



PhD Thesis Proposals: starting in 2009.

1. Coupled-Cavity Vertical-Cavity Surface-Emitting Lasers with disruptive functionalities

With the ever-increasing data rates required in applications as broad as intra-systems interconnects, datacom, and telecommunications, the need is rising for low-cost, high-bandwidth photonic multifunctional transmitters. In this context, Vertical-Cavity Surface-Emitting Lasers (VCSELs) appear as the ideal optoelectronic technology for this purpose. In this project we target the demonstration of VCSELs with data rates 20 – 100 Gb/s, supporting applications such as datacom, intra-systems interconnects, local and metropolitan area networks (LANs and MANs), and telecommunications. The project builds on the current expertise of our semiconductor laser and laser dynamics group at IR-TONA, VUB and on the long-term experience in materials and device technology of one of the most advanced VCSEL prototyping groups in the world.

2. Vertical-cavity surface-emitting lasers with liquid crystal overlay

Liquid crystals are materials that are widely used in displays nowadays, but they are becoming more and more popular for applications in photonics. They have unique electro-optic and opto-optic properties. VCSELs are a new class of semiconductor lasers that contrary to conventional edge emitting semiconductor lasers emit light perpendicular to the top surface. This gives the possibility to epitaxially grow monolithic multilayer devices with wavelength size cavity length in order to prevent multi-longitudinal mode operation however; they are prone to multi-transverse mode emission and unstable polarization behavior. The main goal of this project is to combine VCSELs with a liquid crystal overlay in order to solve above-mentioned issues and to add new functionalities such as, for example, tuning the emission wavelength and modal properties of the VCSEL.

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