Physique appliquée et Communication scientifique en langue étrangère

ECTS

Volume horaire
31.25h

Présentation

Description

Lasers and optoelectronics in english :

- Who, What, How
- A brief history of lasers
- Light - Matter interaction : Description of the "Matter" in "Light-Matter interactions": atomic transitions, broadening, population inversion, ...
- Light - Matter interaction #2 : Description of the "Light" part in "Light-Matter interaction": Black body radiation, Einstein coefficients, ...
- Laser gain & pumping: From the rate equations to the gain & absorption of a propagating beam in the medium. Optical pumping of 2-level, 3-level and 4-level systems.
- Pumping methods : Optical pumping, electric discharge pumping, resonant energy transfer, ...
- Multistack mirrors and coatings
- Waves & Fabry Pérot
- 3D optical resonators

- Optoelectronics :
1. Light emitters based on semiconductors : Working principles
 1.1 Band structure
 1.2 Occupation statistics of electron states
 1.3 Optical transitions in semiconductors
 1.3.1 Vertical transitions
 1.3.2 Transition rate calculation
 1.3.3 Absorption and gain coefficients
 1.4 Technical solutions for laser diodes
 1.4.1 Fabry-Perot cavity
 1.4.2 Double heterostructure laser
2. Quantum optoelectronics
 2.1 Effect of the confinement in 2D semiconductors
 2.2 Light-Matter interaction and optical transitions in 2D
 2.3 Strained heterostructures
 2.4 Optical gain in a quantum well
 2.5 Threshold current in quantum well lasers
 2.6 Vertical cavity lasers
 2.7 Quantum well amplifiers and modulators

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Infos pratiques

Lieu(x)

Toulouse

Informations non contractuelles