

# "Neutron Thermalization and VHTR Considerations"

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(901 Atlantic Drive – directly across from Neely)

**11:00am to 12:00 Noon**

***REFRESHMENTS WILL BE SERVED***

## **Abstract**

Neutron thermalization is the process by which neutrons seek a state of thermal equilibrium with their environment. In this range, the neutrons will be characterized with energies that are on the order of the excitation spectrum in the medium. In addition, these neutrons will have de Broglie wavelengths that are comparable to the inter-atomic spacing of the scattering material. Therefore, thermal neutron interactions will reflect the dynamics of the structure of the medium. For nuclear reactors that operate in the thermal energy range, the understanding of the thermalization phenomenon is essential for their effective and safe operation. While such an understanding has been accumulating over the past 60 years, there still remains much room for improvement and investigation. In particular, for graphitic materials, which serve as essential components of the core and fuel of the proposed very high temperature reactor (VHTR), current nuclear data libraries do not reflect accurately the physics of neutron thermalization. In addition, for graphite (and other solid moderators) current treatments do not address the potential need to account for possible structural evolutions that will accumulate as the reactor is operated.

## **Biosketch**

**Dr. Ayman I. Hawari** is an Associate Professor of Nuclear Engineering and Director of the Nuclear Reactor Program at North Carolina State University (NCSU). His interests focus on computational and experimental research in the area of neutron interactions. In addition, he is interested in the design and implementation of radiation beams for nondestructive examination including imaging.

He has been particularly active in research related to the Very High Temperature Reactor. Over the past few years, he has served in advisory and consulting capacities to various national and international entities including IAEA, CNSC, APS, CRDF, and INL on issues related to Nuclear Engineering education and research. In 2007, he was awarded the NCSU College of Engineering Alcoa Foundation Engineering Research Achievement Award for his achievements during the years 2004 – 2007.

He obtained his BS from the University of Missouri-Rolla and his MS and PhD from the University of Michigan-Ann Arbor all in Nuclear Engineering.