University of Freiburg . 79085 Freiburg . Germany

University of Freiburg

Rectorate

Public Relations

Fahnenbergplatz
D -79085 Freiburg

Contact:
Rimma Gerenstein
Tel. +49 (0)761 / 203 - 8812
rimma.gerenstein@pr.uni-freiburg.de
www.pr.uni-freiburg.de

Freiburg, 01.04.2016

Press Release

Let There Be Light

Freiburg physicist Frank Stienkemeier awarded 2.3 million euros from European Research Council

Almost every living thing on Earth is powered by the conversion of light into energy. Yet it is not just in biology that photosynthesis forms the basis of energy supply. It is also essential for the technical processes involved in converting solar energy in photovoltaic systems. But what happens with the light when it comes into contact with photoactive materials – substances that change in response to light? **Frank Stienkemeier**, professor of molecular and nanophysics at the University of Freiburg's Institute of Physics, has received an Advanced Grant from the European Research Council (ERC) to study fundamental processes of excitation and energy transfer upon light absorption using new laser technologies and, in particular, ultrashort methods. The grant is one of the most prestigious research awards in Europe and recognizes outstanding research leaders to pursue ground-breaking projects. The ERC will provide 2.3 million euros for Stienkemeier's project COCONIS (Coherent Multidimensional Spectroscopy of Controlled Isolated Systems) in the next five years. The researcher's findings could contribute to improving systems based on organic photovoltaics.

"Our goal is to reach a fundamental understanding of the conversion of light in photoactive materials," says the physicist. As soon as light has been absorbed by a material, for instance a dye molecule from an organic solar cell, a chain of processes ensues. The absorbed energy may pass several excited molecular states, until it finally – for example in the case of a solar cell – appears as electrical energy with separated charges. In photosynthesis, the elementary processes happen at the molecular level and can only be understood with the help of quantum mechanics. According to quantum mechanics, electrons as fundamental particles of molecular structures have both particle and wave properties.

Stienkemeier and his group aim to use the method of so-called coherent spectroscopy for the project. In the past years, the team has developed a method for studying controlled and isolated atoms and molecules at low temperatures in order to separate fundamental processes. The technique involves the isolation of molecular structures in superfluid helium. At temperatures approaching absolute zero, which lies at -273.15 degrees Celsius, all friction is lost in helium – the stored molecules can move freely and don't dissipate energy to their environment. With the help of femtosecond laser pulses (a femtosecond is one billionth of a second), it is possible to precisely track processes, allowing the team to analyze whether and how the excited state or the structure of the molecules change. "Using multiple doping of helium droplets in which up to hundreds of molecules are captured, we can also study the influence of different molecular environments," reports Stienkemeier. Besides these experiments on light-stimulated processes, the group plans to develop new spectroscopic methods, including parallelized measurement methods and special algorithms for data acquisition.

Frank Stienkemeier's "Molecular and Nanophysics" research group:
www.nanophysics.uni-freiburg.de

Contact:
Prof. Dr. Frank Stienkemeier
Institute of Physics
University of Freiburg
Phone: +49 (0)761/203-7609
E-Mail: stienkemeier@uni-freiburg.de

UNI FREIBURG