Facoltà di Ingegneria dell'Informazione, Informatica e Statistica (I3S)
https://web.uniroma1.it/i3s/

Dipartimento di Ingegneria dell'Informazione, Elettronica e Telecomunicazioni (DIET)
https://web.uniroma1.it/dip_diet/

Fotonica e sistemi ottici

Prof. Antonio d'Alessandro
Presidente
antonio.dalessandro@uniroma1.it
web.uniroma1.it/cad_ingelettronica

SAPIENZA
UNIVERSITÀ DI ROMA

Motivation and keywords

- Fiber optic systems, large bandwidth, fast internet, large capacity communication systems Tb/s
- Optical interconnections: Fast and low power server connections (Google, Facebook, etc.), Silicon Photonics
- Lighting, consumer optoelectronics (displays, image sensors), biophotonics (Lab on chip), nanophotonics
- Information Security: Quantum information (optical cryptography)

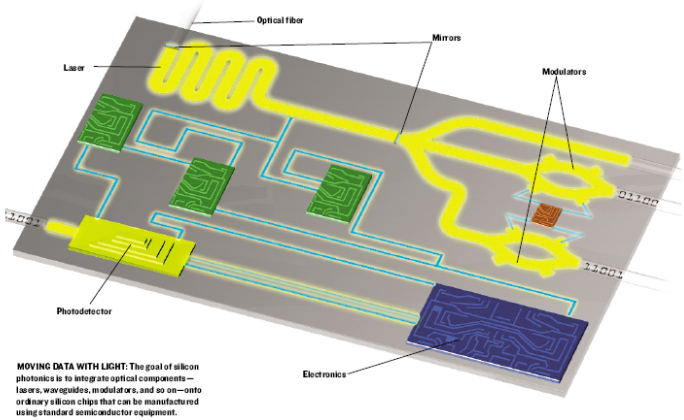
Contesto

- **Photonic systems: information is carried by photons for higher speed and larger capacity**

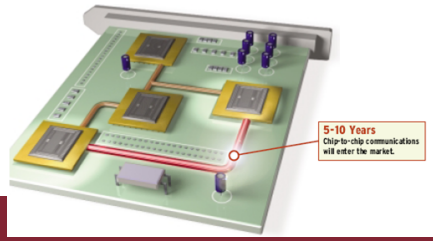
- **Applications:**
- **Telecommunications**
- **Image processing**
- **Big data storage**
- **Metrology and instrumentation (ex. Gravitational waves observation)**
- **Sensors for bioapplications**

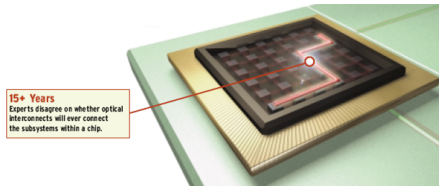
Hardware solutions for fast and big data processing

