

# Andrew D. Horning



**Graduate Institution:** *Massachusetts Institute of Technology*

**Location:** *Cambridge, MA*

**Graduate Discipline:** *Physical Chemistry*

**Hometown:** *Spokane, WA*

## **Research Interests:**

*My research utilizes ultrafast nonlinear laser spectroscopy to examine charge transfer processes on the femtosecond timescale, focusing on how molecular structures and solvation affect the rates, efficiencies, and distances of electron and proton transfer. Specifically, I use 2D infrared spectroscopy (2D IR) to examine how hydrogen bonding networks such as that of liquid water facilitate proton transfer and charge separation. These sorts of reactions take place extremely rapidly, on the order of 100 femtoseconds, and with such rapid motion of small particles, the fluctuating local molecular environment has a tremendous influence on reactivity. I am working to better understand the ties between structure and dynamics which control these fundamental chemical processes underlying solar energy harvesting and energy storage.*

## **About me:**

*I have always been interested in the development of new models of nature - taking basic knowledge of the microscopic and formulating a new picture of macroscopic phenomena. Spectroscopic tools give us unperturbed, direct insight to the quantum mechanical world of molecules, and I seek to both further our understanding of the physics of fundamental chemical processes and to apply this knowledge to real world problems in energy and technology, using basic research results to change our ideas about what is possible in the world. But discoveries are of little use if only a select few understand them, and I have made the clear explication of scientific ideas a personal priority over the past years, working as a teaching assistant, tutor, and instructor for both physics and chemistry classes at USC and MIT. In my spare time, I enjoy jumping out of perfectly good airplanes, and I am a licensed skydiver with over 150 jumps, ranging from many-person formations to sit and head-down freefly skydives.*



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