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Education

- Ph.D.** Experimental Nuclear Physics, University of North Carolina at Chapel Hill, 2009
Thesis: “Spin Correlation Coefficients and Phase Shift Analysis for $p+^3\text{He}$ Elastic Scattering.”
- M.S.** UNC-CH, 2004
- B.A.** St. John’s College, 2001

Employment and Research Experience

Assistant Professor, Department of Physics and Physical Oceanography, UNCW (present)

Project Scientist, SLAC National Accelerator Center (2014-2017)

As EXO-200 Technical Coordinator, I was responsible for operation of the EXO-200 detector, a world-leading search for the neutrinoless double-beta decay ($0\nu\beta\beta$) of ^{136}Xe . In this role I managed the efforts of scientists and technicians on activities ranging from major equipment repair and upgrades to high-quality data collection, including overseeing the successful restart following the February 2014 fire and radiation events at the underground WIPP site where the experiment is located. Close coordination with DOE and site contractor representatives was required to carry out this work in a technically and administratively challenging environment.

I was also in charge of the analysis group responsible for checking EXO-200 data quality, and participated in local nEXO R&D efforts in charge collection and high-voltage performance.

Postdoctoral Researcher, University of Massachusetts, Amherst (2009-2014)

I co-lead a group of 8 undergraduate and graduate students at UMass in the construction, installation, and commissioning of a new Rn filter that will be used to flush the “airgap” between the lead shielding and the EXO-200 cryostat. This was one of the critical detector upgrades for Phase II data collection, since Rn decays in this volume were identified as providing roughly half of the background events in the $0\nu\beta\beta$ region of interest.

I also supervised six undergraduate students in the successful design, construction, and testing of other EXO-related R&D projects in the UMass lab, including a vacuum test stand for scintillation detector testing, a Xe gas purification system, and a liquid Xe chamber for component reflectivity and other studies. In addition, I also led work on accelerator production of ^{136}Cs at TUNL as a possible Ba ion source for ongoing “Ba tagging” R&D within the EXO collaboration, since the ability to identify the Ba decay daughter in coincidence with candidate double-beta decays would greatly suppress backgrounds.

After participating onsite in the 2009 EXO-200 thermodynamic commissioning, I held a series of leadership positions in detector operations, sharing the responsibility for day-to-day planning and data collection with a handful of Run Coordinators and later with a fellow Technical Coordinator. I also served as shift coordinator, responsible for staffing shifts on the experiment, and performed the initial quality checks on new data.

Graduate Research Assistant, University of North Carolina at Chapel Hill (2001-2009)

My thesis project was the measurement of spin-correlation coefficients in $p+{}^3\text{He}$ elastic scattering using polarized proton beam and a polarized ${}^3\text{He}$ target at the Triangle Universities Nuclear Laboratory (TUNL). These measurements were motivated by numerically accurate *ab initio* scattering calculations using realistic NN potentials in the 4N system, and served to constrain a unique solution to a global phase shift analysis. I was the primary operator for the LabVIEW-controlled spin-exchange optical pumping polarizer and holding field coil for the ${}^3\text{He}$ gas target and was responsible for troubleshooting and maintenance. I was also a certified accelerator operator, and routinely started duoplasmatron ion sources and tuned beam through the accelerator systems to target.

Teaching Experience

- Introductory Physics with Calculus, including laboratory section (Fall 2017).
- Introduction to Astronomy, including night labs (Spring 2008, Elon University).
- Attended the two-day NASA CAE workshop “Improving the Introductory Astronomy Survey Course for Non-Science Majors through Active Learning: A Teaching Excellence Workshop” at Guilford Technical Community College (2008).
- Attended the Future Faculty Fellowship program conducted by the Center for Teaching and Learning at UNC (2007). Week-long seminar covered topics including setting course goals and objectives, active learning, and effective methods of evaluation and assessment. Gave one lecture to introductory physics class.
- Teaching assistant for introductory physics labs at UNC for 5 semesters (2001-2004), including both mechanics and electromagnetism. Provided short introduction to each lab exercise, assisted in performance of labs, graded lab reports.

Service Work

- Department of Physics and Physical Oceanography Curriculum Committee (2017 – present)
- Department of Physics and Physical Oceanography Lab Development Committee (2017 – present)

Published Work

Journal Articles

“Search for nucleon decays with EXO-200”, J. B. Albert *et al.*, submitted to Phys. Rev. D.

“Search for Neutrinoless Double-Beta Decay with the Upgraded EXO-200 Detector”, J. B. Albert *et al.*, Phys. Rev. Lett. 120, 072701 (2018).

“Searches for Double Beta Decay of ^{134}Xe with EXO-200”, J. B. Albert *et al.*, Phys. Rev. D 96, 092001 (2017)

“Trace radioactive impurities in final construction materials for EXO-200”, D. S. Leonard *et al.*, Nucl. Instrum. Meth. A 871, 169-179 (2017).

“Measurement of the Drift Velocity and Transverse Diffusion of Electrons in Liquid Xenon with the EXO-200 Detector”, J. B. Albert *et al.*, Phys. Rev. C 95, 025502 (2017).

