Andrew S. Voyles, Ph.D., EIT

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Education

University of California, Berkeley — Berkeley, California
Ph.D., Nuclear Engineering — **August, 2018**
Nuclear Regulatory Commission Graduate Fellowship

University of Utah, Honors College — Salt Lake City, Utah
B.S., *cum laude*, Chemical Engineering — **May, 2013**
Minors: Nuclear Engineering, Chemistry
University of Utah President's Club Scholarship, Dean's List, 2009 - 2013

Research Experience

University of California, Berkeley — Berkeley, California
Assistant Research Engineer — **June, 2019 – Present**

- Led fundamental studies of low-energy nuclear physics at the LBNL 88-Inch Cyclotron as a part of the Bay Area Nuclear Data Program, and supervised M.S./Ph.D. students in these efforts.
- Efforts include the measurement of charged-particle and neutron-induced reaction cross sections relevant to the production of radionuclides for medical applications, and the measurement of independent and cumulative fission yields using cyclical neutron activation analysis.
- Mentored M.S./Ph.D. students' research for cross section measurements and evaluations at LBNL, LANL, and BNL.
- As Isotope Production technical leader, responsible for developing the technical vision for these research objectives, and facilitating interactions with other research organizations to promote collaboration and enhance the impact of research results, chiefly with LANL and BNL.
- Developed stable and radioactive target fabrication capabilities in support of these objectives.
- Compiled all nuclear data produced in experiments into the reaction database EXFOR.
- Led OJT, Integrated Safety Management, EHS, and safety controls for experimental activities in the Bay Area Nuclear Data Program.

Postdoctoral Scholar — **August, 2018 – June, 2019**

- Responsible for overseeing the effort to determine novel production routes for ^{225}Ac, ^{212}Pb, ^{68}Ge, and ^{236}Np, through experiments at the LBNL 88-Inch Cyclotron as a part of the LBNL/UCB Nuclear Data Program.
- Developed in-house capabilities for electrodeposition and pressed-powder target fabrication.
- Assisted other members of the group by supervising M.S./Ph.D. student efforts to determine isotope production routes through cross section measurements at LBNL, LANL, and BNL.

Graduate Student Researcher / NRC Fellow — **August, 2014 – August, 2018**

- Researched "Nuclear Excitation Functions for Production of Novel Medical Radionuclides" — measurement of cross-sections for neutron-induced and charged particle-induced reaction pathways for the production of emerging novel therapeutic and diagnostic medical radionuclides, with high specific activity.
- Developed intense mono-energetic neutron source capabilities for production of novel therapeutic radionuclides.
- Research carried out at the Lawrence Berkeley National Laboratory's 88-Inch Cyclotron and the Los Alamos National Laboratory's Isotope Production Facility at LANSCE.

University of Oslo — Oslo, Norway
Visiting Researcher, Department of Physics — **February – May, 2018**

- Studied preparation of a chelate-conjugated biomolecule carrying a radionuclide, in the Nuclear and Energy Physics group.
- Focus on the radiolanthanide ^{161}Tb and a peptidomimetic displaying dual-receptor targeting through the endothelial growth factor receptor and the HER2/neu antigen.

Institute for Laser Engineering, Osaka University — Osaka, Japan
Visiting Researcher — **February – March, 2015**

- Research and evaluation of solid debris collection diagnostics in search of evidence of nuclear-plasma interactions.

University of Utah — Salt Lake City, Utah
Undergraduate Researcher, Nuclear Engineering — **August, 2010 – August, 2011**

- Developed simulation of Neutron Activation Analysis, an analytical technique using neutron irradiation of matter to determine highly precise compositions of samples.

Undergraduate Researcher, Chemistry — **August, 2009 – May, 2010**

- Synthesis and characterization of metal-doped Cadmium-Selenium quantum dots used to produce photonic crystals structured after iridescent scales of several Brazilian beetles.
- Applications include fully-optical circuitry and tunable, customizable photoluminescent sensors for desired molecules and/or cells.

