

# "Quantum Interference in Chemical Reactions"

## Physical Chemistry Seminar

**Wednesday, April 12, 2023**  
**10:30-11:30 a.m. BRWN 4102 and Zoom**



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### Abstract:

Interferences emerge when multiple pathways coexist together, leading toward the same result. In this talk, I will present a theoretical study for a reaction scheme that leads to constructive quantum interference in a photoassociation (PA) reaction of an  $^{87}\text{Rb}$  Bose-Einstein condensate where the reactant spin state is prepared in a coherent superposition of multiple bare spin states. This is achieved by changing the reactive scattering channel in the PA reaction. As the origin of coherent control comes from the spin part of the wavefunction, we showed that it is sufficient to use radio frequency (RF) coupling to achieve the superposition state. We simulate the RF coupling on a quantum processor (IBMQ Lima), and our results show that interferences can be used as a powerful resource for the coherent control of photochemical reactions. The approach is general and can be employed to study a wide spectrum of chemical reactions in the ultracold regime.