Contact

Argonne National Laboratory
Physics Division, Building 203
9700 South Cass Avenue
Lemont, Illinois 60439, USA
(630) 252-2929

Education

*University of Chicago***,** Chicago, IL, USA
Doctorate of Physics degree, June 2017
Concentration: Atomic Physics

*Hamilton College***,** Clinton, NY, USA
Bachelor of Arts degree, May 2012
Concentrations: Physics, Creative Writing

Awards

2017 Winstein Prize at the University of Chicago:
Awarded annually to a graduate student doing outstanding work in the development or application of instrumentation.

2012 Elihu Root Fellowship at Hamilton College:
Awarded annually to seniors who demonstrate high achievement and special aptitude for research in one or more of the departments of science and plan to pursue graduate study in science.

2012 Southworth Award in Physics at Hamilton College:
Awarded annually to a senior who excels in physics.

Employment History

Since 2020	Assistant Physicist	Argonne National Laboratory
2017 - 2020	Postdoctoral Appointee	Argonne National Laboratory
2013 - 2017	Research Assistant	Argonne National Laboratory
2012 - 2013	Teaching Assistant	University of Chicago
2012 - 2012	Research Assistant	Hamilton College
2010 - 2012	Teaching Assistant	Hamilton College

Research Interests

Ultra-sensitive trace-isotope analysis;
Atom trapping for nuclear science applications;
Hydrological transport for water resource management.

Publications

Atmospheric ^{81}Kr as an integrator of cosmic-ray flux on the hundred-thousand-year timescale
J.C. Zappala, D. Baggenstos, C. Gerber, W. Jiang, B.M. Kennedy, Z.-T. Lu, J. Masarik, P. Mueller, R. Purtschert, A. Visser
Geophysical Research Letters **47**, e2019GL086381 (2020)

Krypton-81 dating of the deep Continental Intercalaire aquifer with implications for chlorine-36 dating
T. Matsumoto, K.Zouari, R. Trabelsi, D. Hillegonds, W. Jiang, Z.-T. Lu, P. Mueller, J.C. Zappala, L.J. Araguás Araguás, N. Romeo, A. Agoun
Earth and Planetary Science Letters **535**, 116120 (2020)

Radiokrypton unveils dual moisture sources of a deep desert aquifer
R. Yokochi, R. Ram, J. Zappala, W. Jiang, E. Adar, R. Bernier, A. Burg, U. Dayan, Z.-T. Lu, P. Mueller, R. Purtschert, Y. Yechieli

Proceedings of the National Academy of Sciences **116**, 16222 (2019)

Recent seawater intrusion into deep aquifer determined by the radioactive noble-gas isotopes ^{81}Kr and ^{39}Ar
Y. Yechieli, R. Yokochi, M. Zilberbrand, Z.-T. Lu, R. Purtschert, J. Sueltenfuss, W. Jiang, J. Zappala, P. Mueller, R. Bernier, N. Avrahamov, E. Adar, F. Talhami, Y. Lifshitz, A. Burg
Earth and Planetary Science Letters, **507**, 21 (2019)

The circulation of the Dead Sea brine in the regional aquifer
N. Weber, Y. Yechieli, M. Stein, R. Yokochi, I. Gavrieli, J. Zappala, P. Mueller, B. Lazar
Earth and Planetary Science Letters, **493**, 242 (2018)

Field degassing as a new sampling method for ^{14}C analyses in old groundwater
R. Yokochi, R. Bernier, R. Purtschert, J. Zappala, Y. Yechieli, E. Adar, W. Jiang, Z.-T. Lu, P. Mueller, G. Olack, R. Ram
Radiocarbon, **60**, 349 (2018)

Setting a limit on anthropogenic sources of atmospheric ^{81}Kr through Atom Trap Trace Analysis
J. C. Zappala, K. Bailey, W. Jiang, B. Micklich, P. Mueller, T. P. O'Connor, R. Purtschert
Chemical Geology, **453**, 56 (2017)

Rapid processing of ^{85}Kr/Kr ratios using Atom Trap Trace Analysis
J. C. Zappala, K. Bailey, P. Mueller, T. P. O'Connor, R. Purtschert
Water Resources Research **53**, 2553 (2017)