University of West Florida — Pensacola, Florida
Visiting Researcher, Department of Physics — **May, 2008 – January, 2009**

- Modeled specific heat capacity anomalies of 4'-octyl-4-biphenyl-carbonitrile liquid crystals, due to the effect of mesophase transitions.

Teaching Experience

University of California, Berkeley — Berkeley, California
Assistant Research Engineer

- International Nuclear Data and Analytical Techniques (INDAT) — **21–29 June 2023**
- Nuclear Data Summer School 2022 — **01–12 August 2022**

Graduate Student Instructor

- NE 101 / 210M — Nuclear Reactions and Radiation — **Fall 2015**

University of Utah — Salt Lake City, Utah
National Science Foundation Outreach Mentor — **May, 2010 – May, 2013**

- Created and presented hands-on demos to local schools, to advocate engineering and science careers, focusing on historically underrepresented demographics.

Teaching Assistant

- CH EN 2300 — Thermodynamics I — **Spring 2013**
- NUCL 3000 / 5030 — Nuclear Principles in Engineering — **Fall 2011**

Selected Publications

Md. Shuza Uddin, Sándor Sudár, M. Shamsuzzoha Basunia, Ingo Spahn, **Andrew S. Voyles**, Alex Hermanne, Lee A. Bernstein, Bernd Neumaier, and Syed. M. Qaim, *Cross sections for the formation of $^{84}Rb^{m,g}$, ^{83}Rb and $^{82}Rb^{m}$ in ^{86}Sr(d,x)-reactions up to deuteron energies of 49 MeV: competition between α-particle and multi-nucleon emission processes.* Physical Review C, (submitted).

Md. Shuza Uddin, Sándor Sudár, M. Shamsuzzoha Basunia, Bernhard Scholten, Stefan Spellerberg, **Andrew S. Voyles**, Jonathan T Morrell, Ingo Spahn, Alex Hermanne, Lee A. Bernstein, Bernd Neumaier, and Syed. M. Qaim, *Excitation functions and isomeric cross-section ratios of (d,xn) reactions on ^{86}Sr.* The European Physical Journal A, **60** (2024) 128. `https://doi.org/10.1140/epja/s10050-024-01330-6`

Jonathan T. Morrell, **Andrew S. Voyles**, Jon C. Batchelder, Joshua A. Brown, and Lee A. Bernstein, *Secondary Neutron Production from Thick Target Deuteron Breakup.* Physical Review C, **108** (2023) 024616. `https://doi.org/10.1103/PhysRevC.108.024616`

N. Burahmah, J.R. Griswold, L.H. Heilbronn, L.A. Bernstein, **A.S. Voyles**, J.T. Morrell, M. Zach, and R. Copping, *^{229}Pa cross section measurements via deuteron irradiation of ^{232}Th.* Physical Review C, **108** (2023) 024609. `https://doi.org/10.1103/PhysRevC.108.024609`

Denise Neudecker, C. Romano, Nathan A. Gibson, Robert C. Little, Lee Bernstein, R. Bostelmann, D. Brown, R.J. Casperson, Stephen Croft, S. Dewji, L. Greenwood, P. Griffin, L. Kyriazidis,

A. Lewis, M. Pigni, B. Pritychenko, B. Rearden, J. Ressler, T. Slaba, M. Smith, V. Sobes, A. Sonzogni, Scott A. Vander Wiel, N. Vassh, **A. Voyles**, and K. Wendt, *5–10 Years Cross-cutting Priorities on the Topic of Nuclear Data Covariances and Uncertainty Quantification for Users.* Technical Report LA-UR-22-32080 (2023). https://doi.org/10.2172/1958970

Andrew S. Voyles, Morgan B. Fox, Jonathan T. Morrell, Michael P. Zach, Evan K. Still, Lee A. Bernstein, Wesley D. Frey, and Burton J. Mehciz, *Preparation and Characterization of Thin Arsenic Targets for Stacked-Target Experiments.* Nuclear Instruments and Methods in Physics Research B, (*in preparation*). https://arxiv.org/abs/2106.05524

