



PRESS RELEASE

Gottfried Wilhelm Leibniz Prize 2006 for Prof. Ferenc Krausz
Deutsche Forschungsgemeinschaft (DFG) awards renowned research prize to Max-Planck Director

The Gottfried Wilhelm Leibniz Prize of the Deutsche Forschungsgemeinschaft (DFG) is being awarded this year to Prof. Dr. Ferenc Krausz, Professor of Physics at the Ludwig-Maximilians University, Munich and Director of the Max-Planck-Institute of Quantum Optics in Garching. This research prize for experimental scientists is at 1.55 million Euros the highest value prize in German research.

The prize money can be used over a period of 5 years for research work. The decision about the prizewinner is made by the Grants Committee on General Research Support and is based on a recommendation by the Nomination Committee, which is made up of renowned scientists from various research areas.

In his earlier work, Prof. Krausz developed a new class of Titan:sapphire laser systems generating light pulses with durations of less than 10 femtoseconds (1 femtosecond = 10⁻¹⁵ seconds). This breakthrough was permitted by the invention of a new class of mirrors by Prof Krausz and his colleague, Dr. Robert Szipöcs. The new mirrors, dubbed chirped mirrors, reflect the light in the whole visible spectrum, but delay the long-wavelength (red) part of the light pulse in comparison with the short (blue) waves. Through this, dispersion of the light pulse in the active laser medium is efficiently compensated. Meanwhile the mirrors are being used in numerous research laboratories worldwide as well as in many commercially available laser systems.

These mirrors have allowed the routine generation of high-intensity light pulses comprising merely a few oscillations of the electromagnetic field for the first time. Subsequently, Prof. Krausz in his collaborative work with Prof. Theodor Hänsch, using the Nobel Prize winning Frequency Comb-Technique, was able to bring these oscillations successfully under control. The resulting light pulse with only 1-2 controlled, intense field oscillations has opened the door to the first reproducible generation and measurement of attosecond pulses and with that has laid the foundation of the new research area of attosecond physics.

Today at the Max-Planck-Institute of Quantum Optics his department "Attosecond and High-field Physics" operates several laser systems, which deliver X-ray pulses with a duration of less than 300 attoseconds. With the new attosecond measurement tools and techniques, the physicists pursue a variety of goals including control and real-time observation of the motion of electrons inside atoms and molecules. Fundamental microscopic processes like ionization can now be measured in real time. One day, even 4-dimensional microscopy of electrons and complex molecular systems may become feasible.

Generation of the attosecond X-ray pulses with wavelengths of a few tenths of a nanometer required to this end is being pursued with a unique laser, the *Petawatt Field Synthesizer*, which is currently under development. After its commissioning in about 3 years, this source is expected to allow pioneering experiments to be conducted in a wide range of research areas. In addition to its applications in attosecond physics and structural biology it may also permit the controlled acceleration of electrons and protons up to the Giga-electronvolt range.

This year, under the guidance of Prof. Krausz, the "International Max Planck Research School for Advanced Photon Science" was established. In addition to the MPI of Quantum Optics, the Ludwig Maximilians University of Munich, the Technical University of Munich and the University of Technology, Vienna, are also participating.

Biography:

Prof. Dr. Ferenc Krausz, who was born in 1962, studied electrical engineering at the Budapest University of Technology and theoretical physics at the Eötvös-Loránd University in Budapest. In 1991 he received his PhD in Quantum Electronics at the Vienna University of Technology, where only 2 years later he received his "Habilitation". Further stages of his career were as visiting professor at the Centre for Ultrafast Optical Science at the University of Michigan, Ann Arbor. In 1999 he was appointed full professor at the Vienna University of Technology and in 2000 he became director at the centre for "Advanced Light Sources". In 2003 he was offered the position of director at the Max-Planck-Institute for Quantum Optics, at which he leads the "Attoseconds and High-field Physics" department. In 2004 he took over the Chair of Experimental Physics at the Ludwig Maximilians University of Munich.