PHOTONEXT

…in a nutshell

Che cosa è?

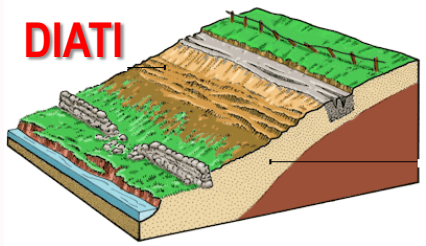
- Centro Interdipartimentale del Politecnico di Torino
  - Bottom-up, Consolidator
  - Finanziato per **1.8 M€** (su tre anni, a partire da Luglio 2017)
- Forte componente sperimentale
  - PhotoNext è un laboratorio «hardware» sulla Fotonica applicata
- 4 dipartimenti coinvolti:

Coordinatore:
- **Roberto Gaudino**

Dipartimento di Elettronica e Telecomunicazioni

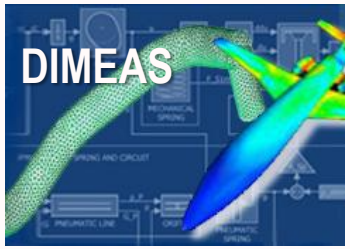
Vice Coordinatore:
- **Daniel Milanese**

Dipartimento Scienza Applicata e Tecnologia



Responsabile DIATI
- **Alberto Godio**

Dipartimento di Ingegneria dell'Ambiente, del Territorio e delle Infrastrutture



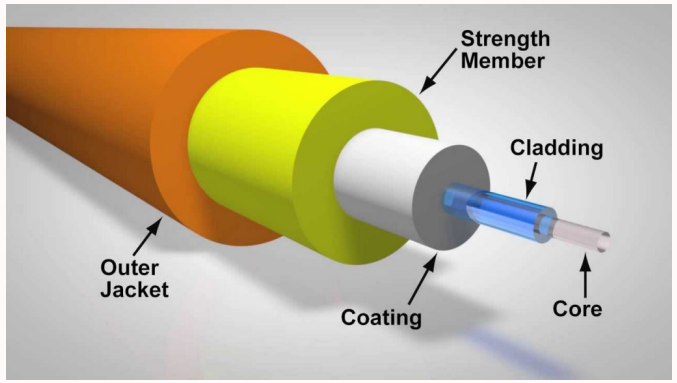
Responsabile DIMEAS
- **Paolo Maggiore**

Dipartimento di Ingegneria Meccanica e Aerospaziale

Che cosa è?

Focalizzato su tre grandi aree della Fotonica

legate all'utilizzo di fibre ottiche



DET

CISCO

SUMITOMO

chimica fisica materiali
DiSAT
scienza e ingegneria

Action 1
TLC

Advanced digital signal processing
Use of multicore and multimode fibers

life.augmented

INRiM Istituto Nazionale di Ricerca Metrologica

TECHNISCHE UNIVERSITÄT DARMSTADT

DET DISAT
DIMEAS DIATI

ThalesAlenia Space

ISMB Istituto Superiore Mario Boella

Action 3:
Components

Action 2:
Sensors

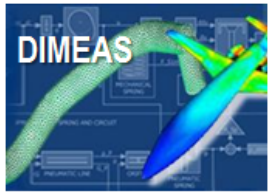
New optical components for optical sources
Silicon Photonics platforms
Novel materials and fibers

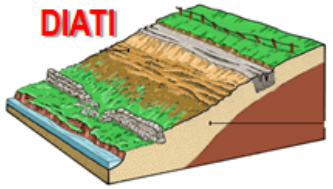
Innovative sensing systems for aeropace and environmental monitoring

