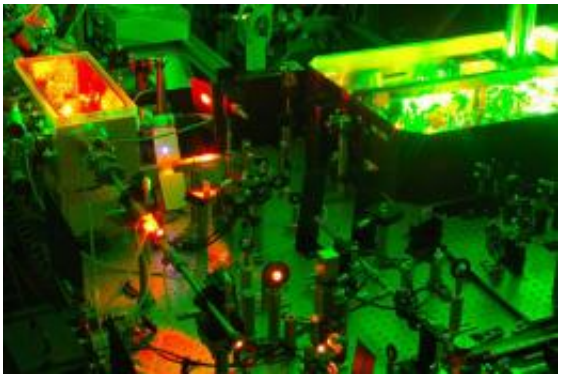
Ultra high speed film: Nano-scientists take snapshots of electronic states

March 10 2011



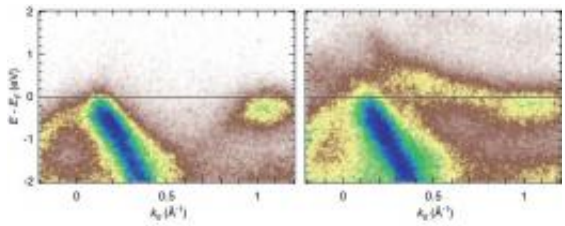
Laser system for generating ultra short x-ray pulses which is used in the experiment to make the recordings. Photo: Rohwer et al., Copyright: CAU

How fast an intense laser pulse can change the electrical properties of solids is revealed by researchers from Kiel University in the current edition of *Nature*.

German scientists in the team of Professor Michael Bauer, Dr. Kai Roßnagel and Professor Lutz Kipp from the Institute of Experimental and Applied Physics, together with colleagues from the University of Kaiserslautern and the University of Colorado in Boulder, U.S.A., are following the course of electronic switching processes which occur within fractions of a second (femtoseconds). The results of their research may trigger future developments of custom-made and ultra fast opto-electronic components in order to increase data transmission rates

or to accelerate optical switches, to name just one example of potential areas of application.

"These techniques that we have developed enables us to record films of extremely fast processes in a much more comprehensive manner than it was previously possible with similar techniques", Bauer explains. "We are able to, for example, directly track phase transitions in solids or catalytic reactions on surfaces."



Two still frames recorded from the newly developed imaging method. The time interval betweenthe two frames is only 0.00000000000007 seconds. Recording: Rohwer et al., Copyright: CAU

To record the films, the Kiel scientists used ultra short flashes of light in the soft x-ray spectral region generated with a specific laser system. Bauer: "The amount of information gained from our pictures when played back in slow motion is vast. We will get completely new insights into most relevant electronic properties of solids which are important for a variety of current and future technologies, for example, in telecommunications."

More information: www.nature.com/nature%20under:%2010.1038/nature09829

Provided by Kiel University

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