

Fotonica e Tecnologie Quantistiche: la Governance di una Infrastruttura di Ricerca per il futuro

Massimo Inguscio

LE PIATTAFORME DELLA TECNO-SCIENZA
Dalle esperienze al loro contributo per il futuro

Mercoledì 12 ottobre 2022
Accademia Nazionale dei Lincei
Roma



EURO-PIATTAFORME: SCIENZA,
TECNOLOGIA ED ECONOMIA
UNA CONNESSIONE CRUCIALE PER L'ITALIA

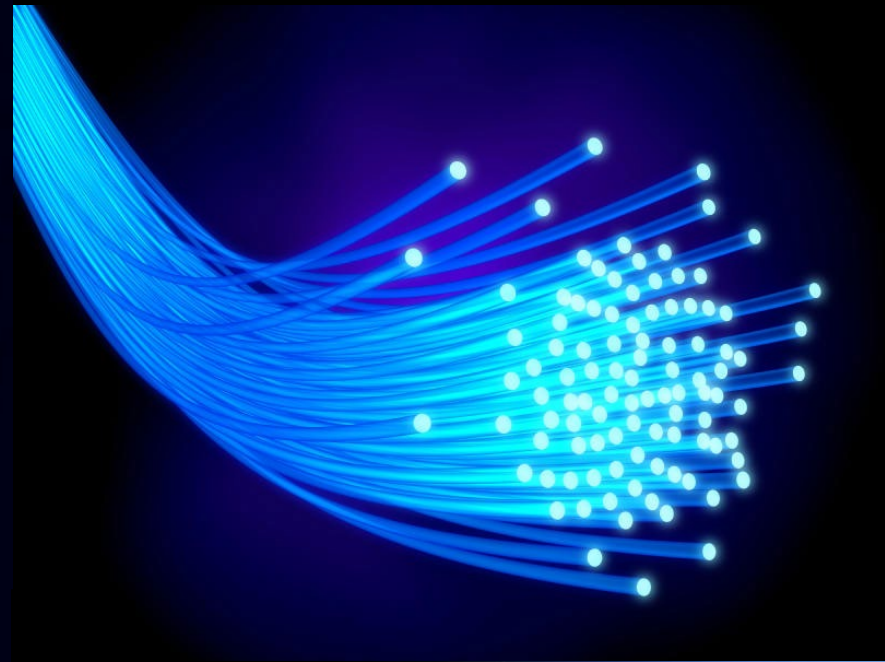
a cura di
Alberto Quadrio Curzio, Marco Fortis e Alberto Silvani

