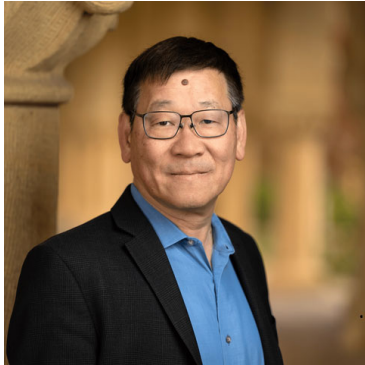


- Date & Time : **Monday 26th May 2025 10:00-11:30**
- Venue : # Room309, Frontier Research Laboratory



Prof. Zhi-Xun Shen

Professor, Stanford University
(RIKEN Fundamental Quantum Science Program)

" Angle-Resolved Photoemission Spectroscopy (ARPES) Advances Made and Opportunities Ahead "

Complex phenomenon in solids continues to be a major theme of physics in the 21st century. As better controlled model systems, a sophisticated understanding on the universality and diversity of these solids may lead to great revelations well beyond themselves. ARPES has become a leading tool to push the frontier of this important field of modern physics, as exemplified by its impact on our understanding of cuprate superconductors, topological and 2D materials. It will continue to help setting the intellectual agenda by testing new ideas, discovering surprises, and challenging orthodoxies.

The improved resolution and carefully matched experiments have been the keys to turning this technique into a sophisticated many-body tool. Fundamentally, the power of the technique stems from its directness and richness in information. Some physics of solids are already understood by their macroscopic and thermodynamic properties, but the truly deep insights often come from spectroscopy and scattering experiments. The momentum resolved nature renders ARPES combined benefit of both energy and momentum space. There is no other tool can equally visualize the energy-momentum phase space of the electronic structure - the DNA of matter.

In this talk, I will review the development of ARPES and its applications to date, highlighting key technical advances and its successes in characterizing fundamental properties, testing theoretical ideas, benchmarking models, identifying signatures of many-body physics, and uncovering surprises. I will also discuss exciting future opportunities enabled by time-, spin-, and spatially-resolved capabilities, as well as new sample environments. The development of ARPES will remain breathtaking, and what we have seen is the tip of an iceberg.

A. Damascelli, Z. Hussain, and Z.-X. Shen; Reviews of modern physics 75 (2), 473 (2003)
J. Sobota, Y. He, and Z.-X. Shen; Reviews of Modern Physics 93 (2), 025006 (2021)
Z.-X. Shen; Coshare Science 02, 04 (2024); DOI: <https://doi.org/10.61109/cs.202405.130>