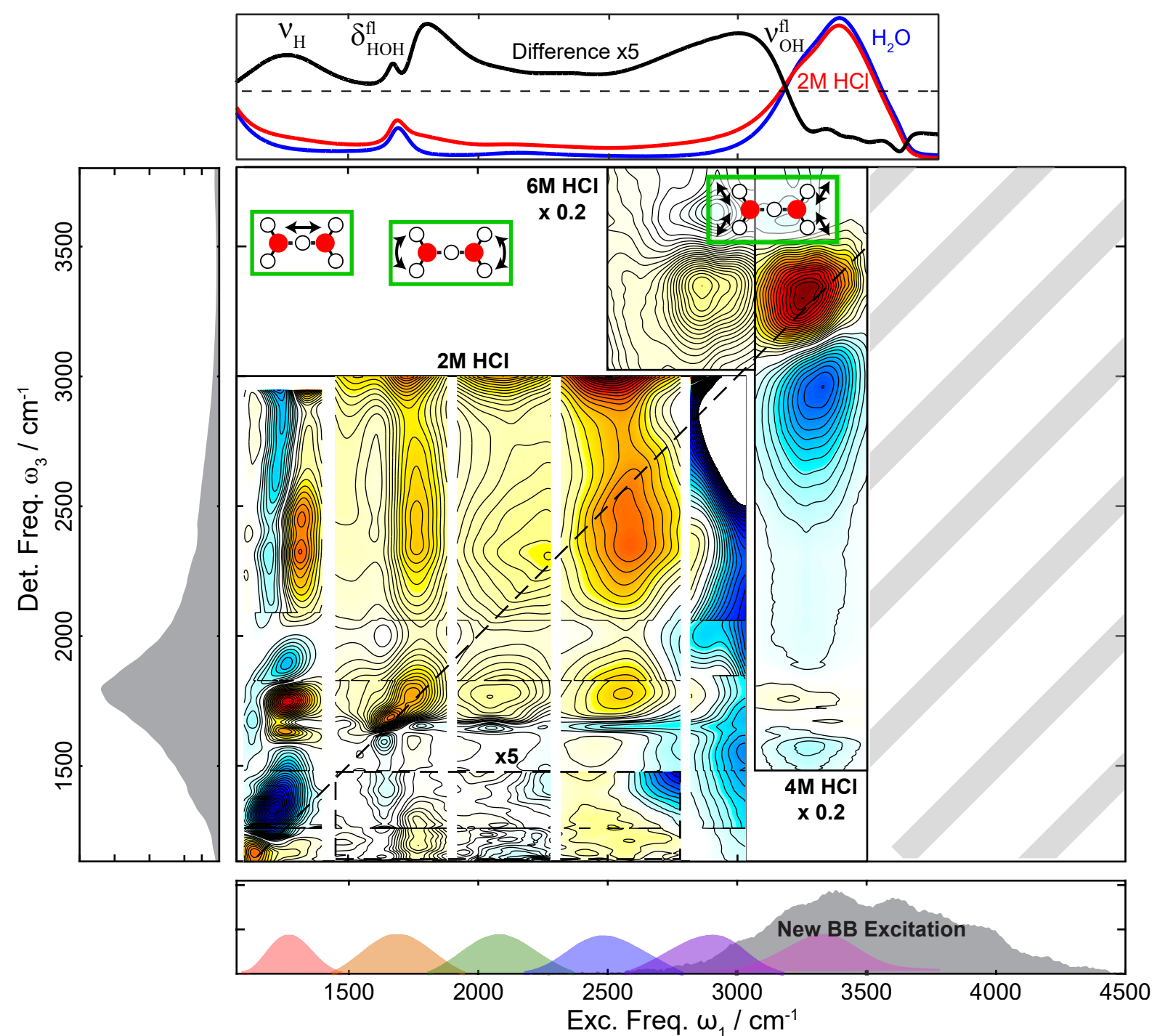
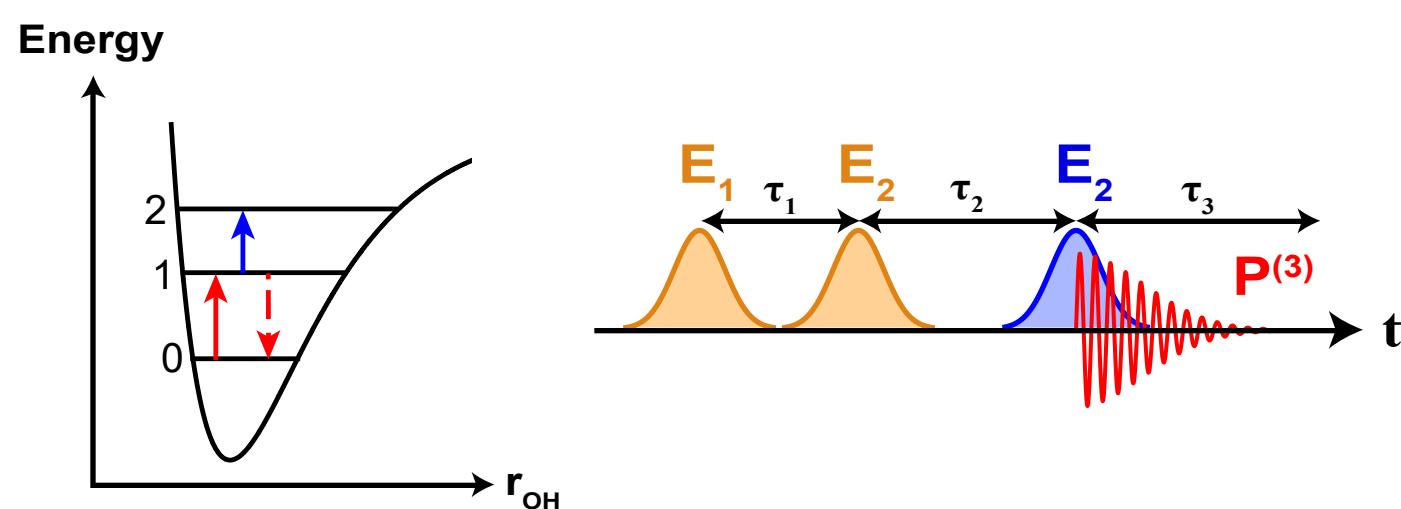