Silicon Photonics

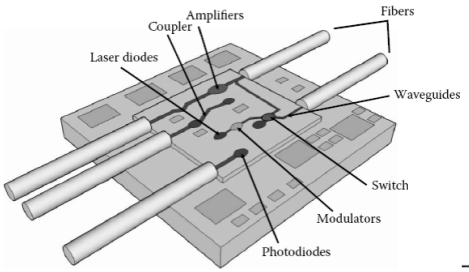


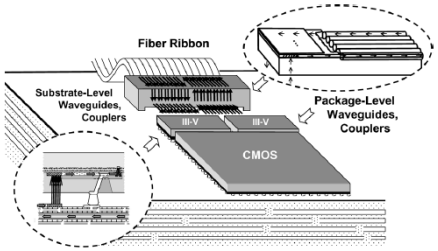
Optical interconnections

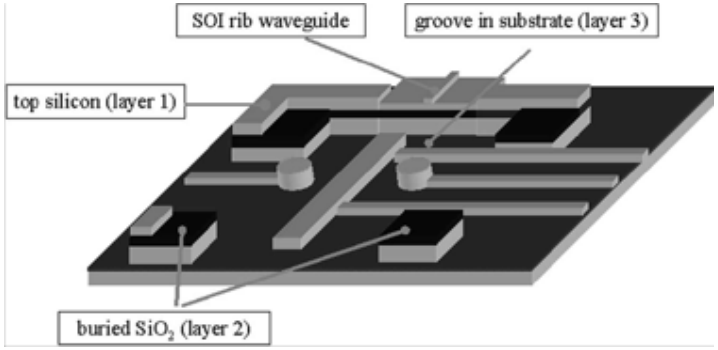




Photonic and electronic integration

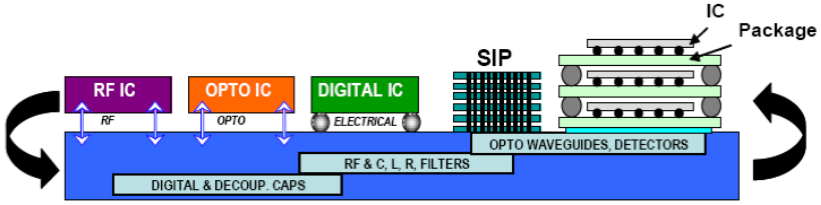


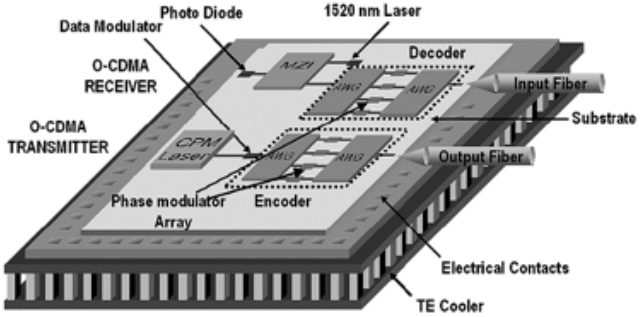




Hybrid integration

SOP



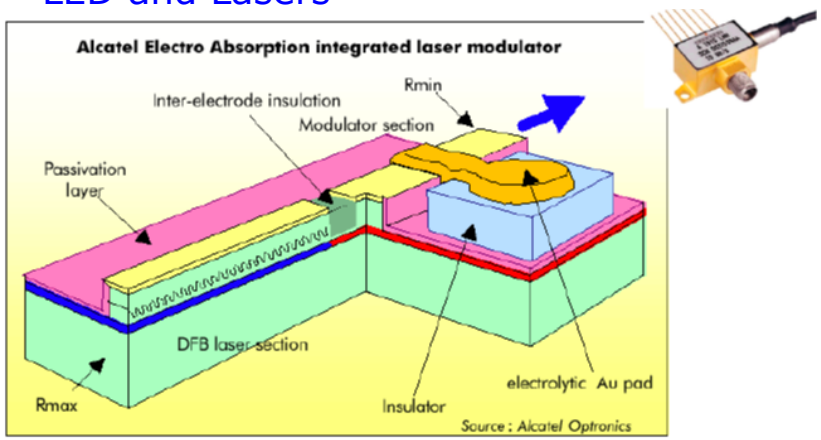


Monolithic integration

Optoelectronics

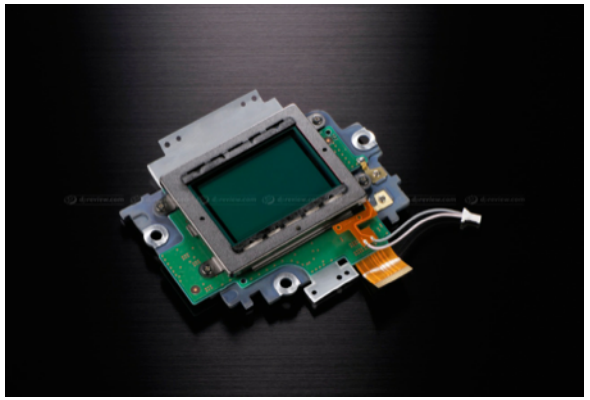
Light-matter interaction principles, optical properties, devices

LED and Lasers



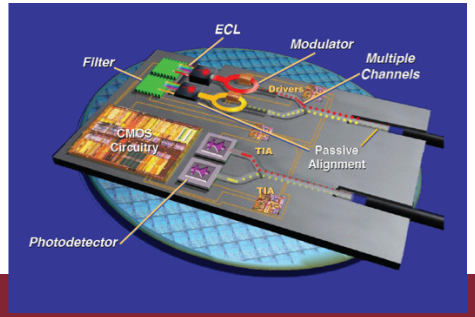
- 10Gb/s module, I_{th} = 20mA, P_{max} = 4mW @80mA , extinction ratio = 15dB for -2.5V

Photodetectors and image sensors



Optical fibers and components

Electronic and photonic integration

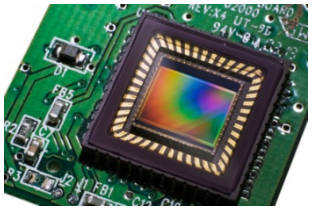


Microsistemi fotonici

… combina elettronica, meccanica, microfluidica, ottica…
Campi di applicazione: telecomunicazioni, commutazione ed elaborazione ottica, elaborazione dell'immagine, memorizzazione dell'informazione, strumentazione e metrologia, ripresa e prospezione di immagine, sensoristica, …

