

October 24, 2025

Risk-Informed Consequence-Driven Hybrid Cyber-Physical Protection System Security Optimization for Advanced Reactor Sites



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ABSTRACT: This presentation will describe a project in which a novel cybersecurity-integrated physical protection system (PPS) framework is being developed for advanced reactor concepts that serves to reduce the operational costs for the life of a reactor against those of a traditional light water reactor (LWR) PPS design. The methodology will leverage a prior effort by utilizing the traditional Design and Evaluation Process Outline (DEPO) methodology for PPS design. The framework from the PPS-informed model is being expanded to uniquely couple consequence modeling with a cyber-physical risk-informed integrated safety-security framework. To assess the merit of the newly proposed methodology, a reactor-agnostic hybrid cyber-PPS framework for an advanced reactor concept will be compared to the approach required by current U.S. federal regulations for the commercial LWR fleet and evaluated vis-à-vis current proposed regulatory requirements for advanced reactors.

Seminar Details

*Friday, Oct 24, 2025
2:30pm – 4:00pm*

*UH Campus
Classroom & Business
Building
Room CBB 104*

*Online via Teams [https://
www.cive.uh.edu/
research/beyer-
distinguished-lecture](https://www.cive.uh.edu/research/beyer-distinguished-lecture)*

BIOGRAPHY: Dr. Kirkland's research focuses on reactor safety and fundamental thermal hydraulics. Dr. Kirkland founded the Nuclear Heat Transfer Systems (NHTS) Laboratory with unique experimental and analytical capabilities for conducting pioneering two-phase flow and heat transfer research. This laboratory provides data for industry, naval reactors, and regulatory organizations to characterize reactor systems and component performance and to develop theoretical models for reactor safety analysis. Under her leadership, the NHTS laboratory has produced 47 graduate dissertations and theses and over 100 full-length refereed publications. In addition to teaching several undergraduate and graduate-level nuclear engineering courses, Dr. Kirkland applied her expertise to develop a new Severe Accident Analysis course. Because of her demonstrated leadership, Dr. Kirkland has served since 2015 as Associate Department Head. She is a Fellow of the American Nuclear Society.

Dr. Kirkland received her B.S. in Nuclear Engineering from Purdue University, M.S. in Nuclear Engineering from the University of California at Berkeley, and Ph.D. in Quantum Engineering and System Sciences from the University of Tokyo. Dr. Kirkland joined the Department of Nuclear Engineering at Texas A&M University in 2006.