Department of Electrical and Computer Engineering

TEXAS TECH UNIVERSITY
Edward E. Whitacre Jr.
College *of* Engineering

Spring 2024 Seminar Series

Seminar Title: ***Research and development in pulsed power science, engineering, and technology at Sandia National Laboratories***

Time: 2:00-2:50 PM, Friday, Mar 1, 2024
Location: Holden Hall 150

Speaker:
Adam Steiner
Sandia National Laboratories

Abstract:
The field of pulsed power encompasses the science, technology, and art of compressing electrical energy in time and space to access otherwise prohibitively high energy density regimes for study within the laboratory environment. Sandia National Laboratories operates three of the world's four superpower-class (>10 TW) pulsed power accelerators, including the world's largest and highest capability pulsed power facility, the Z machine. These accelerators drive research in inertial confinement fusion, radiation effects, dynamic materials properties, and matter under extreme conditions with widespread national security and fundamental science applications. The NNSA is presently refining the requirements for a next-generation pulsed power (NGPP) driver. This proposed facility would deliver approximately ten times more energy than the Z machine to targets, providing a path to high-yield, magnetic direct-drive fusion, among other capabilities in the national interest. Advances in components including gas-insulated switches, vacuum-insulator interfaces, and magnetically insulated transmission lines are highly desired to maximize delivered power and energy and minimize capital and operational costs of an NGPP facility. This talk will present an overview of present work at Sandia National Laboratories in pulsed power component and system R&D that will enable the next generation of pulsed power technology.

Speaker Bio:
Dr. Adam Steiner received B.S. degrees in nuclear engineering and physics from North Carolina State University in 2010, and he received the M.S. and Ph.D. degrees from the Nuclear Engineering and Radiological Sciences department at the University of Michigan in 2012 and 2016, respectively. From 2016 to 2019, he worked in the Revolutionary Technologies Program at Lockheed Martin Aeronautics, where he developed megajoule-class pulsed power drivers for plasma sources, neutral beam accelerators, and magnetic confinement coils on Lockheed's compact fusion reactor concept. He joined the technical staff in the Advanced Accelerator Physics department at Sandia National Laboratories in 2019. In this role, he has led initiatives to diagnose and mitigate dielectric breakdown failure modes on the Z machine; design a 3 MJ, 10 MV Marx-driven water line module for next-generation pulsed power technology development; and predict component failure rates and maintenance cycles on proposed next-generation pulsed power facility concepts. Dr. Steiner is the principal investigator on multiple recent and ongoing laboratory-directed research and development (LDRD) initiatives focusing on pulsed power component modernization, including the development of flashover-resistant composite insulators and low global warming potential alternatives to sulfur hexafluoride gas-insulated switches.