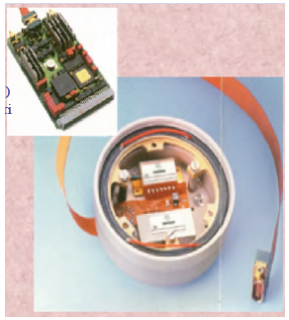
Liquid crystal displays

Camera sensors



OLED screens

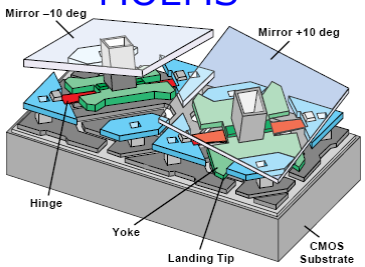
Gyroscope in optical fiber



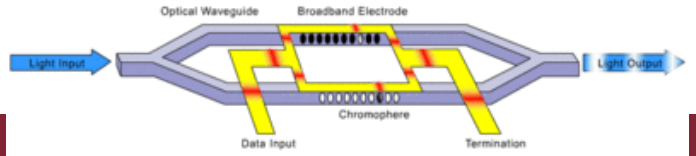
Solar cells

Projectors in DLP technology

MOEMS

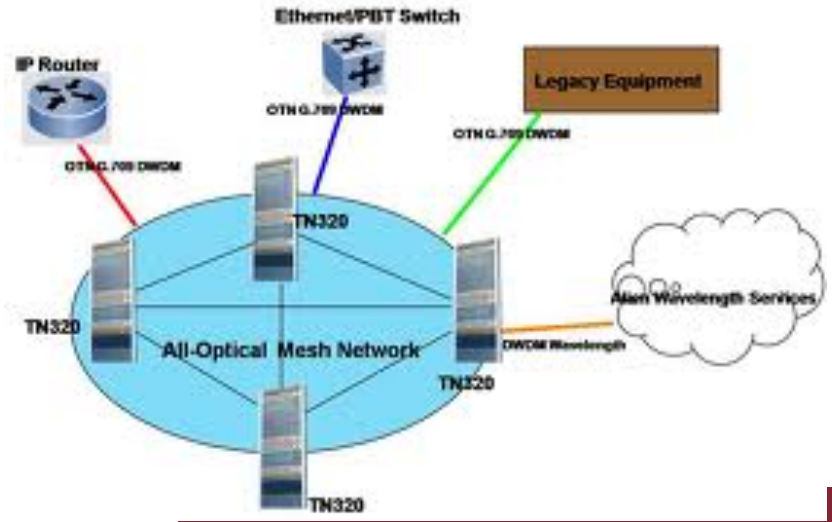


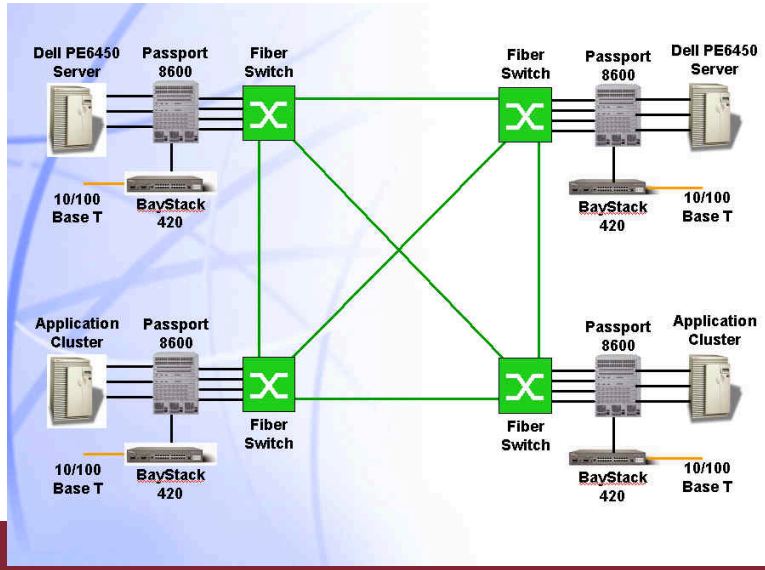
Optofluidic biosensors



Photonics

Fiber optic communication systems: components. optical links, optical networks, design, performance evaluation (Bit-rate vs quality of transmission, link length, etc.)





Relazioni con il mondo del lavoro

Grazie dell’attenzione
Domande?