PRIMA INDUSTRIE

FONDAZIONE MONTAGNA SICURA
MONTAGNE SÛRE

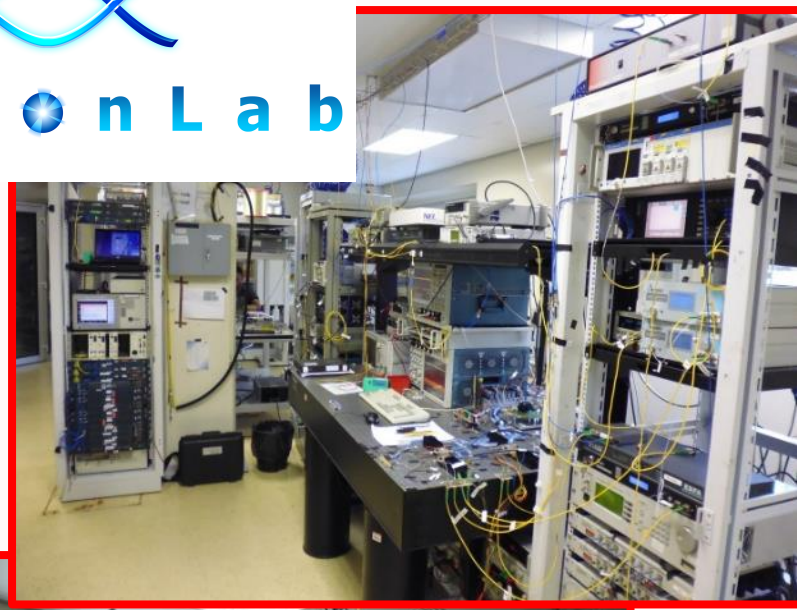
DATALOGIC





Dove?

- PhotoNext coincide come spazi fisici con il laboratorio PhotonLab
  - PhotonLab esiste dal 2002 a seguito di:
    - LAQ2002: Laboratori Alta Qualità POLITO
    - Accordo ISMB-POLITO
- Il laboratorio è situato all'interno dell'Istituto Superiore "Mario Boella" (ISMB)
  - Le attività degli ultimi 15 anni sono sempre state svolte in fortissima sinergia con ISMB/LINKS
  - Stiamo lavorando per un Accordo Quadro specifico tra PhotoNext e ISMB/LINKS



Utilizzo del budget (1.8 M€ su 3 anni)

- Acquisto e aggiornamento di grandi attrezzature sperimentali nel campo della Fotonica, fondamentali per gli obiettivi del progetto


PHOTONEXT:
ACTION 1: TELECOM

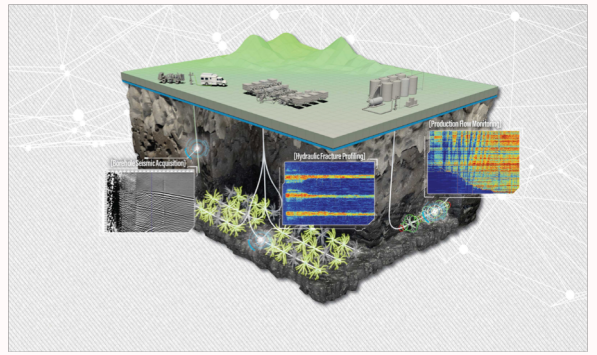
Research activities

- Focus on fiber optic communications from a system level perspective
  - Our main interest are in the physical layer
    - Analysis of fiber propagation
    - Transmission techniques
- Main research areas
  - Long haul and high capacity fiber systems
    - Capacity of 20-50 Tbit/s per fiber over very long distances (from 200 km to 9000 km)
  - Optical access networks and support to 5G networks
    - Low-cost optical transmittion and 5G applications in the access segment (Fiber To The Home and Fronthauling)
  - Optical ultra-high bit rate link for data centers
    - Hundreds of Gigabit/s over <2km


PHOTONEXT:
ACTION 2: SENSORI

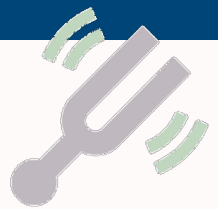
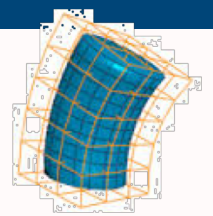
AIM and Overall investment

