UNIKASSEL VERSITÄT

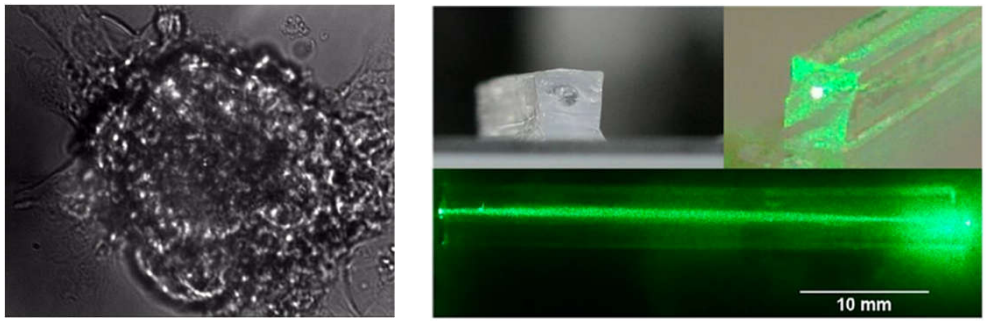
Physikalisches Kolloquium

Thursday, 13.12.2018, 16:15, HS 100
Reception with coffee & cookies 15:45
(For university staff: please bring your own cup for sustainability reasons)

Prof. Dr. Alexander Heisterkamp, Leibniz University Hannover:

Optogenetics and short pulses: Manipulation of cells and tissues using near-infrared lasers

Abstract
Optogenetic approaches foster from genetically modified cells allowing the precise optical control of excitation in neural or muscle cells or, like demonstrated recently, for targeted expression of specific proteins. We use optogenetic approaches to excite cardiac muscle cells, induced pluripotent stem cell derived cardiomyocytes, using near infrared wavelength at 900nm and 140fs pulse duration to achieve contraction of the cardiac bodies. The cells were transfected to express the nonselective cation channel channelrhodopsin-2 (ChR2). Approaches to encapsulate these cells and deliver light using biomaterials for an optical biohybrid implant will be shown. Further applications in neuronal excitation for applications within the auditory system and for targeted gene expression will be discussed.



(a) (b)

Photo: (a) Bioartifical cardiac construct from human iPS cells, excitable by ChR2 expression, leading to successful pacing. (b) Biocompatible PEGDA 700 (90%, core, 40% in cladding) showing successful light guiding.

All of you interested in physics are cordially invited!

Contact: Prof. Dr. Thomas Baumert, Experimental Physics III, More Information: uni-kassel.de/go/physikalisches_kolloquium