

## Nuclear Engineering Seminar

# Dr. Michael Streicher,

*President and Chief Operating Officer,  
H3D, Inc.*

**Wednesday, February 21, 2024**

**3:30pm | PHYS 112**

*High-Resolution Room-Temperature Gamma-ray Imaging Spectrometers  
and their Applications*

### Abstract

Gamma-ray spectroscopy has a wide array of applications ranging from monitoring waste from mining operations or oil and gas extraction, to nuclear safeguards monitoring, to industrial process control, to medical imaging. High-purity germanium (HPGe) spectrometers have served the community well, but the cryogenic cooling requirements can make the material difficult to use in the field or in very low-power applications. Wide-band-gap semiconductor materials have been investigated for many years to fill in operational gaps left by HPGe spectrometers. Materials such as CdTe and CdZnTe have matured to the point where they are commercially viable. Future alternative materials such as TlBr and CsPbBr show promise as well.

H3D, Inc. specializes in packaging these room-temperature spectroscopic materials, designing application-specific integrated circuits (ASICs) to read out the sensors, and developing reconstruction software to provide rich spectroscopic information to end users. CdZnTe is commercially available from H3D, and alternative semiconductors are under investigation.

This seminar will present concepts for reading out single-polarity wide-band-gap semiconductors, extracting 3-D position information from pulse waveforms captured from these devices, and how to use position information to image radioisotopes in the field. The seminar will also cover engineering advances that has allowed miniaturization of H3D's imaging spectrometers. Now, imaging spectrometers with better than 1% FWHM energy resolution at 662 keV are commercially available that weigh less than 0.6 kg and consume less than 5W of power. These spectrometers have been mounted on drones, permanently mounted within nuclear power plants, used for medical imaging, and integrated into safeguards hardware.



Dr. Michael Streicher earned his undergraduate degree from the School of Nuclear Engineering at Purdue University followed by his M.S. and Ph.D. degrees in nuclear engineering from the University of Michigan. Upon graduating from the University of Michigan, he joined H3D, Inc. which provides large-volume, position-sensitive, gamma-ray imaging spectrometers to a wide array of customers in various end applications such as nuclear power, nuclear safeguards, waste monitoring and assay, defense, homeland security, and medical imaging. At H3D, Dr. Streicher currently serves as H3D's President & Chief Operating Officer with previous roles in the company as a Member of the Board of Directors, Vice President, and Director of Electronics and Detector Physics.