Water Dynamics with IR Spectroscopy

Broadband 2D IR spectroscopy

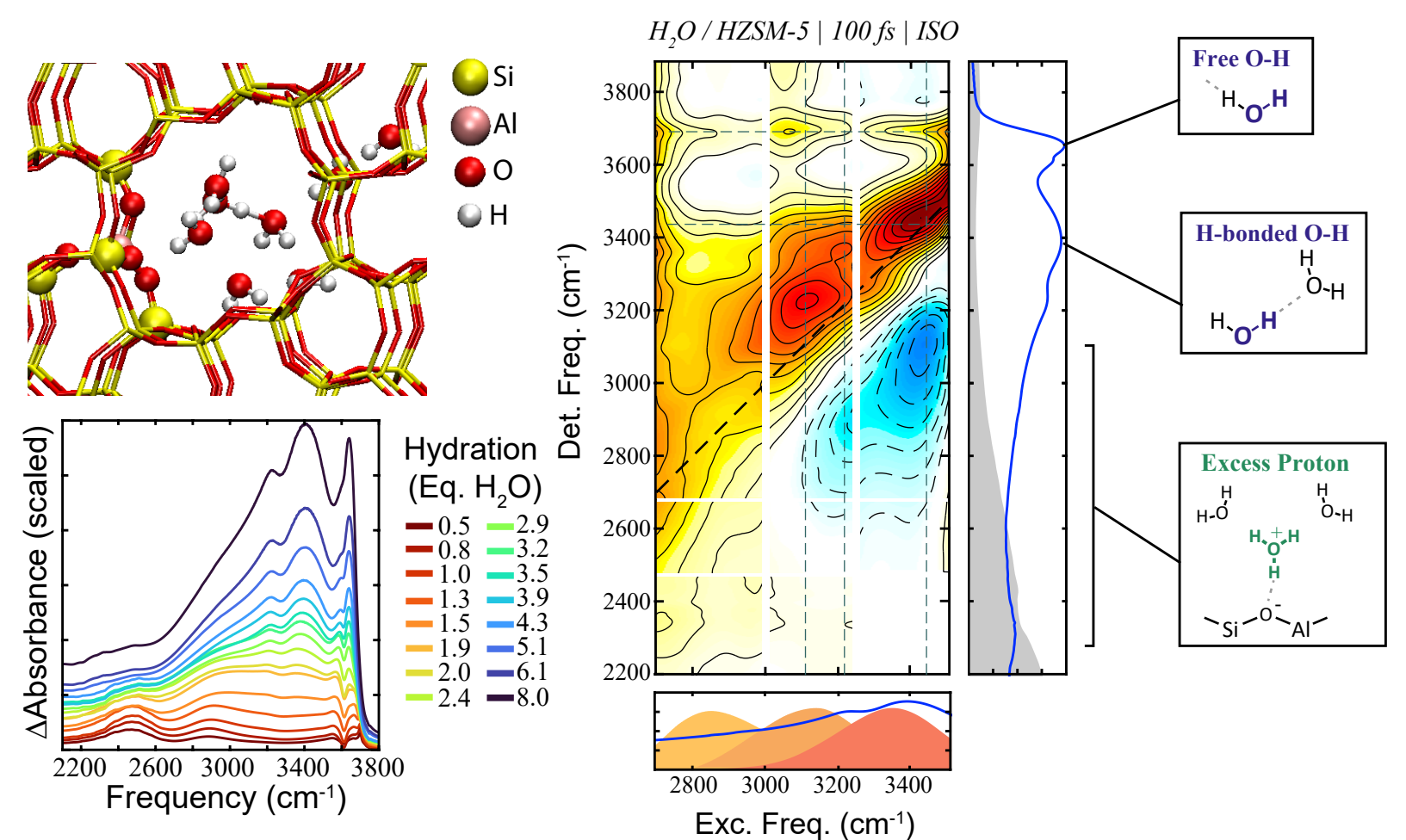
Two dimensional IR spectroscopy (2D IR) is an experimental technique which tracks molecular dynamics. Water absorbs light across the entire mid-IR spectrum. In order to capture each vibration simultaneously and accurately measure the absorption lineshape, we have employed broadband detection and recently developed broadband excitation pulses.



