

Jake J. Hecla

ADDRESS

Department of Nuclear Engineering
University of California, Berkeley
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EDUCATION

June 2017 S.B. Nuclear Science and Engineering
 Massachusetts Institute of Technology
Thesis: A Combined Radiographic and Time-of-Flight Method for Zero-Knowledge Warhead Verification

Since August 2017 Graduate student
 Department of Nuclear Engineering
 University of California, Berkeley
Research: Coded aperture gamma-ray imaging for safeguards applications
Water-based liquid scintillator light propagation characterization

RESEARCH AND INDUSTRY EXPERIENCE

UC Berkeley Department of Nuclear Engineering
 Graduate Student
 Developed code to enable 3D coded aperture imaging using the POLARIS-LAMP detector.
 Developed novel systems to characterize light scattering and attenuation in water-based liquid scintillator.

MIT Department of Nuclear Science and Engineering
 Undergraduate research assistant (UROP program, 2017)
 Assisted in the development of an approach to warhead verification which is highly information-secure and minimally intrusive.

MIT Department of Nuclear Science and Engineering
 Undergraduate student (research carried out beginning 2016)
 Developed detailed neutron transport simulations for the ARC tokamak

project. Assisted in the design and simulation of a novel low-latency fusion power monitoring concept based on Cherenkov radiation in FLiBe.

- MGH
Massachusetts General Hospital, Navy Yard Campus. Charlestown, MA
R&D Intern (2015-2016)
Designed and built hardware and control software for a non-rotating, low-dose CT scanner prototype.
- Boeing
Boeing Applied Physics/Radiation Effects Laboratory. Seattle WA
Intern (June-September 2016)
Developed Monte Carlo models to determine depth-dose profiles in samples irradiated by a flash x-ray system. Assisted in the development of a method of determining neutron-induced SEU sensitivity in integrated circuits.
- Phoenix LLC
(Formerly “Phoenix Nuclear Labs,” now “Phoenix”). Monona, WI
Intern (June-August 2015)
Assisted in the design of a nuclear fuel rod scanning device based on a D-D neutron generator. Designed and built a compact neutral particle calorimeter for a high-current H⁻ ion source.
- Apollo Fusion
Mountain View, CA
External consultant (2017)
Used MCNP6 to develop versatile fast neutron shields to maintain personnel safety during R&D activities.

SELECTED PUBLICATIONS

Hecla, Jake J., and Areg Danagoulian. "Nuclear disarmament verification via resonant phenomena." *Nature Communications* 9, no. 1 (2018): 1259.

Kuang, A. Q., N. M. Cao, A. J. Creely, C. A. Dennett, J. Hecla, B. LaBombard, R. A. Tinguely et al. "Conceptual design study for heat exhaust management in the ARC fusion pilot plant." *Fusion Engineering and Design* 137 (2018): 221-242.

Cramer, A., Hecla, J., Wu, D., Lai, X., Boers, T., Yang, K., Moulton, T., Kenyon, S., Arzoumanian, Z., Krull, W. and Gendreau, K., 2018. Stationary Computed Tomography for Space and other Resource-constrained Environments. *Scientific reports*, 8(1), p.14195.

Hecla, Jake, Rebecca Krentz-Wee, and Andrew W. Reddie. "The Next Generation NC3 Enterprise: Opportunities and Challenges." *Journal of Science Policy and Governance*. Vol. 14, Issue 2, June 2019

Remote Radiation Detection by Electromagnetic Air Breakdown. Center for Strategic and International Studies. "On the Radar" Technical Primer. July 29. 2019

Invited talks and media appearances

Fort Ross Dialogue on US-Russian Relations. "Next Generation Connections Panel: Working Together." The Commonwealth Club, San Francisco CA. October 5. 2019.

Young Professionals' Nuclear Forum 6. "Nuclear Risk Communications in the Wake of Accidents." (joint presentation with G. Levikow, D. Letyagin and K. Pirnavskaya as part of a joint meeting of early-career US and Russian nuclear scientists).Moscow Engineering Physics Institute. December 2019

Stanford University/China Arms Control and Disarmament Association Workshop 2018. "Zero Knowledge Verification Methodologies." Stanford Center at Peking University. October 2018.

Stanford University/China Arms Control and Disarmament Association Workshop 2019. Stanford Center at Peking University. October 2019.

Invention Disclosures and Patent Applications

Sengbusch, Evan R., Arne V. Kobernik, Eli C. Moll, Christopher M. Seyfert, Ross F. Radel, Mark Thomas, and Jake Hecla. "System and method for performing active scanning of a nuclear fuel rod." U.S. Patent Application 15/618,590, filed December 14, 2017.

Rajiv Gupta, Wolfgang Krull, Jake Hecla, Avilash Cramer, Steven Kenyon, Zaven Arzoumanian, and Keith Gendreau. "Tomographic Imaging System." U.S. Patent Application 16/406,300, filed 5/8/2019 (through NASA Goddard Spaceflight Center, not yet publically available as of 4/2020)

Boeing Meritorious Invention Disclosure Award. "Method and Apparatus for Assessing Micro-Electronic Sensitivity to Neutron Environments." Awarded September 2017

