Antineutrino Directionality; Lawrence Livermore National Laboratory
Applied Antineutrino Physics 2018 – October 2018

Career

Physics Mentality – Open Mind Opens Doors, 2015
UC Davis Alumni Physics Careers Seminar.

Talks

Determining the Neutrino Mass Hierarchy, Despite Nuclear Structure;
Theoretical Division, Los Alamos National Laboratory
2018 T Division Lightning Talks – 2018

Distinguishing Two Reactors using Directional Methods; Lawrence Livermore National Laboratory
WATCHMAN Collaboration Meeting – August, 2016.

Time Projection Chamber / Photon Detection System DAQ Synchronization; Santa Fe, New Mexico
CAPTAIN Collaboration Meeting – July, 2016.

Neutrino Detector Design for Directional Mid-Field Nuclear Nonproliferation, 2016
UC Davis 27th Annual Undergraduate Research, Scholarship & Creative Activities Conference.

mini-CAPTAIN Photon Detection System Summary; Santa Fe, New Mexico–2015
CAPTAIN Collaboration Meeting – November, 2015.

Diagnosing and Mitigating Electronic Noise in the Mini-CAPTAIN Liquid-Argon Time Projection Chamber, 2015
UC Davis 26th Annual Undergraduate Research, Scholarship & Creative Activities Conference.

Building the mini-CAPTAIN Photon Detection System; Santa Fe, New Mexico–2015
CAPTAIN Collaboration Meeting – February, 2015.

mini-CAPTAIN Photon Detection System Status; Los Angeles, California–2014
CAPTAIN Collaboration Meeting – November, 2014.

Noise in the Liquid-Nitrogen Filled mini-CAPTAIN Time Projection Chamber;
Santa Fe, New Mexico–2014
CAPTAIN Collaboration Meeting – July, 2014.

Viability of a Fourier Approach to the Neutrino Mass Hierarchy Problem in WATCHMAN, 2014
UC Davis 25th Annual Undergraduate Research, Scholarship & Creative Activities Conference.

Determining the Hierarchy of Neutrino Masses Using Fourier Analysis and Matched-Filter Signal Processing, 2013
UC Davis 24th Annual Undergraduate Research, Scholarship & Creative Activities Conference.

Posters

Physics

Solving the Neutrino Mass Hierarchy Problem, Despite Nuclear Structure; Los Alamos National Laboratory–August, 2018
Los Alamos National Laboratory 75th Anniversary Student Symposium.

Investigation of the Sensitivity of WATCHMAN to Measure the Neutrino Mass Hierarchy;
Los Alamos National Laboratory–2014;

Investigation of the Sensitivity of WATCHMAN to Measure the Neutrino Mass Hierarchy;
Walnut Creek, California–2014
University & Industry Technical Interchange Review Meeting.

Determining the Hierarchy of Neutrino Masses Using Discrete Fourier Analysis;
Newport News, Virginia–2013
2013 Fall Meeting of the APS Division of Nuclear Physics.

Medicine

Dare to Prevent STDs Globally, Washington DC–2014
37th Annual Fulbright Conference.

Bridging the Gap Between Food and Medicine with Technology, Washington DC–2014
37th Annual Fulbright Conference.

Workshops

Mentor
Nuclear Innovation Bootcamp,
University of California, Berkeley–2018.

Participant
2018 Santa Fe Summer Workshop in Particle Physics,
Los Alamos National Laboratory; Santa Fe–2018.

Expert Reference
Nuclear Innovation Bootcamp,
University of California, Berkeley–2017.

Mentor
Nuclear Innovation Bootcamp,
Nuclear Innovation Alliance and US Dept. of Energy; University of California, Berkeley–2016.

Participant
Workshop on the Application of Open Source Tools for Nuclear Nonproliferation Research,
Nuclear Science and Security Consortium; University of California, Berkeley–2015.

Collaborator
Long-Baseline Neutrino Experiment (LBNE) Water-Cherenkov Reconstruction Workshop,
Fermilab–2011.

Skills & Certifications

Radiation laboratory experience and training.
Los Alamos National Lab. Certified Radiological Worker II & UC Davis Certified.

Class 4 laser laboratory experience and training.
Los Alamos National Lab. Certified.

Clean room laboratory experience and training.
UC Berkeley Certified.

Room-temperture / cryogenic photonics development and characterization proficiency.

Data acquisition hardware and software development proficiency.

Superconductor / semiconductor microfabrication experience.

Contributor to multiple open source software projects.

C++ fluency.

Python fluency.

Fortran proficiency.

Mathematica proficiency.

SageMath proficiency.

CERN ROOT proficiency (C++/Cling/CINT/PyROOT).

RAT-PAC detector simulation and analysis proficiency.

HTTP Representational State Transfer (REST) API design and development fluency.

SQL and NoSQL database design proficiency.

SQL and NoSQL object mapping proficiency.

Unified Modeling Language proficiency.

Puppet configuration management proficiency.

Linux/macOS/Windows operating system proficiency.

Classically trained pianist and composer.

Invited soloist in Jackson Hall at Robert and Margrit Mondavi Center for the Performing Arts.

Awards

Distinguished Student Award; Los Alamos National Laboratory, 2018.

Chancellor's Award for Excellence in Undergraduate Research, Honorable Mention; UC Davis, 2017.

Research sponsored by Nuclear Science and Security Consortium, 2012–2016.

Gold U.S. President's Volunteer Service Award, 2016.

Gold UC Davis Community Service Award, 2016.

Sigma Pi Sigma physics honor society lifetime membership, 2014.

UC Davis Integrated Studies Honors Program, 2010–2013.

Golden Key International Honor Society, 2012.

National Society of Collegiate Scholars, 2011.

California Scholarship Federation Life Membership, 2010.

James & Leta Fulmor Scholarship; UC Davis, 2010.

Hubert H. Wakeham Scholarship; UC Davis, 2010.

National Merit Scholarship Program Letter of Commendation, 2010.

Advanced Placement Scholar with Distinction, 2010.

Class of 2010 English Writing Award; St. Ignatius College Preparatory, 2010.

Last updated: August 4, 2018
`http://danielson.pro/cv`