



Wednesday
March 8, 2017
3:30 pm
Room 1005 EECS

Dr. Matthew Gomez

Sandia National Laboratories

Magnetic Direct Drive Fusion Experiments on the Z Facility

The Z facility at Sandia National Laboratories consists of the world's largest pulsed power driver and a multi-kJ, terawatt laser. The Z Facility is used to investigate material properties under extreme conditions, high power x-ray sources, and inertial confinement fusion (ICF). The Z Facility is uniquely suited to investigate the efficacy of magnetic direct drive ICF in which a large current flows axially through a cylindrical can containing fusion fuel. The current generates an azimuthal magnetic field, which combined with the axial current, produces a radially inward Lorentz force that implodes the cylinder containing the fuel. Typical time-scales for pulsed power drivers are 100-1000 ns. These slow implosions allow for more massive, robust target designs, but require help to achieve fusion-relevant conditions.

In Magnetized Liner Inertial Fusion (MagLIF), a laser pre-heats the fuel prior to the implosion, which allows the fuel to reach several keV temperatures. Since the implosion time is relatively long (>50 ns), an axial magnetic field is included to inhibit thermal conduction in the radial direction. This field also helps trap charged-particle fusion products, which is necessary for self-heating in high yield ICF designs.

About the Speaker: Dr. Matthew Gomez received the B.S.E., M.S.E., and Ph.D. degrees from the Nuclear Engineering and Radiological Sciences Department at the University of Michigan in 2005, 2007, and 2011, respectively. As a graduate student he conducted research in the Plasma, Pulsed Power, and Microwave Laboratory with Professor Ronald Gilgenbach as his advisor. Following graduate school, Matthew became a staff member in the Pulsed Power Sciences Center at Sandia National Laboratories, where he studies magneto-inertial fusion, x-ray radiation sources, and high current transmission lines.