Using ^{81}Kr and Noble Gases to Characterize and Date Groundwater and Brines in the Baltic Artesian Basin on the One-Million-Year Timescale
C. Gerber, R. Vaikmae, W. Aeschbach, A. Babre, W. Jiang, M. Leuenberger, Z.-T. Lu, R. Mokrik, P. Mueller, V. Raidla, T. Saks, H. N. Waber, T. Weissbach, J. C. Zappala, R. Purtschert
Geochimica Et Cosmichimica Acta **205**, 187 (2017)

Nucleosynthesis Reactions with the High-Intensity SARAF-LiLit Neutron Source
M. Tessler, M. Paul, T. Palchan, S. Halfon, L. Weissman, N. Hazenshprung, A. Kreisel, T. Makmal, A. Shor, I. Silverman, M. A. Coronado, S. Almaraz-Calderon, W. Jiang, Z.-T. Lu, P. Mueller, R. Pardo, K. E. Rehm, R. Scott, R. Talwar, C. Ugalde, R. Vondrasek, J. Zappala, D. Santiago-Gonzalez, P. Collon, Y. Kashiv, M. Weigland, T. Heftrich, R. Reifarth, D. Veltum, R. Purtschert, C. Guerrero, J. L. Marco, J. M. Quesada, U. Köster, D. Schumann, R. Dressler, S. Heinitz, N. Kivel, and E. A. Maugeri
Proceedings of Science (INPC2016) **139**, 11 (2016)

Measurement of the Hyperfine Quenching Rate of the Clock Transition in ^{171}Yb
C.-Y. Xu, J. Singh, J. C. Zappala, K. G. Bailey, M. R. Dietrich, J. P. Greene, W. Jiang, N. D. Lemke, Z.-T. Lu, P. Mueller, T. P. O'Connor
Physical Review Letters **113**, 033003 (2014)

Efficient generation of optical sidebands at GHz with a high-power tapered amplifier
J. C. Zappala, K. Bailey, Z.-T. Lu, T. P. O'Connor, W. Jiang
Review of Scientific Instruments, **85**, 046104 (2014)

Granularity in Angle: Observability in Scattering Experiments
S. A. Major and J. C. Zappala
Relativity and Gravitation Ed. J. Bicak, T. Ledvinka, Switzerland: Springer International Publishing 547 (2014)

Talks

Calibrating Atom Trap Trace Analysis for Nuclear Data Research
LDRD Series (Invited), Argonne, IL, February 2019

Determining the Absolute Abundance of Atmospheric ^{81}Kr
3rd International Workshop on Tracer Applications of Noble Gas Radionuclides, Hefei, China, September 2018

Determining the Absolute Abundance of Atmospheric ^{81}Kr
27th Goldschmidt Conference, Boston, MA, August 2018

Investigating Underground Production of ^{81}Kr and its Impacts on Radiokrypton Dating
Physics Division Seminar (Invited), Argonne, IL, January 2018

Advancements in Radiokrypton Dating through Atom Trap Trace Analysis
Special Seminar (Invited), University of Bern, Bern, Switzerland, August 2017

Radiokrypton Dating of Old and Young Groundwater
5th Developments in Noble Gas Understanding and Expertise Conference, Paris, France, August 2017

Atom Trap Trace Analysis, Developments and Applications
Physics Division Seminar (Invited), Argonne, IL, November 2016

Applications and Developments in Atom Trap Trace Analysis
Midwestern Cold Atom Workshop, Argonne, IL, October 2016

New Limit on Anthropogenic Sources of Atmospheric ^{81}Kr through Atom Trap Trace Analysis
26th Goldschmidt Conference, Yokohama, Japan, June 2016

Radiokrypton Dating with Atom Trap Trace Analysis
7th International Conference on Laser Probing, Michigan State University, East Lansing, MI, June 2015

Advancement in Atom Trap Trace Analysis for Radiokrypton Dating
45th Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, Madison, WI, June 2014

Scattering, an Atom of Geometry, and Coherent States: A question of observability
15th East Coast Gravity Meeting, Syracuse University, Syracuse, NY, April 2012