

# 8<sup>th</sup> International Workshop on “Single Molecule Detection and Ultrasensitive Analysis in Life Sciences”

Organized by  
PicoQuant GmbH



## Technical Program

September 25 – 27, 2002  
at WISTA Campus  
Berlin-Adlershof (Germany)

## Aims and Purpose

The recent years have seen a vastly increasing interest in the detection and spectroscopy of single molecules. Especially in genetics, molecular and cell biology, as well as in high-throughput screening and diagnostics, Single Molecule Detection (SMD) under biologically native conditions became an important research tool. Three optical detection methods have shown their great potential in such applications: confocal laser (scanning) microscopy, wide-field microscopy, and near-field microscopy. Complementary to optical detection and spectroscopy, force spectroscopy of single molecules developed into a powerful technique for gaining insight into structure and dynamics of individual molecules. Methods based on atomic force microscopy as well as optical tweezers have yielded a large number of exciting results over the past couple of years.

Many methods of single molecule detection and single molecule spectroscopy are now well established and it is time to apply them to important biological and medical problems that are inherently single molecule problems. In addition, there are many more topics with vast potential yet to be realized. Examples include two-photon excitation, new and robust fluorophores such as quantum dots, or metal-fluorophore interactions. With the event we hope to encourage the exchange of knowledge and new ideas between the experts in SMD, interested scientists from other fields and potential users from the Life-Science industry.

For seven years now, the annual Workshop on SMD, organized by PicoQuant in Berlin, has proven to be an excellent forum for the discussion of the topics mentioned above.

PicoQuant GmbH wants to encourage especially young scientists in SMD research. Therefore a special SMD students award worth 750 EUR is again donated by the company for the best talk.

## Venue

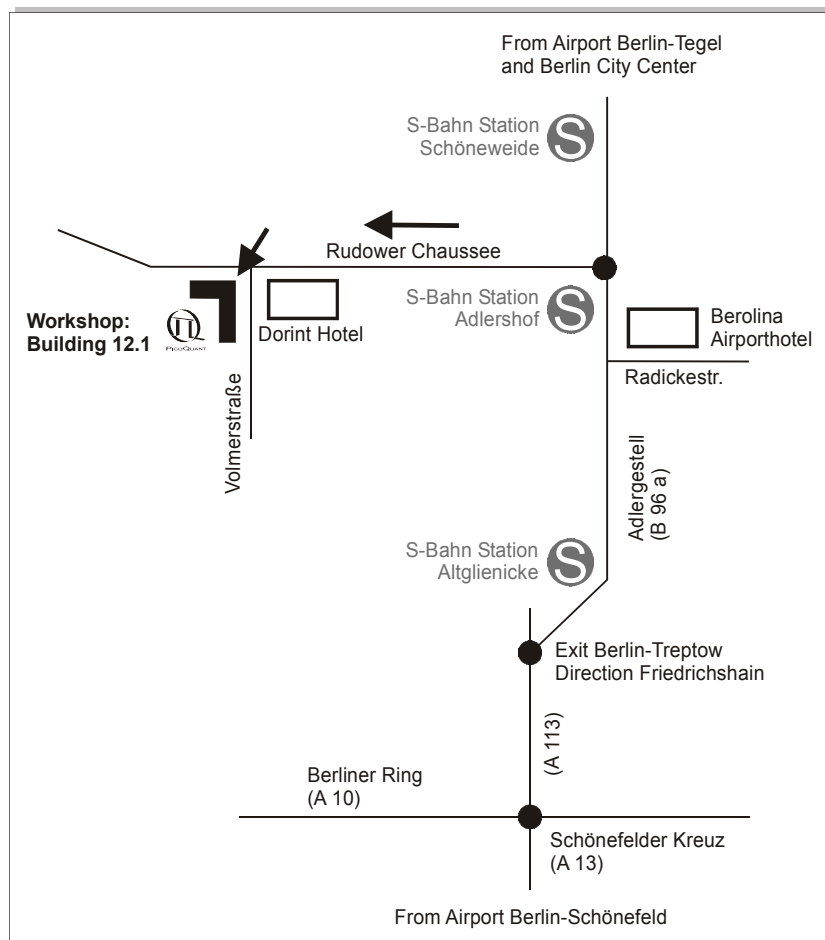
PicoQuant GmbH:	Rudower Chaussee 29 (IGZ) OWZ Building, Room 466 D-12489 Berlin
General Organization:	Rainer Erdmann, Jana Grünig, Angelika Zoufahl, PicoQuant GmbH Phone: +49-30-6392-6560 Fax: +49-30-6392-6561 workshop@pq.fta-berlin.de <a href="http://www.picoquant.com">http://www.picoquant.com</a>
Registration office / Workshop location:	WISTA Conference Center Volmerstraße/Rudower Chaussee 17 Einstein Kabinett <b>Wednesday, 25<sup>th</sup> September</b> <b>11.30 a.m. - 1.00 p.m.</b>
Hotel addresses:	<b>Dorint Hotel Adlershof</b> (opposite to workshop location) Rudower Chaussee 15 D-12489 Berlin Phone: +49-30-67822-0 Fax: +49-30-67822-1000  <b>Berolina Airport Hotel</b> (across the street Adlergestell) Radickestr. 76 D-12489 Berlin Phone: +49-30-67095-0 Fax: +49-30-67095-222