“An optimal energy estimator to reduce correlated noise for the EXO-200 light readout”, C. G. Davis *et al.*, JINST 11 (2016) P07015

“Cosmogenic backgrounds to $0\nu\beta\beta$ in EXO-200”, J. B. Albert *et al.*, JCAP04 (2016) 029

“First search for Lorentz and CPT violation in double beta decay with EXO-200”, J. B. Albert *et al.*, Phys. Rev. D 93, 072001 (2016)

“Search for $2\nu\beta\beta$ decay of ^{136}Xe to the 0^+_1 excited state of ^{136}Ba with the EXO-200 liquid xenon detector”, J. B. Albert *et al.*, Phys. Rev. C 93, 035501 (2016)

“Measurements of the ion fraction and mobility of alpha and beta decay products in liquid xenon using EXO-200”, J. B. Albert *et al.*, Phys. Rev. C 92, 045504 (2015)

“Investigation of radioactivity-induced backgrounds in EXO-200”, J. B. Albert *et al.*, Phys. Rev. C 92, 015503 (2015)

“An RF-only ion-funnel for extraction from high-pressure gases”, Thomas Brunner *et al.*, Int. J Mass Spectrom. 379, 110-120 (2015)

“Spectroscopy of Ba and Ba^+ deposits in solid xenon for barium tagging in nEXO”, B. Mong *et al.*, Phys. Rev. A 91, 022505 (2015)

“Search for Majoron-emitting modes of double-beta decay of ^{136}Xe with EXO-200”, J. B. Albert, *et al.*, Phys. Rev. D 90, 092004 (2014)

“Search for Majorana neutrinos with the first two years of EXO-200 data”, J. B. Albert, *et al.*, Nature 510, 229-234 (2014)

“An improved measurement of the $2\nu\beta\beta$ half-life of Xe-136 with EXO-200”, J. B. Albert *et al.*, Phys. Rev. C 89, 015502 (2014)

“Search for Neutrinoless Double-Beta Decay in ^{136}Xe with EXO-200”, M. Auger *et al.*, Phys. Rev. Lett. 109,

032505 (2012)

“The EXO-200 detector, part I: Detector design and construction”, M. Auger *et al.* JINST 7 (2012) P05010

“Xenon purity analysis for EXO-200 via mass spectrometry”, A. Dobi *et al.* Nucl. Instrum. Meth. A675 (2012)

“Observation of Two-Neutrino Double-Beta Decay in Xe-136 with the EXO-200 Detector”, N. Ackerman *et al.*, Physical Review Letters 107, 212501 (2011)

“A xenon gas purity monitor for EXO”, A. Dobi *et al.* Nucl. Instrum. Meth. A 659, 215-228 (2011)

“A magnetically driven piston pump for ultra-clean applications”, R. Neilson *et al.* Rev. Sci. Instrum. 82, 105114 (2011)

“A Simple radionuclide-driven single-ion source”, M. Montero Diez *et al.* Rev. Sci. Instrum. 81, 113301 (2010).

“Spin-correlation coefficients and phase-shift analysis for $p+^3\text{He}$ elastic scattering”, T. V. Daniels, C. W. Arnold, J. M. Cesaratto, T. B. Clegg, A. H. Couture, H. J. Karwowski, and T. Katabuchi Phys. Rev. C **82**, 034002 (2010)

“A Spin-Exchange Optically Pumped Polarized ^3He Target for Low Energy Charged Particle Scattering Experiments”, T. Katabuchi, S. Buscemi, J. M. Cesaratto, T. B. Clegg, T. V. Daniels, M. Fassler, R. B. Neufeldt, and S. Kadlecsek, Rev. Sci. Instrum. 76, 033503 (2005)

Conference Presentations

“Recent Results from EXO-200”, contributed talk at SESAPS2017, Milledgeville, GA

“Results from EXO”, contribution to the Lake Louise Winter Institute 2017, February 2017, Alberta, CA.

“Results and Status of EXO-200”, contributed talk at the APS April Meeting, January 2017, Washington, DC.

“Results and Status of EXO-200”, contributed talk at DNP 2016, October 2016, Vancouver, BC.

“EXO200: New Results, Current Status, and Future Plans”, invited talk at the Conference on Science at the Sanford Underground Research Facility”, South Dakota School of Mines and Technology, Rapid City, SD, May 2015

“Recent Results from EXO-200”, contributed talk at TAUP 2013, Asilomar, CA, September 2013

“R&D Toward Future Liquid Xe Double Beta Decay Detectors”, contributed talk at DNP 2012, Newport Beach, CA, October 2012.

“Polarized Proton Scattering from Polarized ^3He ”, invited talk at Chiral Dynamics 2012, Newport News, VA, August 2012.

“The Enriched Xenon Observatory for Double Beta Decay”, contributed talk at DPF 2011, Providence, RI, August 2011.

“Status of the EXO-200 Experiment”, poster presented at Neutrino 2010, Athens, Greece, June 2010.

