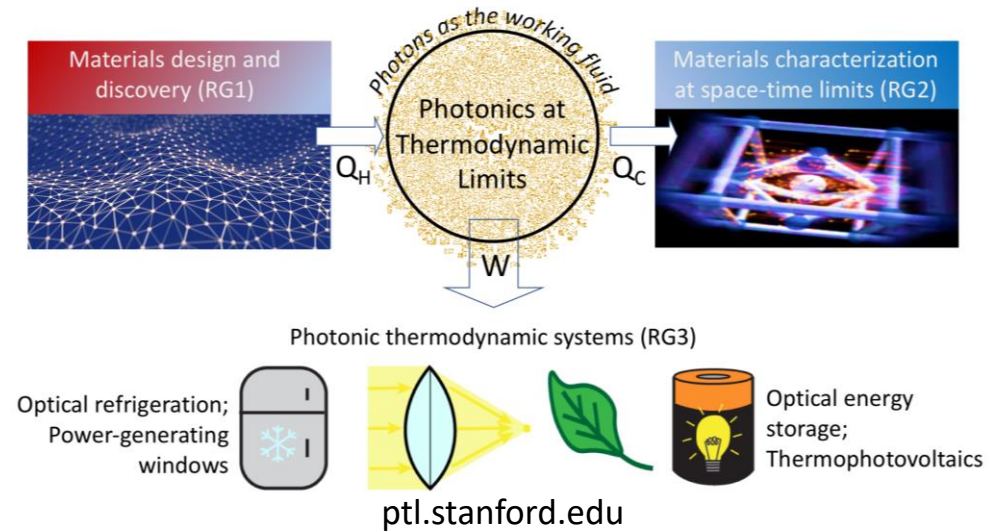


# Photonics at Thermodynamic Limits (PTL)

Jennifer Dionne (Stanford University); Class: 2018-2024

**MISSION:** To achieve light-driven energy and information conversion systems that operate at thermodynamic limits by understanding and controlling the flow of photons, electrons, ions, and phonons in atomically-architected materials.



## RESEARCH PLAN

- Develop new hierarchical materials, suggested by theoretical insights and synthesized with atomic precision, that perform photonic operations at thermodynamic limits.
- Develop new theoretical methods and new characterization tools, that accurately describe optically excited states and dynamic optical processes from the picometer and femtosecond scales to the system-level
- Develop a set of photonic thermodynamic cycles - such as optical refrigeration, thermophotovoltaics, and reversible computing systems - that use light as the working fluid and perform work with an efficiency approaching the Carnot efficiency