## How to get to PicoQuant GmbH

The workshop location is about 12 min walking distance from the S-Bahn station **Adlershof**. Please go through the railway bridge and follow the Rudower Chaussee on the left hand side until Volmerstraße. Directly on the corner you will find the building 12.1, please enter and follow the signs.

- from Airport/Railway station Berlin-Schönefeld:  
take S-Bahn **S9**, go three stops to Adlershof  
Ticket: Short-distance ticket, fare area AB (valid 3 stations, € 1,20)
- from Railway station Zoologischer Garten:  
take the S-Bahn in one of the following directions:  
**S9** to Flughafen Schönefeld  
**S8** to Grünau or Zeuthen  
**S46** to Königs Wusterhausen  
and go to Adlershof  
Ticket: Single ticket, fare area AB (valid 2 hours, € 2.10)
- from Airport Berlin-Tegel:  
take the Express Bus **X9** to railway station Zoologischer Garten and then follow description given above.

## Workshop Location



## Program (subject to alterations)

### Wednesday, 25<sup>th</sup> September 2002

- |               |   |
|---------------|---|
| 11.30 - 13.00 | REGISTRATION  |
| 13.00 - 13.15 | Rainer Erdmann, Berlin<br>Opening Remarks   |
| 13.20 - 13.55 | Michel Orrit, Leiden ( <b>Invited Paper</b> )<br>Blinking and Bleaching of Single Molecules and Nanocrystals: Towards a Unified Picture?  |
| 13.55 - 14.20 | Brahim Lounis, Talence<br>Imaging Single Absorbing Nanoparticles in Scattering Media by Photothermal Interference Contrast  |
| 14.20 - 14.45 | Robert Armstrong, Las Cruces<br>Single-Molecule Detection in Fractal-Microcavity Composites   |
| 14.45 - 15.10 | Tom Vosch, Heverlee-Leuven ( <i>Students Award</i> )<br>A Single Molecule Study of Multichromophoric Dendrimer Systems Bearing Perylene Imide Chromophores at the Rim                             |
| 15.10 - 15.45 | COFFEE BREAK  |
| 15.45 - 16.20 | Norman Dovichi, Seattle ( <b>Invited Paper</b> )<br>Single Molecule Enzymology  |
| 16.20 - 16.45 | Alonso Castro, Los Alamos<br>Ultrasensitive Detection of Specific Nucleic Acid Sequences by Polymerase Nucleotide Incorporation   |
| 16.45 - 17.10 | Michael Börsch, Stuttgart<br>Combining Nano-Electrochemistry with Single Molecule Detection to Control Single-Enzyme Dynamics   |
| 17.10 - 17.35 | Manuel Diez, Freiburg ( <i>Students Award</i> )<br>Monitoring $\Gamma$ -Subunit Rotation in Single $EF_0F_1$ - $H^+$ -ATP Synthase during ATP-Synthesis by Fluorescence Resonance Energy Transfer |
| 17.35 - 18.00 | Battulga Nasanshargal, Jena ( <i>Students Award</i> )<br>Kinetic Characterization of Enzyme Molecules Using a Femtodroplet Pipetting Method   |
| 18.15 - 21.00 | RECEPTION   |

## Program (subject to alterations)

### Thursday, 26<sup>th</sup> September 2002

- 09.00 - 09.35 Akihiro Kusumi, Nagoya (**Invited Paper**)  
Transient Signaling Complexes in the Cell Membrane as Studied by Single Molecule Nanotechnologies
- 09.35 - 10.00 Jens Michaelis, Berkeley  
Single Molecule Studies of Bacteriophage  $\Phi$ -29 DNA-Packaging
- 10.00 - 10.25 Mircea Cotlet, Heverlee-Leuven  
Identification of Different Emitting Species in the Red Fluorescent Protein DsRed
- 10.25 - 11.00 COFFEE BREAK
- 11.00 - 11.35 Claus Seidel, Göttingen (**Invited Paper**)  
Analysis of Molecular Structure and Dynamics by Multiparameter Single-Molecule Fluorescence Spectroscopy
- 11.35 - 12.00 Jörg Enderlein, Jülich  
Ab Initio Modelling of Fluorescence Fluctuation Spectroscopy
- 12.00 - 12.25 Christian Eggeling, Hamburg  
Combining Fluorescence Lifetime and Fluctuation Spectroscopy: Benefits for Biomedical Applications
- 12.25 - 12.50 Andreas Volkmer, Stuttgart  
First-order Quantum Correlation among Photons from a Single Molecule
- 12.50 - 13:15 Katrin Heinze, Göttingen (*Students Award*)  
Advanced Concepts and Applications of Cross-correlation Analysis Probing Complex Interactions of Biomolecules within their Native Environment
- 13.15 - 14.15 LUNCH
- 14.15 - 17.30 POSTER SESSION and PRODUCT PRESENTATION
- 19.00 DINNER

