

## PHYSICAL COLLOQUIUM

### INVITATION

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Monday, 28.11.2016, 4.15 p.m., W2-1-148

speaks

**Prof. Dr. Bernhard Roth**

**Hannoversches Zentrum für Optische Technologien**

**Gottfried Wilhelm Leibniz Universität Hannover**

**Hannover / Germany**

about

#### **Planar-optronic systems - Towards novel polymer sensor networks**

Optics and photonics are key enabling technologies of the 21st century offering great potential for new applications in fields as diverse as medicine, environmental and structural health monitoring or aeronautics. Many of these applications require the implementation of highly-functional optical sensor networks ideally realized by using cost-efficient materials with tailored optical properties and employing high-volume production techniques. Intense interdisciplinary efforts currently under way to achieve this goal need to address all relevant aspects ranging from optics and photonics to material sciences and micro-production techniques.

Our research in this field revolves about the development of planar-optronic systems, i.e. fully integrated, large area polymer foils equipped with optical components and functionality suitable for distributed sensing and analytics. Optronics in this regard implies the use of integrated optical and opto-electronic components, rather than electronics, such that the sensor systems rely on purely optical means for signal generation, processing and data transmission. A key aspect of such systems is that the properties of the quantities to be measured are directly converted into properties of light, e.g. intensity, wavelength or phase.

In my talk I will cover our work on this topic and present some of the results achieved towards the realization of such artificial skin-like polymer sensor systems. This includes the realization of low-loss optical waveguides, interconnects and coupling elements by micro-embossing and laser structuring techniques, their integration into hybrid as well as all-polymer planar sensor foils and resonant structures, and their application for all-optical measurement of physical or biochemical parameters such as strain, shape deformation, or refractive index. Also, I will present our work on the validation and calibration of the systems developed so far and the evaluation of relevant cross-correlations and environmental influences. Finally, I will discuss the main challenges towards realization of all-polymer planar sensor networks for spatially resolved 2D measurement based on economically viable fabrication and efficient use of resources.

All interested persons are cordially invited.

Sgd. Prof. Claus Lämmerzahl