



Center for Soft Matter and Biological Physics

Discussion Meeting

Dr. Abhishek Singh

(Physics, Virginia Tech)

"Insights into Hydration Dynamics at Sub-picosecond Timescales"

Friday, February 7, 2020

4:00pm - 5:00pm

304 Robeson Hall

The liquid state of water is a very complex system due to hydrogen bonding characteristics. Water forms a transient tetrahedral network with neighboring molecules with a life time of the order of picoseconds. The presence of biomolecules in water matrix distorts the H-bond network and makes the water dynamics slower as a result of hydrogen bonding between biomolecule and water. The electrostatic field exerted by a biomolecule gradually weakens as a function of intermolecular distance between biomolecule and water. This results in hydration layers at the surface of a biomolecule, with hydration water molecules having distinct temporal characteristics. I will talk about some of our recent results on the aqueous solutions of DNA, studied employing an extended megahertz-terahertz frequency domain spectroscopy. Based on the spatio-temporal behavior, water molecules in the aqueous DNA solutions can be classified as tightly-, loosely bound, and bulk water. I will further discuss effective medium approximation at terahertz frequencies for such systems.

