French-German Research Institute of Saint-Louis

The **French-German Research Institute of Saint-Louis (ISL)** situated in the border triangle of Germany, France and Switzerland is an internationally renowned research institute belonging to a global industrial and economic network.
The spectrum of our core activities comprises a variety of topics: aerodynamics, energetic and advanced materials, lasers and electromagnetic technologies, protection, security and situational awareness. Our activities are related to both basic and applied research.

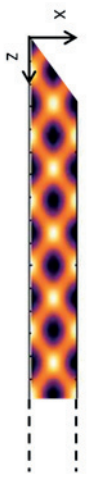
ISL is offering a **PhD Position**

Research Field: Laser and electromagnetic technologies

Investigation of high power continuous wave Er^{3+}:YAG laser

Topic description

ISL is pioneering the field of eye-safe high power lasers, i.e. laser sources emitting at a wavelength where safety issues related to the damage of the retina are much more relaxed, and multi-kW laser outputs with good beam quality have been obtained in an Er^{3+}:YAG heat capacity laser. Due the current laser scheme, however, a true continuous wave (CW) operation is not possible. By using slab geometry for laser medium, true CW-operation with several hundreds of watts of output power with relatively high beam quality would be possible.



References

- M. EICHHORN, Quasi-three-level solid-state lasers in the near and mid infrared based on trivalent rare earth ions, Appl. Phys. B, 93, 269-316 (2008)
- S. BIGOTTA et al., Recent advances in Er^{3+}:YAG solid-state heat-capacity technology, Technologies for Optical Countermeasures XII, Vol. 9650, 965002 (2015)
- M. BRUNNER et al., Investigation on a Continuous-Wave High-Power 1.6 µm Er^{3+}:YAG Laser, Europhoton, Neuchatel, Switzerland, European Physic Society (Eds.), may 2014

Job Description/Objectives

The aim of this study is to use the internal knowledge about Er^{3+}:YAG laser for exploring new laser architectures for achieving a true CW Er^{3+}:YAG laser in the kW range with good beam quality.

The PhD candidate will:
- Optimize the crystal slab geometry for efficiency and beam quality and follow the manufacturing of the slab,
- Optimize the heat extraction from the laser medium,
- Perform theoretical and experimental analysis on the different subjects involved during the thesis (Er^{3+}:YAG spectroscopic properties, laser resonator scheme, reduction of parasitic oscillating modes, etc.),
- Experimental realization and validation of the results.

You will work in a group of 15 researchers, PhD candidates and engineers in the field of development of new laser sources, including new lasing materials (holmium, thulium, erbium), nonlinear crystals such as zinc germanium phosphide (ZGP), doped fibers, non-planar optical parametric oscillators (OPOs) and innovative diode pumping schemes for lasers from 1.6 µm to beyond 5 µm.

Candidate Profile
Qualified diploma or master's degree in photonics or laser physics.

French-German Research Institute of Saint-Louis (ISL)
Christelle KIELECK / Stefano BIGOTTA – Directed photonics and applications
5 rue du Général Cassagnou – 68301 Saint-Louis – France
christelle.kieleck@isl.eu – tel : +33 (0)3 89 69 58 70 / stefano.bigotta@isl.eu – tel : +33 (0)3 89 69 51 72

www.isl.eu