



## Webinar

### Investigating the Directional Dependence in Organic Crystal Scintillator Materials

*Patricia Schuster*

*University of California,  
Berkeley*

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3:00 - 4:00pm

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#### Abstract

Organic scintillator materials have long been used for nuclear security applications. Recently, crystalline materials are of significant interest since the development of high quality stilbene crystals with excellent neutron-gamma pulse shape discrimination (PSD) at Lawrence Livermore National Laboratory. However, crystal organic scintillators are subject to a directional dependence in their response to heavy charged particle interactions, degrading their energy resolution for neutron measurements and worsening their PSD performance.

In this presentation, I will show measurements to characterize the directional dependence across organic crystal scintillators and discuss the physical mechanisms that produce the effect. I will start with an explanation of why PSD works in organic scintillators based on the fundamentals of energy transfer and light emission. Then I will share the measurements I have made to characterize this directional dependence using neutron, gamma-ray, and cosmic muon measurements in eleven different organic scintillator materials. I will show how the effect varies across materials and as a function of the interaction energy. Lastly, I will present a hypothesis for what mechanism produces this directional dependence and discuss the opportunity to use this effect in a directional detection system.

#### About Patricia Schuster

Patricia Schuster is a PhD student in the Nuclear Engineering Department at UC Berkeley. She is performing her dissertation research at Sandia National Laboratories in Livermore, CA through the NSSC under mentor Erik Brubaker. Patricia plans to graduate in May 2016 and is seeking a career in nuclear security at a university or national laboratory. Patricia recently presented this work at the IEEE NSS/MIC in San Diego, CA.

