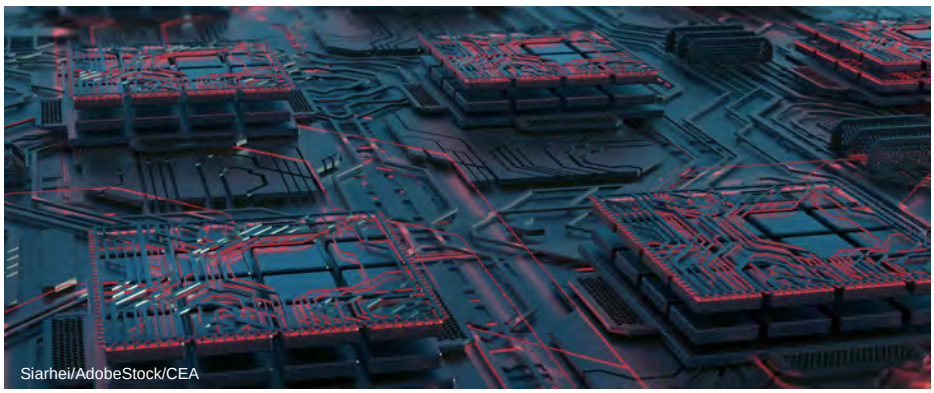
Design and integration of microlasers in a silicon photonic platform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 # Photonics
 # Laser
 # Communication

Offer description

For about ten years, the continuous increase in internet traffic has pushed the electrical interconnections of data centers to their limits in terms of bandwidth, density, and consumption. By replacing these electrical links with optical fibers and integrating all the necessary optical functions on a chip to create transmitters-receivers (transceivers), silicon photonics represents a unique opportunity to address these issues. The integration of a light source within a photonic chip is an essential building block for the development of this technology. While many demonstrations rely on the use of external lasers or bonded laser chips, it is the direct heterogeneous fabrication of a laser within the photonic chip that would allow the desired level of performance while limiting costs.

The objective of this thesis is to provide an innovative solution for the management of very short-distance communications (inter-chip, intra-chip) by realizing, on silicon, III-V membrane microlasers with buried heterostructures. This type of microlaser meets the numerous challenges of very short-distance links thanks to an efficiency/integrability compromise superior to the state of the art of datacom lasers while being compatible with CMOS fabrication lines.

Based on the work carried out during a previous thesis, the PhD student will be responsible for (i) designing the microlasers using the available digital simulation tools in the laboratory, then (ii) manufacturing these microlasers by relying on the technological platforms of CEA-LETI, and finally (iii) electro-optically characterizing the components. This thesis work will be carried out in collaboration between CEA-LETI and LTM/CNRS and will constitute a strategic brick necessary for future generations of photonic transceivers.

Candidate profile

You hold a Master's degree or an engineering degree in semiconductor physics, nanotechnology, and/or photonics/optoelectronics. You will be involved in all stages of microlaser development (design, fabrication, characterization), which requires a certain scientific mindset, autonomy, and a good ability to work with different teams.

Application & societal impact

- High-speed and low-power optical communication for data centers, AI microprocessors.

Start : autumn 2025
Location : **Grenoble**
Tutor : Sylvain GUERBER

To apply, send your application to:

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