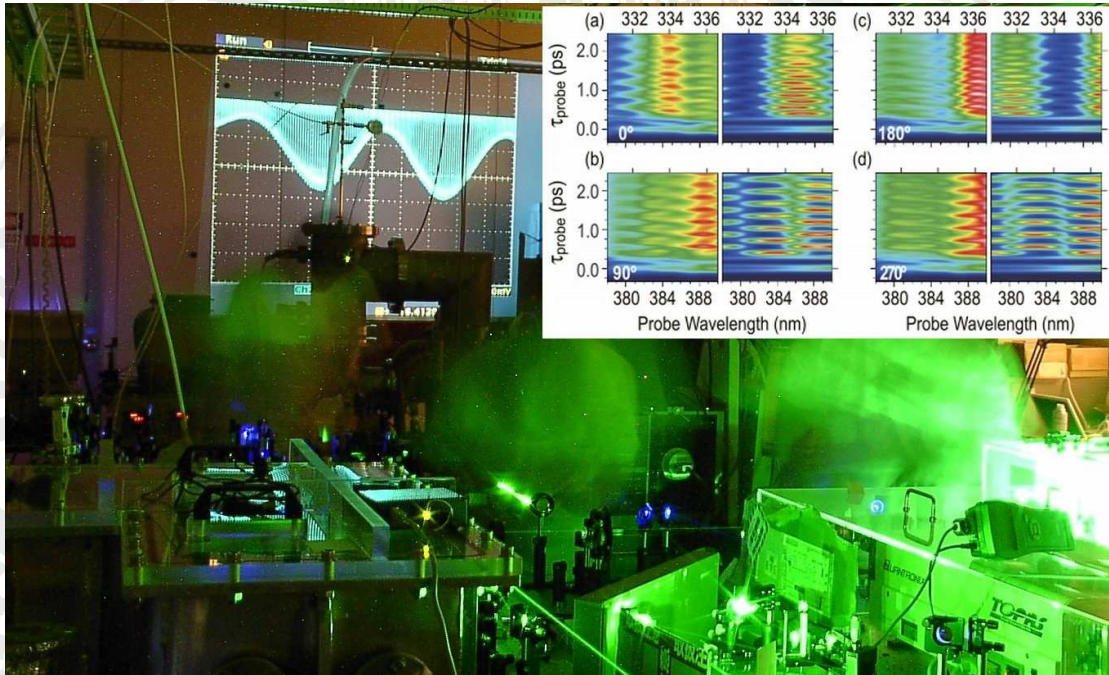


PHYSIKALISCHES KOLLOQUIUM

AM 3. DEZEMBER 2012 UM 17 UHR C.T.

IM GROßEN HÖRSAAL



OPTICALLY ENGINEERED QUANTUM STATES IN ULTRAFAST AND ULTRACOLD SYSTEMS

PROF. DR. KENJI OHMORI

INSTITUTE FOR MOLECULAR SCIENCE, OKAZAKI, JAPAN

We have developed spatiotemporal wave-packet engineering in which the ultrafast wave-packet interference in a molecule is visualized and controlled with precisions on the picometer spatial and attosecond temporal scales [1,2]. This high-precision wave-packet engineering has been applied to ultrafast computing with molecular wavefunctions that executes discrete Fourier transform within 150 fs, faster than the current fastest supercomputers by three orders of magnitudes [3,4]. These ultrafast approaches are now being applied to cold and ultracold systems such as solid para-hydrogen and laser-cooled atoms and molecules to explore quantum many-body dynamics.

- [1] H. Katsuki and K. Ohmori *et al.*, *Science* **311**, 1589 (2006).
- [2] H. Katsuki and K. Ohmori *et al.*, *Phys. Rev. Lett.* **102**, 103602 (2009).
- [3] K. Hosaka and K. Ohmori *et al.*, *Phys. Rev. Lett.* **104**, 180501 (2010)
(Highlighted by *Nature* **465**, 138 (2010); *Physics* **3**, 38 (2010)).
- [4] H. Goto and K. Ohmori *et al.*, *Nature Physics* **7**, 383 (2011).
(Highlighted by *Nature Physics* **7**, 373 (2011); *Nature Photonics* **5**, 382 (2011)).