F. Pogliano, F. L. Bello Garrote, A. C. Larsen, H. C. Berg, D. Gjestvang, A. Görgen, M. Guttormsen, V. W. Ingeberg, T. W. Johansen, K. L. Malatji, E. F. Matthews, M. Markova, J. E. Midtbø, V. Modamio, L. G. Pedersen, E. Sahin, S. Siem, T. G. Tornyi, and **A. S. Voyles**, *Observation of a candidate for the M1 scissors resonance in odd-odd ^{166}Ho.* Physical Review C, **107** (2023) 034605. https://doi.org/10.1103/PhysRevC.107.034605

Sarah Stevenson, Andrew Dong, Yujun Xie, Jon Morrell, **Andrew S. Voyles**, Jeff Bickel, Lee Bernstein, S.A. Maloy, and Peter Hosemann, *The effects of high energy deuteron ion beam irradiation on the tensile behavior of HT-9.* Nuclear Instruments and Methods in Physics Research B, **531** (2022) 65–73. https://doi.org/10.1016/j.nimb.2022.09.001

Karolina Kolos, Vladimir Sobes, Ramona Vogt, Catherine E. Romano, Michael S. Smith, Lee A. Bernstein, David A. Brown, Mary T. Burkey, Yaron Danon, Mohamed A. Elsawi, Bethany L. Goldblum, Lawrence H. Heilbronn, Susan L. Hogle, Jesson Hutchinson, Ben Loer, Elizabeth A. McCutchan, Matthew R. Mumpower, Ellen M. O'Brien, Catherine Percher, Patrick N. Peplowski, Jennifer J. Ressler, Nicolas Schunck, Nicholas W. Thompson, **Andrew S. Voyles**, William Wieselquist, and Michael Zerkle, *Current nuclear data needs for applications.* Physical Review Research, **4** (2022) 021001. https://doi.org/10.1103/PhysRevResearch.4.021001

M. S. Uddin, M. S. Basunia, S. Sudár, B. Scholten, S. Spellerberg, **A. S. Voyles**, J. T. Morrell, M. B. Fox, I. Spahn, O. Felden, R. Gebel, L. A. Bernstein, B. Neumaier, and S. M. Qaim, *Excitation functions of proton-induced nuclear reactions on ^{86}Sr, with particular emphasis on the formation of isomeric states in ^{86}Y and ^{85}Y.* The European Physical Journal A, **58** (2022) 67. https://doi.org/10.1140/epja/s10050-022-00714-w

Morgan B. Fox, **Andrew S. Voyles**, Jonathan T. Morrell, Lee A. Bernstein, Jon C. Batchelder, Eva R. Birnbaum, Cathy S. Cutler, Arjan J. Koning, Amanda M. Lewis, Dmitri G. Medvedev, Francois M. Nortier, Ellen M. O'Brien, and Christiaan Vermeulen, *Measurement and modeling of proton-induced reactions on arsenic from 35 to 200 MeV.* Physical Review C, **104** (2021) 064615. https://doi.org/10.1103/PhysRevC.104.064615

Stephan Friedrich, Geon-Bo Kim, Dongwon Lee, J. Ad Hall, Robin Cantor, **Andrew Voyles**, Ruslan Hummatov, and Stephen P.T. Boyd, *Ultra-High Resolution Magnetic Microcalorimeter Gamma-Ray Detectors for Non-Destructive Assay of Uranium and Plutonium.* Journal of Nuclear Materials Management, **49** (2021), 114–122.

