Master Thesis:

Passively Q-switched Nd^{3+}:YAG monolithic laser

Passively Q-switched monolithic lasers allow for highly-integrated fully contained laser sources in the (sub-)nanosecond range for a large variety of applications from metrology, sensing and range detection up to future applications in combustion ignition for fuel engines [1]. The monolithic design, in which laser medium and passive Q-switch form one composite crystal and the laser cavity mirrors are formed by the composite-crystal end facets, offers a fully contained resonator beam without free-space optics, and therefore a low environmental influence on the laser properties. However, (repetitive) pulse emission in such devices still shows a certain pulse-to-pulse jitter, which is also pronounced in single-shot operation.
The aim of this work is to investigate pulse build-up and jitter in modern monolithic composite laser crystals and laser performance with respect to pump parameters and to optimize pulse energy and jitter effects.

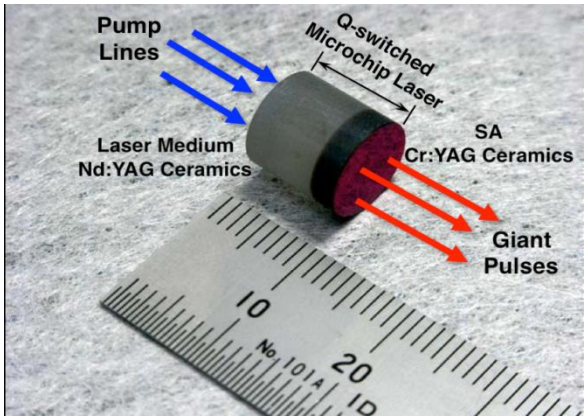

Fig.1 Bonded Nd:YAG/Cr:YAG passively Q-switched monolithic laser [1]

What we offer

The ISL is a multi-disciplinary French-German research laboratory located in Saint-Louis, France. We provide access to all necessary measurement and simulation equipment. Being a bi-national government facility, the applicant has to possess an EU member state citizenship to be eligible for this work.

Your Task

Investigation of laser performance of diode-pumped monolithic passively-Q-switched composite lasers (pulse energy, pulse duration, build-up time and pulse jitter) in various pumping geometries and optimization of laser operation conditions for maximum pulse energy and low jitter.

Fig.2 Monolithic passively Q-switched laser for fuel ignition [1]

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[1] Takunori Taira, Domain-controlled laser ceramics toward Giant Micro-photonics, OPTICAL MATERIALS EXPRESS, Vol. 1, No. 5