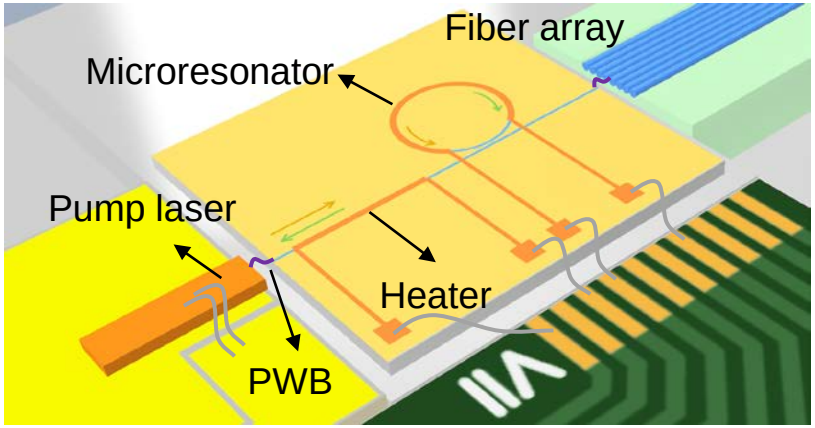
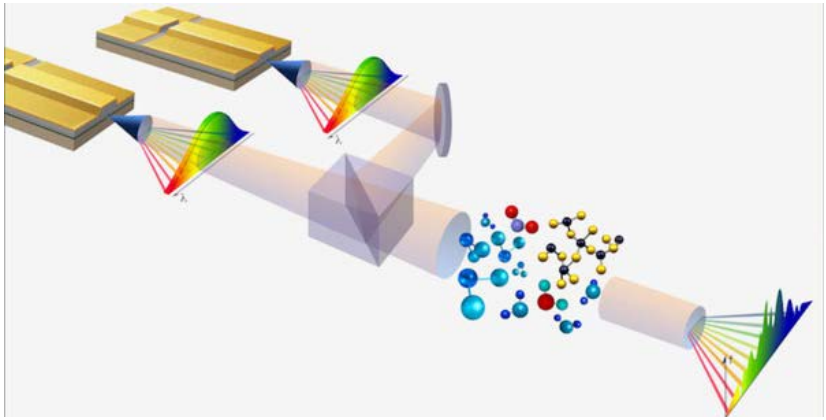
Master Thesis: Absorption spectroscopy based on Kerr soliton combs

Karlsruhe Institute of Technology

Absorption spectroscopy based on optical frequency combs is a powerful tool to **precisely measure absorption spectra of chemical substances with high resolution**. A particularly interesting approach is the concept of dual-comb spectroscopy, in which the sample is illuminated with a first comb while the second comb acts as a multi-wavelength local oscillator for coherent detection. The goal of this thesis is to improve the resolution of dual-comb spectroscopy techniques by exploiting special modulation technics. Your tasks comprise the simulation of the detection scheme and of the underlying impairments and the comparison of different modulation schemes. Based on this, a measurement setup shall be implemented and tested. The viability of the scheme will be proven by performing spectroscopy measurements for gas analysis.





Picqué, N., & Hänsch, T. W. Frequency comb spectroscopy. *Nature Photonics*, **13**, 146–157 (2019)

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