



DEPARTMENT OF ELECTRICAL ENGINEERING

Graduate Seminar Guest Speaker

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“Beyond Simplicity: Application and Evolution of Pulsed Power Technology in Large Accelerator Complexes”

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ABSTRACT

Today's accelerator complex spreads over thousands of acres, such as Brookhaven's Collider-Accelerator Complex, FNAL, CERN, and J-PARC. It usually consists of a chain of linear and circular accelerators. The primary application of pulsed power technology in a large accelerator complex is for beam transfer between accelerators. Other applications include beam source, beam instrumentation, and pulsed RF system, etc. Tens to hundreds of pulsed power systems are used in each accelerator complex. A unique character of pulsed power systems is its appearance of simplicity. In this presentation we look into engineering challenges beneath the surface and the trend to go beyond simplicity. Most accelerator pulsed power systems are high repetition rate systems. The systems' lifetimes can reach several billion pulses. They are high voltage and high current power systems with peak powers in the range of several hundred-mega-watts to several giga-watts. In addition, these systems generate output pulses of precision wave shapes with low timing jitters. Recent developments in this area focus on solid-state modulators and beam deflector designs. With the availability of high power fast solid-state switches, various new topologies are being investigated in power modulator designs. New challenges include generation of high power pulses with a few nano-second rise and fall time, flexible wave shapes, high repetition rate pulsed power RF systems, and high current density systems. We are interested in links between scientific and technical concepts and where they might lead in this evolutionary age of pulsed power technology. We will report our latest research and development efforts to go beyond simplicity.

BIOGRAPHY

Wu (Arlene) Zhang received her B.E., M.S., and Ph.D. in Electrical Engineering from State University of New York at Stony Brook in 1983, 1984, and 1988, respectively. She joined Brookhaven National Laboratory in 1987, and is currently a senior research engineer and pulsed power group leader of Collider-Accelerator Department. Her research work includes repetitive pulsed power systems, large-scale power supply system simulation and analysis, systems and control theory, etc. She has successfully developed many pulsed power systems for large accelerator complexes and consulted for accelerator engineering projects at accelerator facilities in U.S. and other countries. She serves on various committees and boards to promote technical and social issues.