## Program (subject to alterations)

### Friday, 27<sup>th</sup> September 2002

- 09.00 - 09.35 W.E. Moerner, Stanford (**Invited Paper**)  
Emerging Frontiers in Single Molecule Spectroscopy
- 09.35 - 10.00 Musundi Wabuye, Baton Rouge (*Students Award*)  
Single Pair-Fluorescence Resonance Energy Transfer (spFRET) Detection in Microfluidic Devices for Single Nucleotide Polymorphism (SNPs) Genotyping
- 10.00 - 10.25 Volker Buschmann, Heidelberg (*Students Award*)  
Studying Surface-Attached Single Dyes under Aqueous Conditions with Rotating Polarization, Spectrally Resolved, Fluorescence Lifetime Imaging Microscopy (SFLIM)
- 10.25 - 11.00 COFFEE BREAK
- 11.00 - 11.35 Vahid Sandoghdar, Zürich (**Invited Paper**)  
Nanometer Localization of Single Molecules and Observation of the Coherent Dipole-Dipole Interaction
- 11.35 - 12.00 Markus Sauer, Heidelberg  
Precision Distance Microscopy in Cells: How to Reveal the Organization of Transcription Factories
- 12.00 - 12.25 Felix Koberling, Berlin  
Fluorescence Lifetime Imaging with Single Molecule Sensitivity and Sub-micrometer Resolution
- 12.25 - 12.50 Oliver Piestert, Heidelberg (*Students Award*)  
Conformational Dynamics of DNA Hairpins Studied Using a Rotating Polarization, Two-color, Fluorescence Lifetime Imaging Confocal Microscope
- 12.50 - 13.50 LUNCH
- 13.50 - 14.25 Jörg Wrachtrup, Stuttgart (**Invited Paper**)  
Diffusion Analysis and Spectroscopy of Membrane Bound Receptors and Second Messengers
- 14.25 - 14.50 Christian Hübner, Mainz  
Photon Anti-Bunching in the Fluorescence of Bi-Chromophoric Molecules
- 14.50 - 15.15 Boleslaw Kozankiewicz, Warsaw  
Excited Singlet State Relaxation Yields of Pentacene
- 15.15 - 15.45 COFFEE BREAK

...

## Program (subject to alterations)

### Friday, 27<sup>th</sup> September 2002

...

15.45 - 16.10 Benjamin Schuler, Golm  
Single Molecule Protein Folding: Free Diffusion and Microfluidic Mixing

16.10 – 16.35 Pierre-Alain Muller, Göttingen  
Conformational Dynamics of Hairpins Studied with Single Molecule MFD FRET-Analysis

16.35 – 17.00 Colin Coates, Belfast  
Ultrasensitive Imaging using Electron Multiplying CCD Technology: Application to Single Molecule Detection

17.00 – 17.25 Bürk Schäfer, Jena  
Direct Microscopic Observation of Single DNA-Molecule Reactions: Comparison of Different Restriction Enzymes

17.25 – 17.45 Rainer Erdmann, Berlin  
Presentation of „SMD Students Award“ and Concluding Remarks

## Call for Papers 2003

We would like to invite all participants of this meeting and all other interested scientist to the

### **9<sup>th</sup> International Workshop on “Single Molecule Detection and Ultrasensitive Analysis in Life Sciences”**

which will be held in Berlin September 24 – 26, 2003. The first announcement will be available towards the end of this year on our web page:

<http://www.picoquant.com>

We would like to invite people to submit their papers as soon as possible. From our experience organizing the previous meetings we recommend to do all correspondence by e-mail. Please submit abstracts on basis of the instructions given on the web.

Further, we would like to bring the following meeting to your attention:

Following the successful short courses on **"Principles and Applications of Time-Resolved Fluorescence"** by **Dr. J.R. Lakowicz at the Center of Fluorescence Spectroscopy (CFS)** in Baltimore a **European course** will be offered in October 2003 in Berlin, Germany. The course consists of lectures as well as instrumentation and software hands-on training. Local organization is handled by PicoQuant and the key lectures are given by Prof. J. Lakowicz and other invited speakers. The new event will complement our own workshops on Single Molecule Detection.

The final date will be announced on the following web pages:

<http://www.picoquant.com>  
<http://cfs.umbi.umd.edu/course>