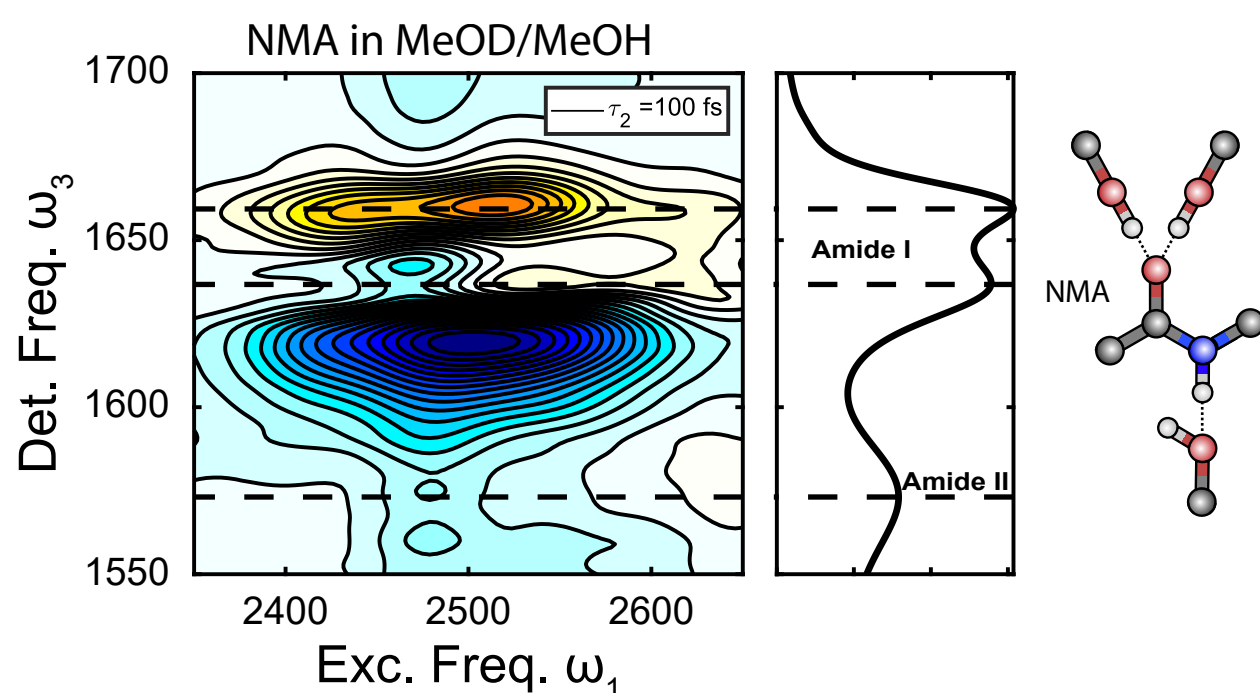
Water in Complex Environments

Water Confined in Zeolites

Interfacial water plays an important role in biology, electrochemistry, and solvation. To isolate interfacial water, we studied water confined in the pores of solid acid catalysts. Water's molecular arrangement, H-bonding network, and interactions with the solid acid site evolve as a function of hydration, as reflected in the IR spectrum.



Cooperative Hydration During Demixing



The structural dynamics of water are highly cooperative, meaning the motions of individual water molecules are correlated. We are investigating the cooperative nature of solvation by comparing the water directly hydrating a solute to the bulk water and monitoring these relative spectra through demixing. We expect to get insight into related water chemistry problems such as solvation, miscibility, hydrophobicity, and phase separation