



15th TcSUH STUDENT/POSTDOC SEMINAR

Monday, December 5th, 2022 - 5:00 pm, HSC 102

or join by Zoom:

(Meeting ID: 993 6574 8039, Passcode: 902301): <https://tinyurl.com/4u485jpf>

Meet & Greet: **Snack and soft drinks** will be served
at **4:30** p.m!! (RSVP)

Machine Learning as a Diffusion on a Free Energy Landscape

Dr. Yang He

TcSUH and Department of Chemistry

Abstract: A free energy perspective on machine learning will be introduced in this talk. As an example, the simplest memory unit can be understood as a dynamical system operated at finite temperature. We connect formation of knowledge with an emergence of a complex free energy landscape, where distinct memories correspond to distinct free energy minima. The presence of a pattern can reduce the number of these minima. At the end of the talk, we will review the attempts to account for general intelligence systems within the free energy framework.

Bio: Dr. Yang He currently holds a postdoctoral fellowship in Prof. Vassiliy Lubechenko's group in the department of chemistry and Texas Center for Superconductivity at University of Houston.

Chemo-mechanical Function of Silver-carbon Interlayer in Sheet-type All-solid-state Lithium-metal Batteries

Chaoshan Wu

TcSUH and Materials Science and Engineering Program

Abstract: Emerging all-solid-state Li metal batteries (ASSLMBs) based on high energy density Li metal anode offer unparalleled opportunities for an increasing number of high power/energy applications. However, the breakthrough of ASSLMBs was hindered by the rapid performance degradations among morphologically unstable Li and solid electrolyte (SE) interfaces. It has been reported that the insertion of a metal-carbon nanocomposite between Li and SE can stabilize the interface, however, the mechanisms for the stabilization are unclear, making future improvement challenging. Here, the chemo-mechanical function of a silver-carbon (Ag-C) nanocomposite layer between Li and argyrodite-type sulfide electrolytes is investigated. We have demonstrated that the Ag-C interlayer can homogenize the current density by manipulating the interface of the redox reaction. In addition, the transportation property of lithium in the lithiated Ag-C interlayer was investigated by GITT.

Bio: Mr. Chaoshan Wu is currently a Ph.D. candidate in Dr. Yan Yao's group in the Materials Science and Engineering Program and Texas Center for Superconductivity at the University of Houston.

Extreme Value Statistics of Community Detection in Complex Networks with Reduced Network Extremal Ensemble Learning (RenEEL)

Tania Ghosh

TcSUH and Department of Physics

Abstract: Arguably the most fundamental problem in Network Science is finding structure within a complex network. One approach is to partition the nodes into communities that are more densely connected than one expects in a random network. “The” community structure corresponds to the partition that maximizes a measure that quantifies this idea. Finding the maximizing partition, however, is a computationally difficult NP-Complete problem. We explore the use of a recently introduced algorithmic scheme to find the structure of a set of benchmark networks. The scheme, known as RenEEL, creates an ensemble of k partitions and updates the ensemble by replacing its worst member with the best of k' partitions found by analyzing a simplified network. The updating continues until consensus is achieved within the ensemble. Varying the values of k and k' , we find that the results obey different classes of extreme value statistics and that increasing k is generally much more effective than increasing k' for finding the best partition.

Bio: Ms. Tania Ghosh Ssennyimba is currently a Ph.D. candidate in Dr. Kevin Bassler’s group in the department of Physics and Texas Center for Superconductivity at University of Houston.

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RSVP BY Friday, December 2, at 3:00 p.m. for Pizza (for the seminar attendees), Drinks, and Snacks:

<https://forms.office.com/r/JZf9WkBVL2>