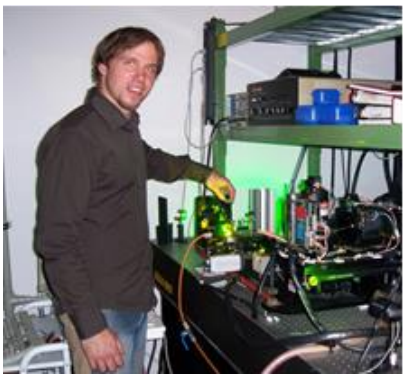
TECHNISCHE UNIVERSITÄT CHEMNITZ

Institut für Physik
Physikalisches Kolloquium



Mittwoch, 10.12.2014, um **16:00 Uhr**

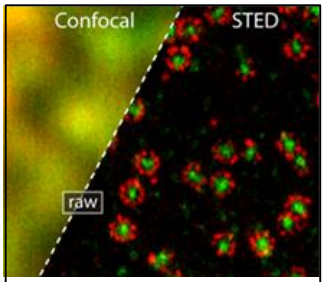
Ort: Reichenhainer Str. 90;
Zentrales Hörsaal- und Seminargebäude, Raum 2/N013

Dipl. Phys. Stefan Krause

Technische Universität Chemnitz
Institut für Physik

Nobelpreis für die höchstauflösende optische Mikroskopie – einzelne Quantensysteme machen es möglich

Optical microscopy is one of the most common and successful methods for investigations in life and material sciences as well as medicine. The reasons for this success are manifold and are based on the non-invasiveness and a variety of contrast enhancements e.g. via fluorescent molecules or nanoparticles. Fluorescence based microscopy techniques are nowadays a powerful tool in biology and medicine both for *in vivo* and *in vitro* applications. However, the investigation of nano-structured entities e.g. cell components is limited by the ABBE diffraction criterion in the order of half of the optical wave length. The validity of the ABBE criterion is commonly considered to be a principle constraint of any kind of microscopy. For decades strong efforts have been made to circumvent this principle limitation imposed to optical resolution. Despite their difficult implementation techniques such as optical near field microscopy or two photon microscopy established a resolution beyond the diffraction limit. During the past two decades fundamental developments in detection of single quantum objects opened an alternative pathway for optical microscopy in principle without any diffraction limit down to the molecular scale. The success of this approach has been recognized by the 2014 Nobel Prize in Chemistry for S. W. Hell, W. E. Moerner and R. E. Betzig.



F. Göttfert, C. A. Wurm, V. Mueller, S. Berning, V. C. Cordes, A. Honigmann, S. W. Hell Biophys. J. 105 2013

Research at the Physics Department of the TU Chemnitz has contributed to the development of single quantum object detection and microscopy since two decades. I will elucidate the historic development of single molecule techniques as a basic precondition for modern microscopy and derive the two main concepts of super-resolution optical microscopy which are honored in the Nobel Prize ceremony on December 10th. In addition, examples will be presented for successful applications in the field of chemical analysis to biophysics, biological and biomedical research, medical diagnostics, and material science. Finally, I will report on own recent results in this field which are related to material properties of polymers.

Alle Zuhörer sind ab 15:45 zum Kaffee vor dem Hörsaal eingeladen.

Informationen zum Vortrag erteilt:
Prof. Dr. Christian von Borczyskowski, Tel.: 0371 531 33035/ 33015

www.tu-chemnitz.de/physik