

IRTG-Seminar



PD Dr. Ingo Breunig

Institut für Mikrosystemtechnik, Professur für Optische Systeme, Universität Freiburg

“Continuous-wave optical parametric oscillators: From bow-ties to whispering galleries”

There are different approaches for the generation of coherent light. The most prominent one is lasing. It is based on stimulated emission, and the tuning range strongly depends on optical transitions in the gain medium. While lasers enjoy great popularity, another light source still leads a life on the edge of obscurity: optical parametric oscillators (OPOs). They base on an optically driven nonlinear polarization, and the tuning range is limited only by the transparency of the medium used. The wavelength flexibility of OPOs exceeds the one that can be reached by any laser. Furthermore, they act as versatile sources for non-classical light and single photons. They are the key component of many quantum-optical experiments.

However, OPOs did not yet find the way to out of the lab into real-live applications. The reason is the missing possibility of miniaturization. But times have changed. We have demonstrated millimeter-sized monolithic OPOs based on whispering gallery resonators. Thus, the main disadvantage of OPOs compared with their lasing counterparts does not exist anymore. This talk reviews the recent progress in the development of miniaturized continuous-wave optical parametric oscillators including microwatt oscillation thresholds, single-photon emission with high brightness, extension of the tunability into the mid-infrared and the first steps to cover the whole visible spectral range. Furthermore, the presentation reflects the speakers' unashamed pro-parametric bias.

**Tuesday, December 18, 2018; 6:00 p.m., HSII
Physics high rise, Hermann-Herder-Str. 3**