David M. Jonas
Department of Chemistry
University of Colorado at Boulder
215 UCB, Boulder, CO 80309-0215
(303) 492-3818; e-mail: david.jonas@colorado.edu

Positions

University of Colorado at Boulder
Professor, August, 2006 - present
Associate Professor, August, 2002 - August, 2006
Assistant Professor, August, 1995 - August, 2002

University of Chicago
Postdoctoral Research Associate, 1992-1995

Education

Massachusetts Institute of Technology
Ph.D. Physical Chemistry, June 1992
thesis: "Spectroscopy of Vibrationally Hot Molecules: Hydrogen Cyanide and Acetylene"
thesis co-supervisors: Robert W. Field and Robert J. Silbey

University of California, Berkeley
B.S. Chemistry, June 1986
A.B. Mathematics, June 1986

Awards

Earle K. Plyler Prize for Molecular Spectroscopy and Dynamics, 2018
"for the demonstration and development of femtosecond two-dimensional Fourier transform spectroscopy and its use in studying fast processes" (National Award from the American Physical Society)
Fellow of the Optical Society of America, 2017
BOMEM-Michelson Award, 2015 (Coblentz Society)
Fellow of the American Association for the Advancement of Science. 2014
Ahmed Zewail Award in Ultrafast Science and Technology, 2013
"For the demonstration, development, and elucidation of the principles of femtosecond two-dimensional Fourier-transform spectroscopy, widely used for the investigation of diverse ultrafast phenomena." (National Award from the American Chemical Society)
Who's Who in America, 2009 - present
University of Colorado Faculty Fellowship, 2009
Fellow of the American Physical Society, 2007
National Science Foundation Special Creativity Award, 2006
Alfred P. Sloan Research Fellow, 1999-2003
David and Lucile Packard Fellow in Science and Engineering, 1996-2001
University of Colorado Junior Faculty Development Award, 1996
Camille and Henry Dreyfus New Faculty Award, 1995

member of the American Chemical Society (1993-present), the American Physical Society (1987-present), the Optical Society of America (1995-present), Sigma-Xi (1991 - present), and the American Association for the Advancement of Science (2008-present)

Over 170 Talks at Universities and Scientific Meetings

interviewed about 1999 Nobel Prize in Chemistry on National Public Radio, ("All Things Considered", 10/12/99 at 4:20 pm EST)

interviewed about Shortest Time Interval Measured on National Public Radio ("Morning Edition", 2/26/04 at 6:00 am EST)

Bryce Crawford Lecture "Two-Dimensional Femtosecond Spectroscopy", Department of Chemistry, University of Minnesota, Minneapolis, MN, 10/22/2015

Noyes Distinguished Lecture "Quantum Dot Carrier Dynamics: from ballistic to thermodynamic", Department of Chemistry, University of Texas at Austin, 10/24/2019

Service Highlights

International Program Committee, Nobel Symposium "Exploring complex molecular and condensed phase processes and functions by multidimensional spectroscopy from THz to X-rays", Royal Swedish Academy of Sciences, 2021

Chair, Department of Chemistry, 7/2018-6/2021

Editorial Advisory Board, Journal of Chemical Physics, 2018 -

General Chair, International Conference on Ultrafast Phenomena, 2010

Fellow, Renewable and Sustainable Energy Institute, 2009 – present

Co-Director, Center for Revolutionary Solar Photoconversion, a research center of the Colorado Renewable Energy Collaboratory, 2008-2014

Chair, Department of Chemistry and Biochemistry Self Study, 11/06-5/08

Program Chair, International Conference on Ultrafast Phenomena, 2006

Provost's Committee for Renewable and Sustainable Energy Initiative, 2005-06

David Jonas' group was the first to experimentally demonstrate optical analogs of 2D NMR. His 1998 letter demonstrated femtosecond electronic analogs of the COSY, NOESY, and zero-quantum two-dimensional Fourier transform experiments. This letter also experimentally separated real-valued absorptive 2DFT spectra (which have high resolution) from imaginary refractive 2DFT spectra (which are broad). In 1999, Mukamel published his first theoretical treatment, calculating absolute value 2DFT correlation spectra. In 2000, Hochstrasser partially replicated Jonas' experiment to report absolute value COSY 2DFT vibrational spectra. In 2003, Tokmakoff succeeded in using Jonas' approach to obtain real-valued absorptive 2DFT spectra in the vibrational infrared. At present, over 70 groups worldwide use the approach to 2DFT spectroscopy that Jonas developed for experiments from the Terahertz to the deep ultraviolet.

Jonas' group was the first to predict and experimentally verify several aspects of femtosecond 2DFT spectra. They showed that real-valued absorptive femtosecond 2DFT spectra could "freeze" vibrational and solvent motions in time to obtain linewidths below the single molecule limit. They found 2DFT signatures of solvent memory and a coherent solvent Stokes' shift. They were the first to use femtosecond spectroscopy to watch both coherent Jahn-Teller vibrational distortions and the accompanying coherent electron rearrangements, and the first to see these dynamics in 2DFT spectra. In 2013, they were the first to explain the long-lived coherences reported in the 2DFT spectra of photosynthetic light harvesting antennas, solving a 75 year-old mystery about their efficient energy transfer. Their mechanism involves nonadiabatic resonance between excitons and delocalized vibrations in which donor and acceptor have anti-correlated intramolecular vibrations. The anti-correlated vibrations of a dimer are the analog of asymmetric Jahn-Teller active vibrations, and the long-lived coherences arose from their resonant excitation on the ground electronic state. Since Zigmantas experimentally verified Jonas' explanation in 2018, the mechanism has become widely accepted for energy transfer and is hypothesized to play a role in photosynthetic charge transfer and other efficient light harvesting phenomena.