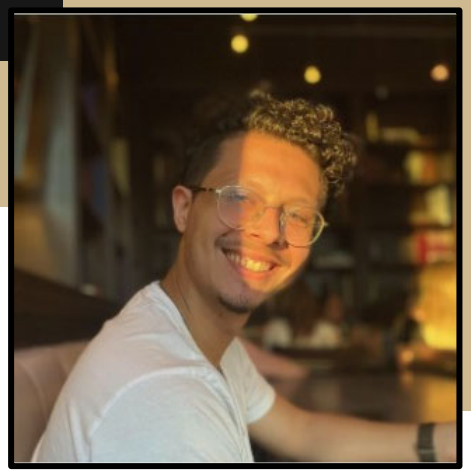
PHYSICAL CHEMISTRY SEMINAR



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Collective Electrodynamics in Condensed Matter Systems

Fascinating optical phenomena, such as Dicke superradiance and subradiance, can emerge when emitters cease to behave independently and rather respond collectively. Collective behaviors have been extensively studied in atomic platforms, where near-identical emitters can be arranged and controlled with remarkable precision. A natural question is how this collective physics changes when brought into a condensed matter setting, where microscopic dipoles are separated by atomic-scale distances and optical excitations can themselves possess spatial dynamics. Two-dimensional excitonic systems provide a useful setting in which to explore this crossover, where kinetic energy, material geometry, and collective light–matter interactions can occur on comparable length and energy scales. In this talk, we will discuss how these ingredients reshape the optical response of modulated excitonic materials, how collective surface excitations behave in the presence of boundaries, and how some of these ideas may extend to molecular crystals. Together, these examples illustrate how collective electrodynamics evolves as one moves from the limit of dilute resonant emitters toward dense and spatially structured condensed matter systems.