DEPARTMENT OF
PHYSICS &
ASTRONOMY

Physics & Astronomy
Colloquium

Prof. Takeshi Egami

(host: Prof. Dima Bolmatov)

U of Tennessee and Oak Ridge National Lab

3:30 - 4:30 p.m. | Tuesday, Sept. 30

ESB I Building 120

Title: Physics of Dynamic Aperiodic Matter (DAM)

Abstract: Polymers, colloids, liquids, macromolecules and biological matter are called “soft-matter”. The naming is catchy, but softness is not the essential nature for this class of materials. I propose to call them “dynamic aperiodic matter (DAM)”, because the central features for these non-crystalline substances are the dynamic heterogeneity and cooperativity. These represent notions never encountered in hard-condensed-matter physics and thus require development of novel theoretical concepts and experimental approaches. I will discuss the new experimental capabilities we developed to determine the dynamic two-body correlation functions, the energy-resolved pair density function, g(r, E), and the Van Hove function, G(r, t), using inelastic X-ray and neutron scattering, and the new idea of intermediate-range dynamic correlation, observed as extended oscillations in the pair-density correlation function, theoretically interpreted as damped density waves. As an example, I also mention the recent observation with Dima Bolmatov on the relaxor ferroelectric behavior in polar membranes using the simulated Van Hove function.

Refreshments at 3:00 p.m. | ESB I 120

Biography

Takeshi Egami received his Bachelor's degree in Applied Physics from the University of Tokyo in 1968, and his PhD in Materials Science from the University of Pennsylvania in 1971. After the postdoctoral research at the University of Sussex, U.K. and Max-Planck-Institute in Stuttgart, Germany, he returned to the University of Pennsylvania in 1973 as Assistant Professor. He was promoted to Associate Professor in 1976, to Professor in 1980, and was the Chair of the Department of Materials Science and Engineering from 1997 to 2002. He moved to the current position in 2003. He was Founding Director of UT-ORNL Joint-Institute for Neutron Sciences, currently Shull-Wollan Center (2008 – 2015). Egami has authored or co-authored 1 book, over 30 full reviews and over 550 technical papers. He gave over 370 invited technical presentations at national and international conferences.