Electromagnetism and nanoelectronics

Component
École Nationale Supérieure d'Électrotechnique d'Électronique

In brief

- **Ametys Code:** N9EE14D
- **Open to exchange students:** Yes

Presentation

Objectives

Understand the theoretical basics for solving physics problems involving a classical (non-quantized) electromagnetic field and a charged particle – Understand the concept of probability waves and know how to relate it to the calculation of probabilities of physical events – Understand the basic principles governing the operation of a tunneling microscope and a magnetic resonance imager

Description

I- Electromagnetism at the nanoscale
II- Probability waves
II-1 Definition and initial developments
II-2 First principles of wave mechanics
II-3 Probability wave interference phenomena and uncertainty relations
II-4 Schrödinger equation for a charged particle in a classical harmonic electromagnetic field
III- Charged particle in an electrostatic field
III-1 Potential barrier
III-1 Potential barrier
III-2 Tunneling effect
III-3 Potential well
IV- Electromagnetic applications
IV-1 Electron microscopy

IV-2 Magnetic resonance imaging
IV-3 Nanoantennas
IV-4 “Quantum radar”
V-Prospects in nano-electromagnetism

Pre-requisites

The following subjects: Electromagnetic radiation and antennas (Apogée code N8EE26A) – Guided and free-space propagation (Apogée code N7EE09A1)