- **AIM**: to leverage existing expertise in optical sensing for:
  - Aerospace
  - Environmental monitoring
  - Harsh Environment
  - Automotive

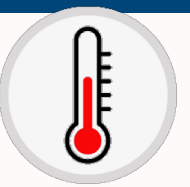


- Overall investment: 300,000 € for new equipment to go beyond SOA and provide useful service to companies and develop new applications

Research lines

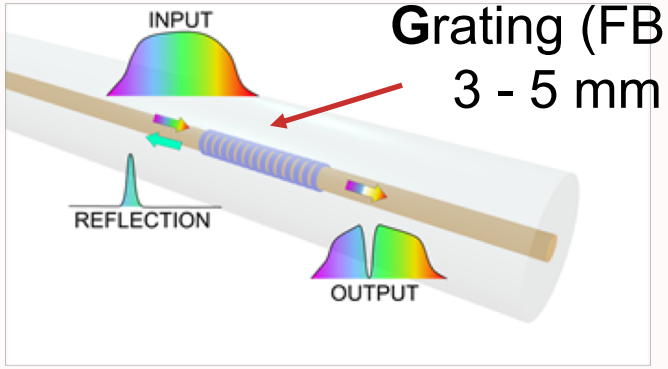



Sensing of strain, temperature and vibrations

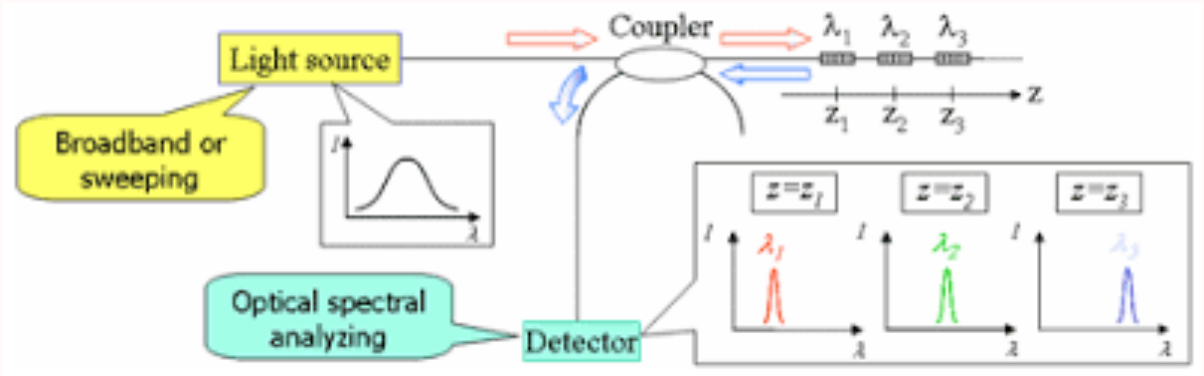


- Point sensing

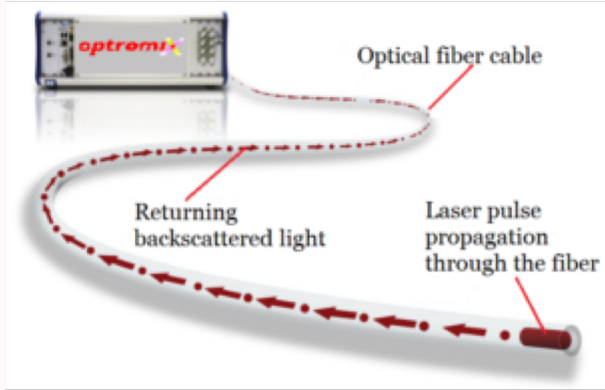
Fiber **B**ragg **G**rating (FBG) 3 - 5 mm



