
Photonic components and devices B

Finalità

The course will deepen the study of optical devices and components for WDM telecommunication systems starting from the basic knowledge given in Componenti Fotonici A course.

New approaches and analysis tools will be provided as long as important novelty in the field of photonics and optoelectronics.

Programma

- Introduction.
- Bragg gratings in optical fiber and dielectric waveguide. Couple mode theory.
Applications to reflectors, wavelength selectors, dispersion compensation, add-drop filters.
- Directional couplers in optical fiber and dielectric waveguide.
- Reflection gratings. Optical spectrum analysers.
- Fabry-Perot cavity. Interferometers.
- Mach-Zehnder interferometer filters. Splitters and star-couplers, multiplexer and demultiplexer.
- Plane waves in anisotropic media; ordinary and extraordinary waves.
Magneto-optic devices, phase retarders, polarizers, isolators and circulators; applications.
- Optical modulators. Electroabsorption, electrooptic and acoustooptic modulators.
- Semiconductor optical amplifiers - SOA.
Applications; optical switches, wavelength converters.
- Raman amplification; physics and applications.
- Photonic crystals and band gap. Definition, technology and structures.
Photonic crystal based devices: waveguides, junctions, curves, filters, couplers.
- Photonic crystal fibers and holey fibers.
Definition, fabrication technology, applications in telecommunications; performances.
- Source coherence; spatial and temporal coherence.
- Finite Methods; the finite difference and the finite element method, the mode matching.
Features and applications. Time and harmonic propagation methods.

Attività d'esercitazione

Student will attend labs for numerical simulation and experimental activity.

Modalità d'esame

Oral test

Propedeuticità

Componenti Fotonici A

Testi consigliati

B. E. A. Saleh, M. C. Teich "Fundamental of Photonics" Wiley Interscience, 1991.

P. Bassi, G. Bellanca, G. Tartarini "Propagazione ottica libera e guidata" Clueb, 1999.