D. Gjestvang, S. Siem, F. Zeiser, J. Randrup, R. Vogt, J.N. Wilson, F. Bello-Garrote, L.A. Bernstein, D.L. Bleuel, M. Guttormsen, A. Görgen, A.C. Larsen, K.L. Malatji, E.F. Matthews, A. Oberstedt, S. Oberstedt, T. Tornyi, G.M. Tveten, and **A.S. Voyles**, *Excitation energy dependence of prompt fission γ-ray emission from ^{241}Pu*.* Physical Review C, **103** (2021) 034609. https://doi.org/10.1103/PhysRevC.103.034609

Andrew S. Voyles, Amanda M. Lewis, Jonathan T. Morrell, M. Shamsuzzoha Basunia, Lee A. Bernstein, Jonathan W. Engle, Stephen A. Graves, and Eric F. Matthews, *Proton-induced reactions on Fe, Cu, & Ti from threshold to 55 MeV.* The European Physical Journal A, **57** (2021) 94. https://doi.org/10.1140/epja/s10050-021-00401-2

Morgan B. Fox, **Andrew S. Voyles**, Jonathan T. Morrell, Lee A. Bernstein, Amanda M. Lewis, Arjan J. Koning, Jon C. Batchelder, Eva R. Birnbaum, Cathy S. Cutler, Dmitri G. Medvedev, Francois M. Nortier, Ellen M. O'Brien, and Christiaan Vermeulen, *Investigating high-energy proton-induced reactions on spherical nuclei: Implications for the preequilibrium exciton model.* Physical Review C, **103** (2021) 034601. https://doi.org/10.1103/PhysRevC.103.034601

Ryan K. Chapman, **Andrew S. Voyles**, Narek Gharibyan, Lee A. Bernstein, and James E. Bevins, *Measurement of the $^{160}Gd(p,n)^{160}Tb$ excitation function from 4–18 MeV using stacked-target activation.* Applied Radiation and Isotopes, **171** (2021) 109647. https://doi.org/10.1016/j.apradiso.2021.109647

D.L. Bleuel, L.A. Bernstein, R.A. Marsh, J.T. Morrell, B. Rusnak, and **A.S. Voyles**, *Precision measurement of relative γ-ray intensities from the decay of ^{61}Cu.* Applied Radiation and Isotopes, **170** (2021) 109625. https://doi.org/10.1016/j.apradiso.2021.109625

M. Shuza Uddin, Bernhard Scholten, M. Shamsuzzhoha Basunia, Sandor Sudár, Stefan Spellerberg, **Andrew S. Voyles**, Jonathan T. Morrell, Haleema Zaneb, Jesus A. Rios, Ingo Spahn, Lee A. Bernstein, Bernd Neumaier, and Syed M. Qaim, *Accurate Determination of Production Data of the Non-Standard Positron Emitter ^{86}Y via the $^{86}Sr(p,n)$-Reaction.* Radiochimica Acta, **108** (2020) 747-756. https://doi.org/10.1515/ract-2020-0021

M.S. Basunia, J.T. Morrell, M.S. Uddin, **A.S. Voyles**, C.D. Nesaraja, L.A. Bernstein, E. Browne, M.J. Martin, and S.M. Qaim, *Resolution of a discrepancy in the γ-ray emission probability from the β decay of $^{137}Ce^g$.* Physical Review C, **101** (2020) 064619. https://doi.org/10.1103/PhysRevC.101.064619

G.B. Kim, S.T.P. Boyd, R.H. Cantor, **A.S. Voyles**, J.T. Morrell, L.A. Bernstein, and S. Friedrich, *A New Measurement of the 60 keV Emission from Am-241 Using Metallic Magnetic Calorimeters.* Journal of Low Temperature Physics, (2020) 1-7. https://doi.org/10.1007/s10909-020-02412-7

Jonathan T. Morrell, **Andrew S. Voyles**, M. S. Basunia, Jon C. Batchelder, Eric F. Matthews, and Lee A. Bernstein, *Measurement of $^{139}La(p,x)$ cross sections from 35–60 MeV by stacked-target activation.* The European Physical Journal A, **56** (2020) 13. https://doi.org/10.1140/epja/s10050-019-00010-0

