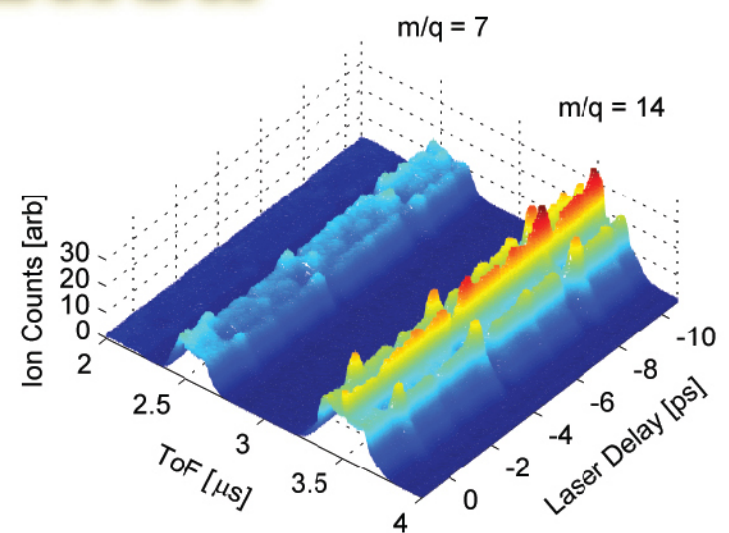


P.H. Bucksbaum

Observing Structure and Motion in Molecules with Ultrafast Strong Field and Short Wavelength Laser Radiation

The term “molecular movie” has come to describe efforts to track and record Angstrom-scale coherent atomic and electronic motion in a molecule. The relevant time scales for this range cover several orders of magnitude, from sub-femtosecond motion associated with electron-electron correlations, to 100-fs internal vibrations, to multi-picosecond motion associated with the dispersion and quantum revivals of molecular reorientation. Conventional methods of cinematography do not work well in this ultrafast and ultrasmall regime, but stroboscopic “pump and probe” techniques can reveal this motion with high fidelity. This talk will describe some of the methods and recent progress in exciting and controlling this motion, using both laboratory lasers and the SLAC Linac Coherent Light Source x-ray free electron laser, and will further try to relate the data to the goal of molecular movies.



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