

Massachusetts Institute of Technology

The Richard C. Lord Lecture is an annual event sponsored by the MIT Department of Chemistry and the G. R. Harrison Spectroscopy Laboratory to honor a scientist who has made important contributions to the field of spectroscopy. We thank the many friends and colleagues of Dr. Lord for their generous contributions to the endowment fund.

Past Awardees

Takeshi Oka 1992	Robert Field 2005
Alexander Pines 1993	John Hall 2006
Charles Townes 1994	Graham Fleming 2007
Richard Zare 1995	Mildred Dresselhaus 2008
Carl Lineberger 1996	Michael Feld 2009
William Klemperer 1997	Wolfgang Ketterle 2010
William Phillips 1998	Stefan Hell 2011
Theodor Hänsch 1999	Erich Ippen 2012
Daniel Kleppner 2000	James Fujimoto 2013
Steven Chu 2001	Mostafa A. El-Sayed 2014
Norman Ramsey 2002	Paul L. McEuen 2015
Britton Chance 2003	
Watt Webb 2004	

The Department of Chemistry and  
MIT Laser Biomedical Research Center  
cordially invite you to attend the

## 2016 Richard C. Lord Lecture

by

**Jun Ye**

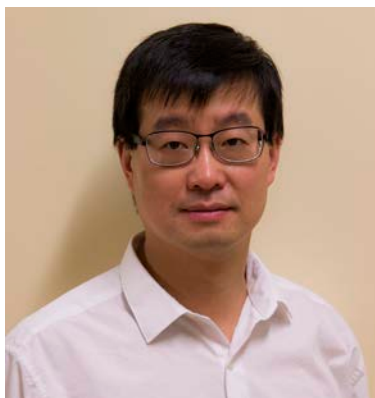
on

## Frequency comb spectroscopy – From mid – IR to XUV



Tuesday, April 5, 2016, 12 Noon  
MIT, 35-225

Refreshments served following the lecture  
In the Grier Room (34-401)



**Jun Ye** is a Fellow of JILA, NIST and University of Colorado. He is a member of the National Academy of Sciences, a Fellow of NIST, a Fellow of the American Physical Society, and a Fellow of the Optical Society of America. His research focuses on the frontier of light-matter interactions and includes precision measurement, quantum physics and ultracold matter, optical frequency metrology, and ultrafast science. He has co-authored over 300 scientific

papers and has delivered over 450 invited talks. Awards and honors include US Presidential Rank Award, three Gold Medals from the U.S. Commerce Department, Frew Fellowship from the Australian Academy of Science, I. I. Rabi Prize from the American Physical Society, European Frequency and Time Forum Award, Carl Zeiss Research Award, William F. Meggers Award and Adolph Lomb Medal from the Optical Society of America, Arthur S. Flemming Award, Presidential Early Career Award for Scientists and Engineers, Friedrich Wilhelm Bessel Award from Alexander von Humboldt Foundation, and Samuel Wesley Stratton Award from NIST. His research group web page is <http://jila.colorado.edu/YeLabs/>.

Phase controlled optical frequency combs provide revolutionary synergy between precision measurement and ultrafast science. An excellent example is the recently developed direct frequency comb spectroscopy, which provides simultaneous measurements of tens of thousands of molecular spectral features at high spectral resolution and over a wide spectral coverage, thus forming the basis for molecular identification at an unprecedented level of specificity and confidence.

We have recently extended frequency combs into the mid infrared and extreme ultraviolet. With the capability of performing time-resolved absorption, we can now quantitatively track transient chemical species and study reaction kinetics in real time. Combined with the technology of cold molecules, we can unravel complex spectra from large molecules and obtain new insights into molecular structure and dynamics. Finally, with an XUV frequency comb we can directly manipulate molecules and probe the extreme nonlinear physics, opening future high-precision measurements in strong-field phenomena.

*Richard C. Lord* was born in Louisville, Kentucky in 1910. He was graduated from Kenyon College, Ohio in 1931. He received the Ph.D. degree in physical chemistry from Johns Hopkins University in 1936, where he began a long and distinguished career as a scientist and educator. In 1942 Dr. Lord came to MIT. He was appointed Professor of Chemistry in 1954 and was Director of the Spectroscopy Laboratory from 1946 to 1976. He died in 1989.

Lord's research contributions were in the infrared and Raman spectroscopy of polyatomic molecules. His achievements include the observation and interpretation of Coriolis-activated forbidden vibrational transitions, the synthesis and complete vibrational analysis of a large number of deuterated molecules, and the discovery and exploitation of the anomalous far infrared spectra of ring molecules. Toward the end of his career he became interested in biomolecules. His studies of the laser Raman spectra of proteins and nucleic acids opened a new field of research.

Lord was also a dedicated teacher and an inspired supervisor of graduate students. His summer course in spectroscopy, held first at MIT and then at Bowdoin College, attracted more than 2000 scientists.

Lord had a major impact on the development of the Spectroscopy Laboratory. During his thirty year tenure as Director, the Laboratory became an Interdepartmental Laboratory of the School of Science, with broadened faculty participation. Research activities expanded from the study of atomic spectra using visible light and large gratings to include visible-UV electronic molecular spectra, molecular vibrational spectra using classical infrared and far infrared sources, and then to the use of lasers. During this period the Laboratory pioneered in a wide variety of vibrational studies of molecules and Raman studies of biomolecules, some of them mentioned above, as well as in seminal laser studies of the stimulated Raman and Brillouin effects and the use of lasers for precision measurements and ultra-high resolution spectroscopy.

Lord received the Presidential Certificate of Merit in 1948, and the Award in Spectroscopy from the Pittsburgh Spectroscopy Society in 1966. He served as president of the Commission of Molecular Spectroscopy of the International Union of Pure and Applied Chemistry, and was president of the Optical Society of America, and received the Lippincott Medal from them in 1976. He was also a fellow of the American Academy of Arts and Sciences.

The annual Richard C. Lord Lecture has been established as a tribute to the memory of Dr. Lord.