Elitenetzwerk Bayern

GRK 1640

UNIVERSITÄT BAYREUTH

Module

Light Harvesting Processes

Part I. Tutorials
March 24, 2017
Room PNS, 5.1.00.001, University of Bayreuth

Part II. Conference
March 26-30, 2017
Banz Monastery

Part III. Seminar
April 25, 2017
Room PNS, 5.1.00.001, University of Bayreuth

SS 2017

(Joint module of ENB and GRK)

"Light Harvesting Processes" is a conference module in SS 2017 within the Elite Study Program “Macromolecular Science” and GRK 1640. The courses cover aspects in biology, chemistry and physics of photosynthesis, natural and synthetic light harvesting materials and solar cells. The module consists of three parts. The students are expected to attend all three parts; *I: Tutorials, II. Conference* and *III. Seminar.*

I. Tutorials

March 24, 2017, **Room PNS, 5.1.00.001, University of Bayreuth**

The tutorials will be held by:

A). Prof. Dr. Heinrich Schwoerer, Planck Institute for the Structure and Dynamics of Matter, Hamburg

March 24, 2017; 9 am

“Introduction to ultrafast spectroscopy of photo-induced charge dynamics in organic solar cells”

We will discuss the initial photo-physical processes occurring in novel solar cell materials based on organic molecular absorbers. For efficient light harvesting the initially localized excitation, for example in form of an exciton, has to propagate to an interface, which allows an irreversable charge separation into free electrons and holes, which then have to be able to propagate to the electrodes. Several loss processes such as fluorescence and non-radiative relaxation of the molecules, or recombination of intermediate, still bound, charge transfer states can interfere with the efficient harvesting of charges.

We will introduce femtosecond transient absorption spectroscopy as a powerful tool to observe all the initial, intermediate and final electronic states, at least if their spectral signatures are known. However, by identifying consistencies and relations between temporal dynamics, even unknown spectral signatures often can be assigned to intermediate excited states.

The broader the spectral range of the transient absorption measurement, the more states are accessible of course. We will discuss the experimental layout of a femtosecond pump probe experiment for wavelengths between 300 nm and 2.5 µm, and learn how to read and understand the transient absorption data. We will present experimental results from dye-sensitized solar cells as well as from perovskite thin film samples.

B). Prof. Dr. Stephan Gekle, Theoretical Physics, UBT

March, 24, 2017; 11 pm

"Molecular dynamics simulations"

The tutorial will start by introducing the fundamental principles of molecular dynamics simulations as well as some practical aspects. We will then continue towards more sophisticated simulation techniques such as free energy calculations and linear response formalisms. Both can be used to understand the behavior and dynamics of complex molecules.

C). Prof. Dr. Jürgen Köhler, Experimental Physics, UBT

March 24, 2017; 2 pm

"An Introduction to Photosynthesis"

In this tutorial I will provide an overview over the supramolecular structures, i. e. mainly pigment protein complexes that play a role in photosynthesis. This covers the machineries of anoxygenic and of oxygenic photosynthesis, i. e. bacteria and plants. Aim of the presentation is to clarify (as good as possible) the nomenclature used and to help to follow some of the topics addressed during LHP 2017.

II. Conference on „Light Harvesting Processes"

March 26-30, 2017, Banz Monastery

This conference gives insight into the complex processes involved in photosynthesis. Additionally this meeting will give ideas and inspirations to understand and mimic synthetically some of the steps involved in the above process. Closely related technological phenomena are synthetic light harvesting and photovoltaics, which are also part of the conference contributions. Additionally, theoretical aspects of the above topics are dealt with. Aim of the conference is to bring together scientists from different areas such as biology, chemistry, physics and technology, working in the field of light-harvesting processes, photovoltaics and related subjects. The meeting will provide a platform for interdisciplinary communication and the exchange of ideas.

The confirmed invited speakers include:

Alexander Ruban (London, United Kingdom)
Wolfgang Zinth (Munich, Germany)
Frank Spano (Temple, USA)
Wolfgang Lubitz (Mühlheim a.d.R., Germany)
Leif Hammarström (Uppsala, Sweden)
Alan Aspuru-Guzik (Harvard, USA)
Kai-Hong Zhao (Huazhong, China)
Thomas Basche (Mainz, Germany)
Gabriela Schlau-Cohen (MIT, USA)
Jakub Psencik (Praque, Czech Republic)
Johannes Neugebauer (Münster, Germany)
Kai Zhang (Mainz, Germany)
Martin Vacha (Tokyo, Japan)
Peter Lu (Ohio, USA)
Alastair Gardiner (Glasgow, United Kingdom)

The homepage of the conference is: http://www.LHP-bayreuth.de

III. Seminar on the scientific topics covered in the conference

April 25, 2017, 1 pm, Room PNS 5.1.00.001, UBT

The participating students should form interdisciplinary groups with 2 students per group. Each group will select one main topic of the conference and will prepare a seminar of about 30 minutes presenting the basics, different stages of the scientific development as well as highlights. The seminar language is English.

Please consult Prof. J. Köhler for any queries regarding the topics and division of groups.