



Institute for Materials Science

UNCLASSIFIED

2016 IMS Summer School: Los Alamos Science Capabilities



Michelle Espy
LANL Fellow

X-ray and Neutron Radiography

Wednesday, July 6, 2016

2:00 PM

MSL Auditorium (TA-03 - Bldg 1698 - Room A103)

The IMS Summer School focuses on Science Capabilities at Los Alamos National Laboratory and is designed to expose our visitors to the broad range of great science performed at the Lab. Through the course of **seven talks** and **four site visits**, students will have a unique opportunity to learn about LANL directly from our top scientists and participate in facility tours.

Abstract: This talk will present applications, methods, and some of the underlying physics behind radiography with x-rays and neutrons. Radiography using x-rays is a method over 120 years old. It is ubiquitous in medical and industrial diagnostics. Through the use of computed tomography methods 3-D imaging has been demonstrated with exquisite (sub-mm or even micron level) resolution. Although x-ray is an old method, there continue to be advances in methods and applications. This talk will discuss the use of x-ray at LANL as it has been applied to everything from non-destructive evaluation of welded parts to art. Much more recent is the use of neutrons for radiography. As sources advance, neutron radiography may become a complementary method to x-ray for some applications. While an x-ray will stop in dense material such as metal and easily pass through plastic, the situation is almost reversed for neutrons. Neutrons can pass through large amounts of dense metal to image what might be inside. In addition, the cross section between H₂O and D₂O is quite different between neutrons, making it a compelling method for imaging water dynamics in plants. Some applications of neutron radiography at LANL will also be discussed.

Bio: Michelle Espy is a scientist in the Applied Engineering and Technology Directorate. She has many years of experience leading and contributing to diverse team of scientists, technicians, and engineers that execute applied physics instrumentation and research projects for programmatic and basic research. Her specific areas of interest include novel nuclear magnetic resonance (NMR) techniques including ultra-low field NMR and nuclear quadruple resonance (NQR) for detection of explosives, and ultra-low field MRI of the human brain for field-portable systems. Recently she has focused her efforts on methods of imaging based on x-ray and neutron computed tomography for characterization of materials, and nuclear physics based methods of spectral characterization of x-ray and neutron sources.

Michelle first came to Los Alamos in 1991 as a visiting graduate student from the University of Minnesota, and became a Director's Fellow post-doc in 1996. She joined Los Alamos as staff in Physics Division in 1998.

Michelle has over 60 peer-reviewed publications, over 1300 citations, and in 2014 was made a Fellow of the American Physical Society in the Division of Nuclear Physics.

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