“Refinement of Global Phase-Shift Analysis for $p + {}^3\text{He}$ Elastic Scattering Using Spin-Correlation Coefficients”. Contributed talk at DNP 2008, Oakland, CA, October 2008.

“Experience with the UNC Polarized ${}^3\text{He}$ Target”. Contributed talk at SESAPS 2008, Raleigh, NC, October 2008.

“Measurement of Spin Correlation Coefficients for $p+{}^3\text{He}$ Elastic Scattering”. Contributed talk at the APS April Meeting, Tampa FL, April 2005.

Conference Proceedings

"A Polarized ${}^3\text{He}$ Target System for Low-Energy Charged Particle Scattering Experiments," Tatsuya Katabuchi, Timothy V. Daniels, Mark Fassler, Thomas B. Clegg, Hans Paetz gen. Schieck, John Nouls, and Bastiaan Driehuis, Contribution submitted to HELION02, Mainz, Germany, Sept. 8-13, 2002.

“Precision Measurements of $D(d,p)T$ and $D(d,n){}^3\text{He}$ Total Cross Sections at Big-Bang Nucleosynthesis Energies,” D.S. Leonard, M.S. Boswell, C.R. Brune, T.B. Clegg, T.V. Daniels, B.M. Fisher, H.J. Karwowski, T. Katabuchi, and E.J. Ludwig, Proceedings of 17th International Conference in Few Body Physics, Durham, NC, June 5-10, 2003, eds. W. Glockle and W. Tornow, (Elsevier B.V. 2004) p. S109.

“Polarized ${}^3\text{He}$ Target for Low Energy Charged Particle Scattering Experiments,” T. Katabuchi, M.S. Boswell, T.B. Clegg, T.V. Daniels, M. Fassler, B.M. Fisher, S. Kadlecsek, H. Karwowski, D.S. Leonard, E.J. Ludwig, J. Nouls, W. Weinzierl, poster presentation at 17th International Conference in Few Body Physics, Durham, NC, June 5-10, 2003.

"A New ${}^3\text{He}$ Polarizer and Target System for Low-Energy Scattering Measurements", T. Katabuchi, T. B. Clegg, T. V. Daniels, and H. J. Karwowski, Proc. 11th International Workshop on Polarized Sources and Targets, November 14-17, 2005, Tokyo, Japan, to be published by World Scientific.

“Status of the EXO-200 Experiment”, T. V. Daniels for the EXO Collaboration, Submitted to Nuclear Physics B Proceedings Supplement (2010). Prepared for Neutrino 2010.

Abstracts

“Development of Polarized ${}^3\text{He}$ Target Cells for Proton and Neutron Scattering,” R.B. Neufeld, T. Katabuchi, T.B. Clegg, T.V. Daniels, and S. Kadlecsek, Bull. Am. Phys. Soc. 48, no. 7 (2003).

“Polarized ${}^3\text{He}$ Target for Low-Energy Charged Particle Scattering Experiments,” T. Katabuchi, S. Buscemi, T. B. Clegg, T. V. Daniels, M. Fassler, S. Kadlecsek, H. J. Karwowski, D. S. Leonard, E. J. Ludwig, R. B. Neufeld, E. Osenbaugh, Bull. Am. Phys. Soc. 49, no. 2 (2004) 63.

- “Precision Measurements of $d(d,p)t$ and $d(d,n)^3\text{He}$ Cross Sections at Big-Bang Nucleosynthesis Energies,” D.S. Leonard, M.S. Boswell, C.R. Brune, T.B. Clegg, T.V. Daniels, B.M. Fisher, H.J. Karwowski, and E.J. Ludwig, *Bull. Am. Phys. Soc.* 49, no. 2 (2004) 74.
- “Measurement of Spin Correlation Coefficients for $p+^3\text{He}$ Elastic Scattering”, T.V. Daniels, T. Katabuchi, T. Clegg, and H.J. Karwowski, *Bull. Am. Phys. Soc.* 50, no. 2 (2005), p. 136.
- “Spin-Polarizing ^3He at 8 Atmospheres with a Frequency-Narrowed Diode Laser”, C.W. Arnold, T.V. Daniels, A.H. Couture, T.B. Clegg, *Bull. Am. Phys. Soc.* 51, no 8 (2006) p. 20.
- “Hybrid K-Rb Spin-Exchange Optical Pumping Cells for the Polarization of ^3He ”, A. Couture, T. Daniels, C. Arnold, T. Clegg, *Bull. Am. Phys. Soc.* 51, no 8 (2006) p. 20.
- “Refinement of Global Phase-Shift Analysis for $p + ^3\text{He}$ Elastic Scattering Using Spin-Correlation Coefficients”, Tim Daniels, Charles Arnold, John Cesaratto, Thomas Clegg, Alexander Couture, Astrid Imig, and Hugon Karwowski, *Bull. Am. Phys. Soc.* 53, no 12 (2008) p. 75.
- “Experience with the UNC Polarized ^3He Target”, Timothy Daniels, Thomas Clegg, Alex Couture, and Charles Arnold, *Bull. Am. Phys. Soc.* 53, no 13 (2008) p. 20.