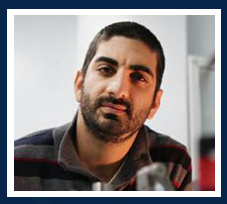
Molecular Choreography



Elad Harel
Assistant Professor, Chemistry

CURRENT RESEARCH

Seeing molecules dance at the extremes of time, space, and energy

When we imagine individual molecules, it may come as a surprise that they are not static and in fact, the ways in which they move are completely unfamiliar to us. For instance, protein molecules "know" how to fold in ways that scientists do not yet understand. In some biological and chemical systems, energy moves through molecules at incredible speeds - far faster than it takes the atoms of the molecule to rearrange. Dr. Elad Harel, of Northwestern University, develops tools that allow one to see the molecular choreography of life. These tools peer into the quantum world in order to understand how to mimic, control, or disrupt molecules for tailored function. The applications of this research is far-reaching, from tracking the molecular origin of disease such as Alzheimer's to creating efficient solar cells for energy conversion technologies.

The impact of Dr. Harel's research is to inform the design of novel materials with unprecedented functionality. While his research is fundamental, it has far reaching consequences for controlling matter at the molecular length scale. The structures of atoms and molecules are well-understood, but how they function together to give rise to cooperative properties, that is, those in which the whole is greater than the sum of its parts, is not. The major bottleneck is the difficulty in seeing these processes directly and it is here that Dr. Harel's research is making an impact. Like the invention of the microscope that allowed scientists to peer into the microscopic world, Dr. Harel and his team are developing tools that allow scientists to see further than ever before, thereby making movies of molecules dancing inside of living cells or energy moving through...

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AFFILIATION

Northwestern University

EDUCATION

- Postdoctoral Training, in Chemistry, 2011 , University of Chicago
- Ph.D., in Chemistry, 2008 , University of California, Berkeley
- B.A., in Mathematics, 2003 , University of California, San Diego
- B.S., in Chemical Physics, 2003 , University of California, San Diego

AWARDS

- Packard Fellowship for Science and Engineering, Northwestern University, 2013
- Army Research Office Young Investigator Award, Northwestern University, 2013
- Institute for Complex Adaptive Matter (ICAM) Postdoctoral Fellowship at the University of Chicago, 2009-2011
- Department of Homeland Security (DHS) Graduate Student Fellowship, UC Berkeley, 2004-2007
- Joseph E. Mayer Award for Outstanding Research in Chemistry, UCSD, 2003

RESEARCH AREAS

Technology, Chemistry

FUNDING REQUEST

Your contributions will support the continued research of Dr. Elad Harel as he develops tools to see molecules "dance" at the extremes of time, space, and energy. Your donations will support the necessary $500K per year required for running the lab including funding students, lasers, and other equipment. Additional funding will support new experimental setups. In choosing to donate, you will play a part in the fundamental research necessary for incredible advances in technology and understanding!