Lee A. Bernstein, David A. Brown, Arjan J. Koning, Bradley T. Rearden, Catherine E. Romano, Alejandro A. Sonzogni, **Andrew S. Voyles**, and Walid Younes, *Our Future Nuclear Data Needs.* Annual Review of Nuclear and Particle Science, **69.1** (2019) 109–136. https://doi.org/10.1146/annurev-nucl-101918-023708

Andrew S. Voyles, *Nuclear Excitation Functions for the Production of Novel Medical Radionuclides*, University of California, Berkeley, (2018). https://search.proquest.com/docview/2135771326

Andrew S. Voyles, Lee A. Bernstein, Eva R. Birnbaum, Jonathan W. Engle, Stephen A. Graves, Toshihiko Kawano, Amanda M. Lewis, and Francois M. Nortier, *Excitation functions for (p,x) reactions of niobium in the energy range of $E_p = 40$–90 MeV.* Nuclear Instruments and Methods in Physics Research B, **429** (2018) 53–74. https://doi.org/10.1016/j.nimb.2018.05.028

Mauricio Ayllon, Parker A. Adams, Joseph D. Bauer, Jon C. Batchelder, Tim A. Becker, Lee A. Bernstein, Su-Ann Chong, Jay James, Leo E. Kirsch, Ka-Ngo Leung, Eric F. Matthews, Jonathan T. Morrell, Paul R. Renne, Andrew M. Rogers, Daniel Rutte, **Andrew S. Voyles**, Karl Van Bibber, and Cory S. Waltz, *Design, construction, and characterization of a compact DD neutron generator designed for $^{40}Ar/^{39}Ar$ geochronology.* Nuclear Instruments and Methods in Physics Research A, **903** (2018) 193–203. https://doi.org/10.1016/j.nima.2018.04.020

Andrew S. Voyles, M.S. Basunia, J.C. Batchelder, J.D. Bauer, T.A. Becker, L.A. Bernstein, E.F. Matthews, P.R. Renne, D. Rutte, M.A. Unzueta, and K.A. van Bibber, *Measurement of the $^{64}Zn,^{47}Ti(n,p)$ Cross Sections using a DD Neutron Generator for Medical Isotope Studies.* Nuclear Instruments and Methods in Physics Research B, **410** (2017) 230–239. https://doi.org/10.1016/j.nimb.2017.08.021

Certifications

- Licensed in Utah as Engineer in Training (EIT, ID# 13-802-04) **April, 2012**

Computer Skills

Languages	Java, C/C++, Python, Javascript, HTML, Fortran
Tools	git, svn, CAD, MATLAB, Mathematica, Maple, LaTeX, Arduino, RPi, shell, bash, node, pug, SQLite, COMSOL Multiphysics, Aspen, Cura, Lychee Slicer, ANSYS Fluent
Nuclear Software	TALYS, EMPIRE, CoH, ALICE, GEANT4, MCNP/MCNPX, Curie, FLUKA, EXFOR

Lab Skills

- 3D Printing (FDM, SLA)
- Radionuclide labeling via chelate-conjugated biomolecules.
- Radio-HPLC, radio-TLC, and solid-phase extraction radiochemical purification.
- HPGe Gamma spectroscopy, radiation detection and measurement.
- Design and implementation of PID process control systems.
- Operation of heat exchanger, distillation column, ebulliometer (classroom experience).
- ^{1}H and ^{13}C NMR , IR characterization and analysis, chromatography.
- Organic laboratory synthesis and purification techniques.

Professional Service

NNSA, DNN R&D (NA-22)

- Independent Assessments Panel Member & SME – since 2023

Journal Referee

- IEEE Transactions on Nuclear Science – since 2023
- Applied Radiation and Isotopes – since 2022
- Materials – since 2020
- Journal of Radioanalytical and Nuclear Chemistry – since 2019
- Nuclear Instruments and Methods in Physics Research B – since 2017

Bay Area Nuclear Data Group

- Webmaster – since 2021

American Nuclear Society

- Program Chair, Northern California Section – since 2016
- Executive Committee, Northern California Section – since 2016
- Webmaster, Utah Student Section 2011 – 2013