Dynamic Disorder and Collective Reorganization in Lead Halide Perovskites

Lead halide perovskites are an emerging class of photovoltaic materials that have shown record breaking power conversion efficiencies. However, much of their basic photophysics and chemistry is unknown. In this talk I will show how the interplay between a soft but polarizable lattice results in complex collective phenomena not seen in conventional semiconductors. For example, mixed halide solid solutions can undergo photo-induced phase separation under extended light exposure, and competing lattice structures can be inter-converted by exposure to humid air. Both behaviors undermines the utility of these materials in device applications as it drastically reduces their stability. We have developed molecular simulation tools to interrogate these and related phenomena, which have enabled the derivation of simple theories capable of proposing practical solutions.

Refreshments served at 1:45 pm  331 Klamath Hall

Hosted by Marina Guenza