

Erlangen Graduate School in Advanced Optical Technologies (SAOT)

Speaker

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Aims and structure

In November 2006, the Erlangen Graduate School in Advanced Optical Technologies (SAOT) was established in cooperation with the Faculty of Medicine within the framework of the excellence initiative of the German federal and state governments to promote science and research at German universities. SAOT offers a structured, internationally oriented (working language: English) and interdisciplinary education program to graduate students. It is hosted by the Faculties of Engineering, of Sciences, and of Medicine and is embedded into an international network of distinguished experts in their respective fields of optical technologies. The scientific topics of SAOT are optical metrology, optical material processing, optics in medicine, optics in communication and information technologies, optical materials and systems, and computational optics.

Research

Intensive research work is carried out in each of the SAOT topics which are partly overlapping. This in particular is true for the topic "Optics in Medicine", which can be considered to form an application field of the other topics. It is inherently interdisciplinary, covering e.g. optical diagnostics as well as optical therapy and surgery. The further development of optical techniques in medicine demands an intensive and comprehensive exchange and collaboration between the different disciplines involved. The topic "Optics in Medicine" deals with the fundamental functioning principles of the human body, its organs and tissues under the exposure of optical radiation covering a broad field of frequencies and light strengths. These detailed investigations of the interaction of light and tissue promote the development of improved diagnostics, therapy, and surgery techniques. Moreover, technical specifications are defined which will serve as the basis for future development and engineering of bio-optical sensors and apparatuses for medical applications.

To reach these objectives, the Clinical Photonics Laboratory (CPL) and a junior professorship for functional imaging in medicine (Prof. Dr. M. Waldner, Department of Medicine 1 – Gastroenterology, Pneumology, and Endocrinology; since 2018 W2 Professor for Functional Imaging in Medicine) were established within SAOT. CPL is equipped with a worldwide unique apparatus pool for the comprehensive characterization of optical properties of biological tissues. CPL runs several collaborations with international institutes and medical and clinical research institutes of the FAU. The most recent principal investigator to join SAOT for the topic "Optics in Medicine" is Prof. Dr. M. Kesting (Department of Oral and Cranio-Maxillofacial Surgery). To intensify the interdisciplinary and international collaborations, SAOT routinely organizes international workshops.

Teaching

During the terms, SAOT offers standard lectures, which are related to the application of optical technologies in medicine. Special SAOT activities related to the educational program comprise seminars, workshops, and academies. Outstanding scientists from international leading institutions are invited to give an one-hour talk on specialized themes at the SAOT seminar. Workshops usually last up to three days, e.g. the past workshops on "Retina image processing" and "Advanced Optical Methods for Diagnostics, Assessment, and Monitoring of Clinical Therapy and Surgery". The program includes several speakers of leading international research institutions who contribute with a talk to a major subject. During the weeklong academies which take place outside Erlangen twice a year, the graduate students are in charge of contributing to the success of the formed group work on a specific focus or have to give short presentations on the activities in their own field. Additionally, participation in the entrance academy which is organized once a year is mandatory for all SAOT graduate students. At the end of this academy, they have to pass the entrance examination which covers all scientific topics of SAOT.

