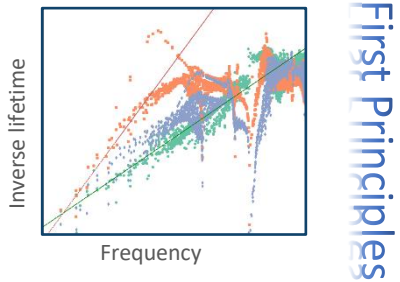
Center for Thermal Energy Transport under Irradiation (TETI)

Daivd Hurley (Idaho National Laboratory); Class: 2018-2026

MISSION: To accurately predict, from first principles, thermal energy transport in actinide materials in extreme environments.

RESEARCH PLAN: The transport of heat (thermal energy) in nuclear fuel is directly related to fuel performance, safety margins, and fuel longevity. The aim of TETI is to develop a first principles understanding of electron and phonon transport in advanced nuclear fuels that will provide engineers the necessary tools to design advanced nuclear fuel by tailoring defects and microstructure.



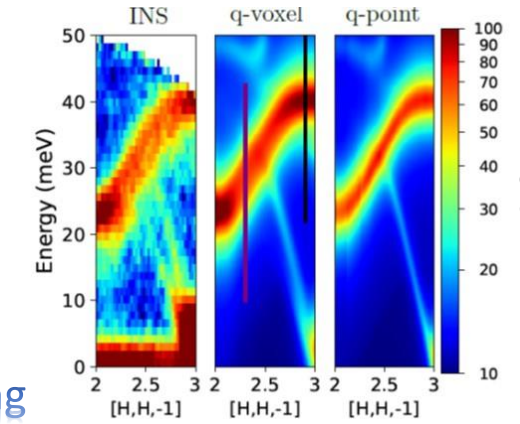
First Principles

$$\kappa_{\alpha\beta} = \frac{1}{Vk_BT^2}\int_0^\infty \langle J^\alpha(0)J^\beta(t)\rangle dt$$

Electron correlation

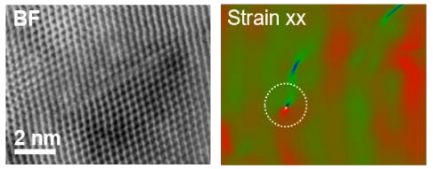
Temperature extremes

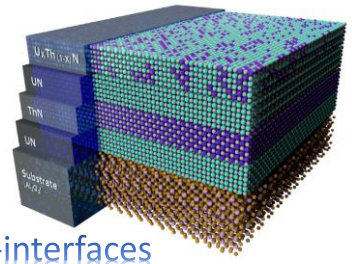
Electron-phonon coupling



Accurate lifetimes

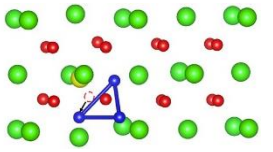
Strain Fields





Hetero-interfaces

Defect evolution



http://teti.inl.gov