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Michigan Institute for Plasma Science and Engineering

Wednesday
March 6, 2024
3:30 pm
Room 1005 EECS

Dr. Stephanie Hansen

Sandia National Laboratories

X-ray Spectroscopy for High-energy-density Plasma Studies

High-energy-density plasmas have pressures exceeding one million atmospheres and temperatures above ten thousand degrees. These extreme states of matter are present in diverse systems from inertial fusion targets to the hearts of stars. Measuring the precise conditions of these plasmas and predicting their atomic-scale properties play a key role in understanding system-scale behavior. This talk introduces X-ray spectroscopy, a powerful measurement technique that can identify the elemental composition of a plasma, constrain its temperature and density, and signal extreme magnetic and electric fields. It will also show how X-ray spectroscopy can help refine the designs of inertial fusion targets and increase our understanding of main sequence and white dwarf stars.

About the Speaker: Stephanie Hansen is a Senior Scientist in the Pulsed Power Science Center of Sandia National Laboratories. She studies the atomic-scale behavior of atoms in extreme environments and develops atomic, spectroscopic, equation-of-state, and transport models to help predict and diagnose the behavior of high energy-density plasmas. She is the author and developer of the SCRAM non-LTE spectroscopic modeling code and MUZE, a self-consistent field code used for equation-of-state, scattering, and transport calculations. Hansen was awarded an early-career grant from DOE to study material in non-equilibrium conditions in 2015, received the Presidential Early Career Award for Scientists and Engineers in 2017, and was elected a Fellow of the American Physical Society's Division of Plasma Physics in 2019. She holds degrees in Physics and Philosophy from the University of Nevada, Reno and has been a Visiting Associate Professor at Cornell University since 2012.