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Seminar über Ultrafast Science and Technology

Referent/in: **Philippe Raisin**, Optical Fiber and Fiber Laser Lab, Institute of Applied Physics, University of Bern

Datum/Zeit: Donnerstag, 22. Oktober 2015, 11:15 Uhr

Ort: Hörsaal B116, Gebäude Exakte Wissenschaften, Sidlerstrasse 5, Bern, Schweiz

Titel: **This presentation is divided in two parts:**
i) Intrinsically stable all in-fiber broadband light-source
ii) Two dimensional refractive index mapping of optical fibers

Part i): Many experiments rely on the measurement of an optical power. The precision of these experiments increases with the stability of its optical components, including the light source. In the course of a Master thesis, an intrinsically stable, broadband all in-fiber source is being developed. The approach relies on reaching full inversion in a short piece of rare-earth doped active optical fiber by applying high pump power. The resulting purely spontaneous emission can theoretically reach a temporal stability two orders of magnitude higher than the stability of the pump source. The talk will focus on the influence of different rare-earth active media on the achievable stability enhancement as well as constraints for the fiber parameters when designing the source. In order to achieve the optimal stability enhancement, dedicated detector circuitry as well as temperature and mechanical stabilization of the setup are needed.

Part ii): One of the possible applications of this source is to use it in a fiber-optical reflection based refractive index mapping instrument. The instrument is needed for the fiber research and development activities in our group. The fiber-coupled setup allows the point-wise high precision measurement of the Fresnel back-reflection. The index steps of commercially available fibers can be measured accurately down to $< 10^{-3}$. The precision limit of the instrument is currently on the order of 10^{-4}. An overview of recent developments in improving stability and reliability of the instrument will be given.