

East Carolina University

Department of Physics

Colloquium

“Gallium Nitride Neutron Detector, Collimated Neutron Beam
and Their Applications”

Friday, January 27 at 3:15 p.m. N102, Howell Science Complex
Refreshments at 3:00 p.m.

Dr. Lei “Raymond” Cao

Director, Nuclear Analysis and Radiation Sensor Lab
Department of Mechanical and Aerospace Engineering
(Nuclear Engineering Program) - Ohio State University

The giant leap in light-emitting diode (LED) industry toward general lighting came when the first practical bright blue LED using nitride-based compound semiconductors (e.g. GaN) was developed in mid-1990. The exceptional electronics and mechanical properties observed in GaN makes it a potential candidate for radiation detection. When properly doped or coated with neutron-sensitive materials, GaN could be turned into an effective and inexpensive neutron detection device. We are fabricating such a sensor based on GaN and are studying its fundamental radiation response when applied to harsh radiation environment in nuclear reactors. The potential applications of this neutron sensor would also be in proliferation detection of special nuclear materials as well as neutron dose measurement. A neutron beam facility that has been recently built at the Ohio State University Research Reactor (OSURR), which delivers a well-thermalized neutron beam with adjustable beam size from 30 mm to 1 mm, will also be introduced including its applications for studying lithium migration within a Li-ion battery and for testing of novel neutron sensors.

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