Lecture for the Laser Colloquium:

Quantum Cascade Lasers and Applications

Abstract:
In this lecture, I will present step by step specific characteristics of Quantum Cascade Lasers (QCL) which make them efficient unique lasing devices emitting in the terahertz and mid infrared range. I will present how one could get such a laser, combining a 2-level system in the infrared range based on semiconductor quantum wells, an engineered population inversion and an adequate cavity.

I will then describe QCL performances, their limitations as well as their recent developments, such as modelocked operation, frequency comb emission and room temperature THz emission. Finally if time, I’ll present some applications for QCL, including nonlinear frequency mixing within these structures.

Bio Sarah Houver:
Bachelor-Master in Physics: Ecole Normale Supérieure de Lyon, France
PhD with Dr. Sukhdeep Dhillon and Jérôme Tignon at Ecole Normale Supérieure de Paris, France: Resonant nonlinear optics in Quantum Cascade Lasers.
Postdoc with Pr. Steve Johnson at ETH Zürich: 2D THz spectroscopy technique to study carrier dynamics in semiconductors and topological semimetals.
Assistant professor at Université Paris Cité: Time-resolved optical spectroscopies to study ultrafast dynamics in correlated condensed matter systems.

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- L’Oréal-Unesco Fellowship for Women in Science in 2017
- Project Grant for young researchers in 2021 from the French National Research Agency