

**« Rare-earth-doped lasers from the visible to the mid-infrared »
Christian Kränkel, Universität Hamburg**Auditorium - Institut d'Optique d'Aquitaine - Talence
17/09/2015 from 01:15 pm to 02 :15 pm**Abstract:**

The 4f-shells of rare earth ions provide optical transitions from the UV to the mid-IR. Utilizing these transitions for efficient lasers is often not straight-forward and the choice of the host material is crucial in this respect. Besides obvious properties such as transparency range or thermal conductivity also factors like the crystal field strength and the phonon energies of the host lattice have to be taken into account to avoid unwanted parasitic radiative and non-radiative transitions between energy levels of the doping ion.

In my presentation I will treat these requirements and present our latest results on novel, highly efficient rare-earth doped lasers. Pr³⁺- and Tb³⁺-doped materials allowed for more than 1 W of continuous wave output power at various visible wavelengths with efficiencies exceeding 50%, while Tm³⁺- and Er³⁺-doped laser crystals enabled highly efficient lasing in the 2 μm and 3 μm spectral range. The ongoing progress in semiconductor-based pump sources even allowed to increase the efficiency of well-established laser ions such as Yb³⁺ and allowed fs-lasers with optical-to-optical efficiencies in the order of 70% at 1 μm.