

Applied Physics Seminar

# Extending the Capability of Neutron Scattering

**Prof. Roger Pynn**

Indiana University and Spallation Neutron Source

**Abstract:**

Neutron scattering is a mature technique for determining the positions and movements of atoms in condensed matter. Features of the interaction between neutrons and matter allow the technique to achieve results that often cannot be obtained in any other way. Because large fluxes of neutrons are so hard to produce, the method is usually practiced at large central facilities but, even so, there are many materials and phenomena that are beyond reach because neutron fluxes are much lower than, for example, x-ray flux from a synchrotron light source. In an attempt to overcome this problem, my collaborators and I have been working on a technique that makes more efficient use of neutrons by coding the direction of travel of the neutron into the phase of the neutron wavefunction and using an interferometric technique to measure the neutron scattering. After providing some background on neutron scattering, I will show how our method works by demonstrating a simple optical analogy based on so-called Wollaston prisms that were invented for light at the end of the 18<sup>th</sup> Century. I will show that with our method we are currently able to measure structural correlations in thin films over distances between a few nanometers and 500 nm.

**Biography:**

Roger Pynn was born in England and received his PhD degree from the University of Cambridge in 1969. His research has involved the use of neutron scattering to probe phenomena as diverse as structural phase transitions, magnetic superconductors, low-dimensional magnets and complex fluids. He has worked at several of the world's leading neutron centers and was, for several years, the Director of the Los Alamos Neutron Science Center. He is a Fellow of the APS and the AAAS and a Past President of the Neutron Scattering Society of America.

***Tuesday April 28th***

***3:00pm-4:00pm.***

***Watson 104***

*Refreshments will be available in the Watson Lobby at 3:45pm*