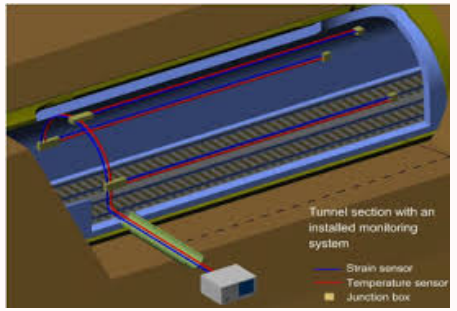
- Multiplexing
- Sensing up to 2km

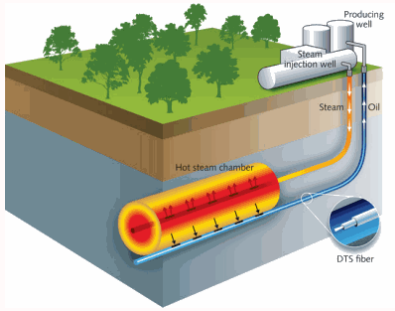


- Distributed sensing



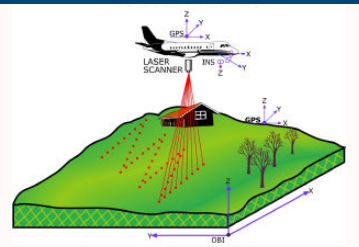
- Resolution 10 cm
- Sensing up 30 km






PHOTONEXT:
ACTION 3: COMPONENTI

Scientific Activity /1



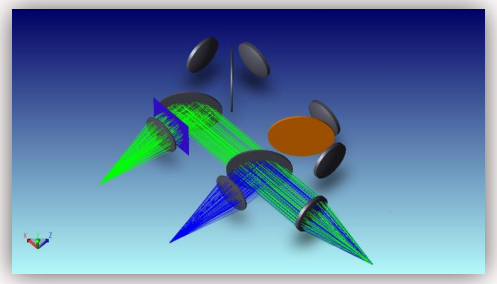
- **Multifunctional specialty optical fibers:**
  - Er, Yb and Yb/Er doped optical fiber power amplifiers for LIDAR applications
  - With DATALOGIC:
    - Delivery of pulsed fiber lasers for micromachining and texturing of different materials
    - Testing of commercial optical fibers for laser cavities

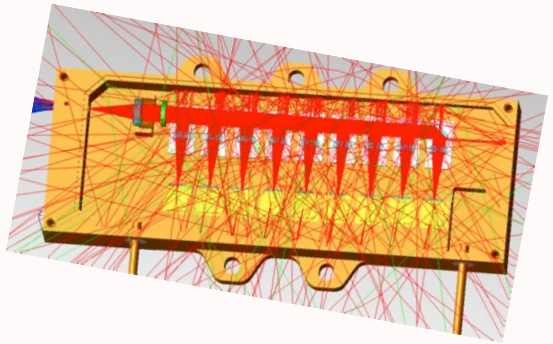
Scientific Activity /2

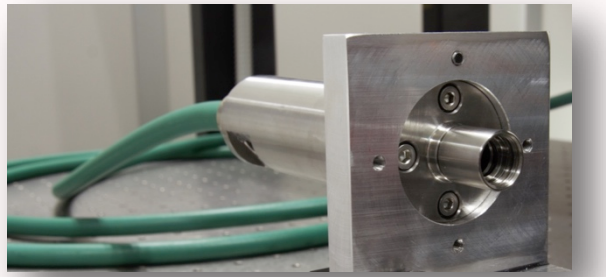
- **Silicon photonic integrated circuits**
  - Design of silicon photonic integrated circuits, including both passive and active (modulators, photodetector, lasers ...) components
  - Realise the designed circuits in Multi-Wafer-Project using a silicon photonic foundry
  - Characterization and testing of silicon photonic integrated circuits

Scientific Activity /3

- **Components for high power laser sources**
  - High power beam combining architectures (free space kW beams and for multi-emitter diodes)
  - High peak power (ps-fs pulses) fiber beam delivery systems







industrial grade cable based on innovative hollow core optical fibers