

# Olympus, Monash Micro Imaging, & FABLS *invite you to a seminar on* **“Modern Approaches to Time-Resolved Single Molecule Microscopy”**

*Given by*

**Dr. Benedikt Kraemer**  
Senior Scientist Microscopy  
PicoQuant GmbH, Berlin



**WHEN : Wednesday 4<sup>th</sup> March, 11am -12pm, The STRIP, Bld 75,  
Ground floor conference room, Monash University Clayton Campus**

## **Abstract**

Ultrasensitive fluorescence detection and spectroscopy is important in many fields of fundamental research as well as chemo- and bioanalytical applications. In recent years, technical improvements in photodetector sensitivity, microscope objective optics, and laser light sources have advanced the capabilities for the detection of single molecule detection. The technique allows the visualization of variations from molecule to molecule which would be hidden performing ensemble measurements. Today, time-resolved measurements permit to follow fluorescence dynamics of single molecules starting in the sub-nanosecond range up to fluctuations in the second range and beyond. By exploiting the full information content of such a multi-dimensional measurement, classical intensity based analysis schemes like FCS and FRET in confocal microscopy can be significantly improved by sorting and weighting the detected photons. We will present actual instrumentation and discuss recent applications:

### **Fluorescence Lifetime Cross Correlation Spectroscopy (FLCCS):**

FCCS is a superior tool to detect binding of two molecules, each marked with a fluorophore, in liquid environment.

### **Two-Focus FCS (2fFCS):**

Small structural changes of molecules like proteins can be investigated in their natural environment by the determination of the diffusion coefficient.

### **Lifetime Förster Resonance Energy Transfer (Lifetime FRET):**

FRET allows the study of distances of molecules tagged with two fluorescent labels in the nanometer range.

## **Dr. Benedikt Kraemer**

Benedikt Kraemer conducted his studies in Physics at the Free University in Berlin and finished his diploma thesis in 1993. During his Ph. D. (1998) he studied the physical and chemical properties of single levitated micro droplets under stratospheric conditions.



He worked the following five years in the field of medical physics at the Physikalisch-Technische Bundesanstalt in Berlin, Germany. There he constructed a single molecule sensitive microscope to study the function of specific antibodies in tissue sections. In 2004 he joined PicoQuant GmbH, Berlin, Germany. His main function is the development of new methods like Two-Focus FCS and PIE FRET for time-resolved confocal microscopy. In addition he is product manager for the Laser Scanning Microscope Upgrade Kits for FLIM and FCS.

For more information, please go to the FABLS website:

**[www.physics.mq.edu.au/research/fluoronet](http://www.physics.mq.edu.au/research/fluoronet)**

The ARC Network for **Fluorescence Applications in Biotechnology and Life Sciences (FABLS)**

facilitates and coordinates research programs and seminars relating to applications of fluorescence that require a high degree of interaction between biology, physics, chemistry, bioengineering and medicine.

The FABLS network covers 490 researchers and industry representatives worldwide.