Collana della Fondazione Edison

PARTE SECONDA: PROGRESSI E PROGETTI ITALO-EUROPEI

9. Luce Comune Europea, *di Massimo Inguscio*

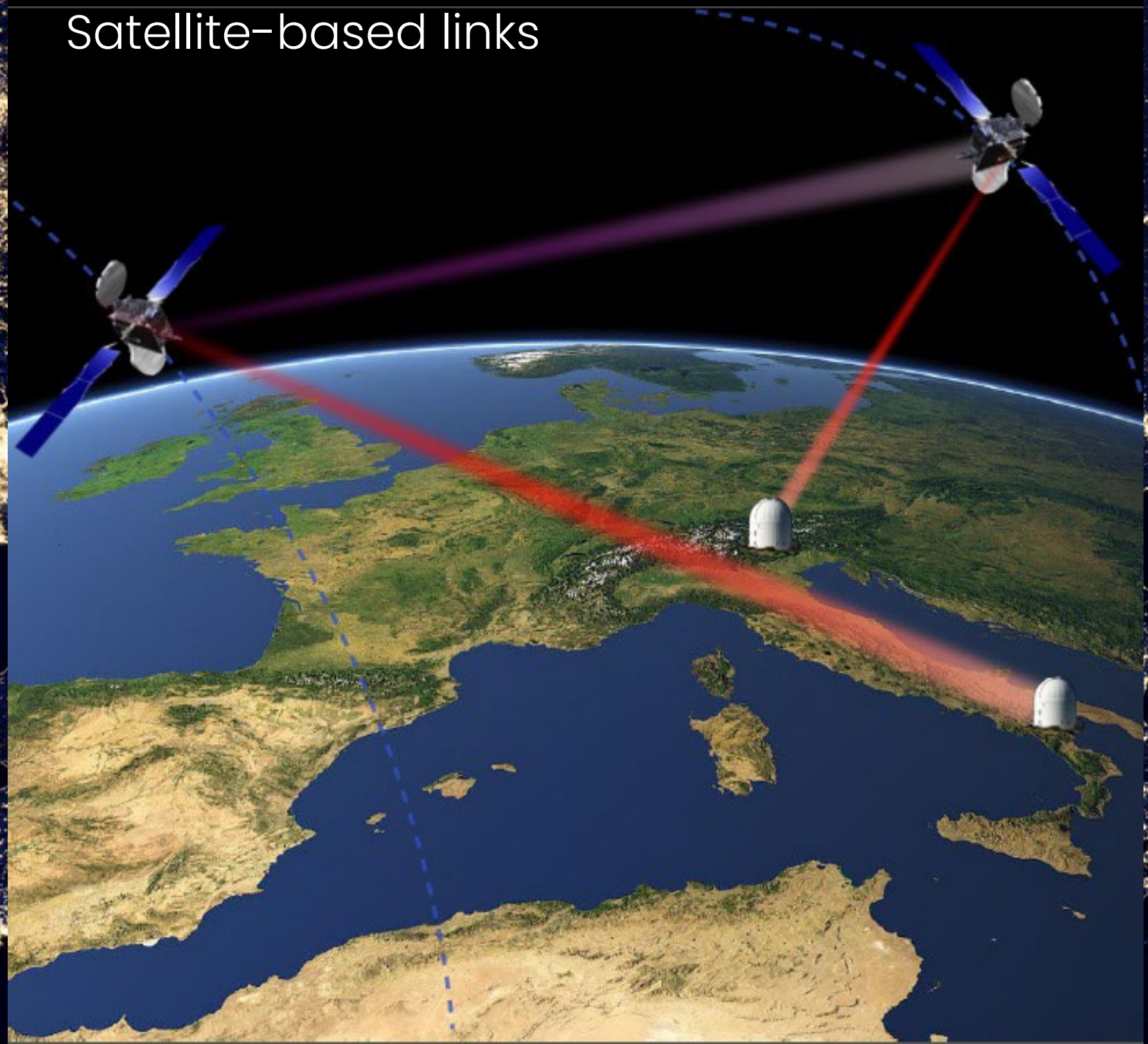
il Mulino

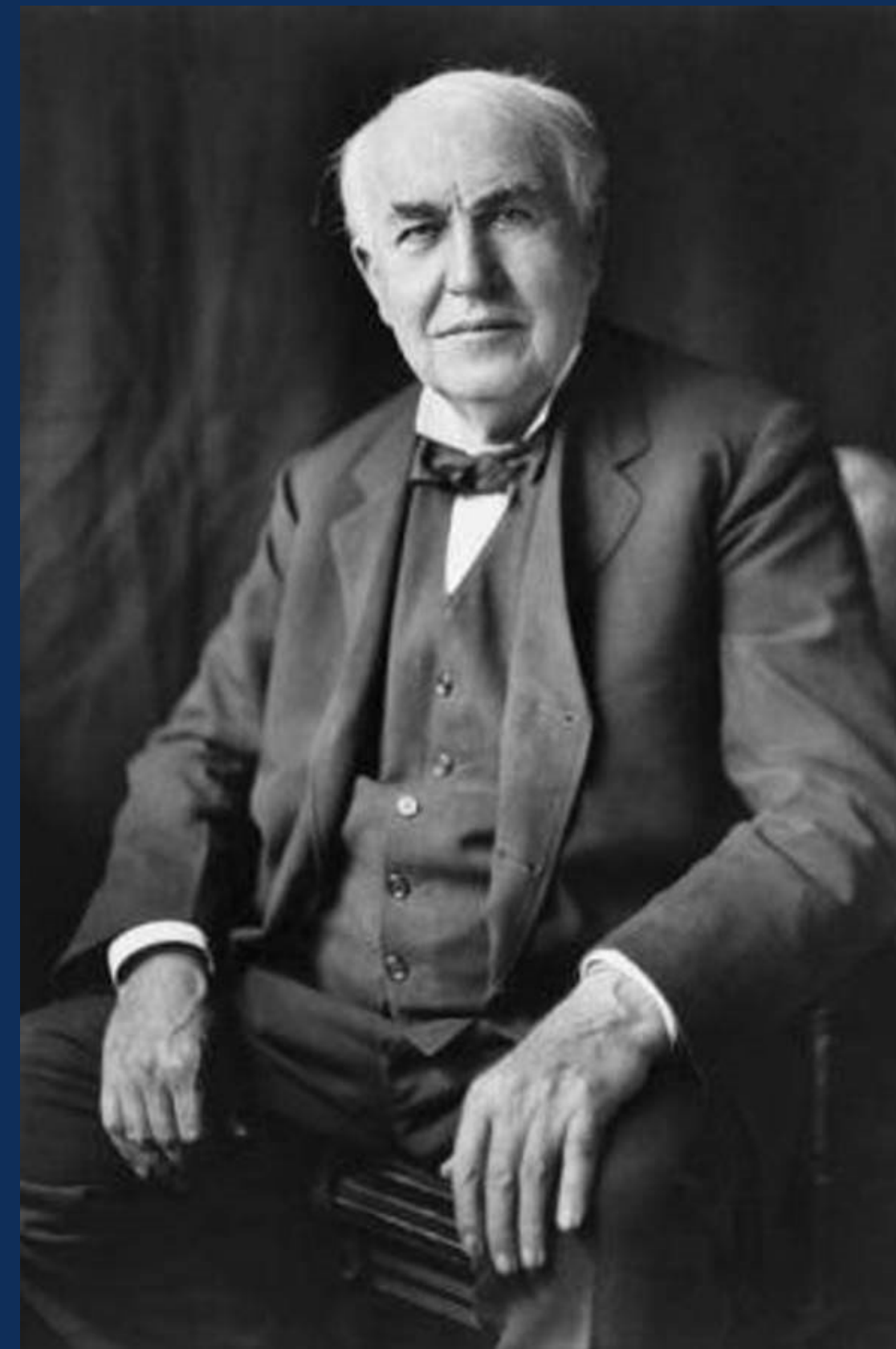
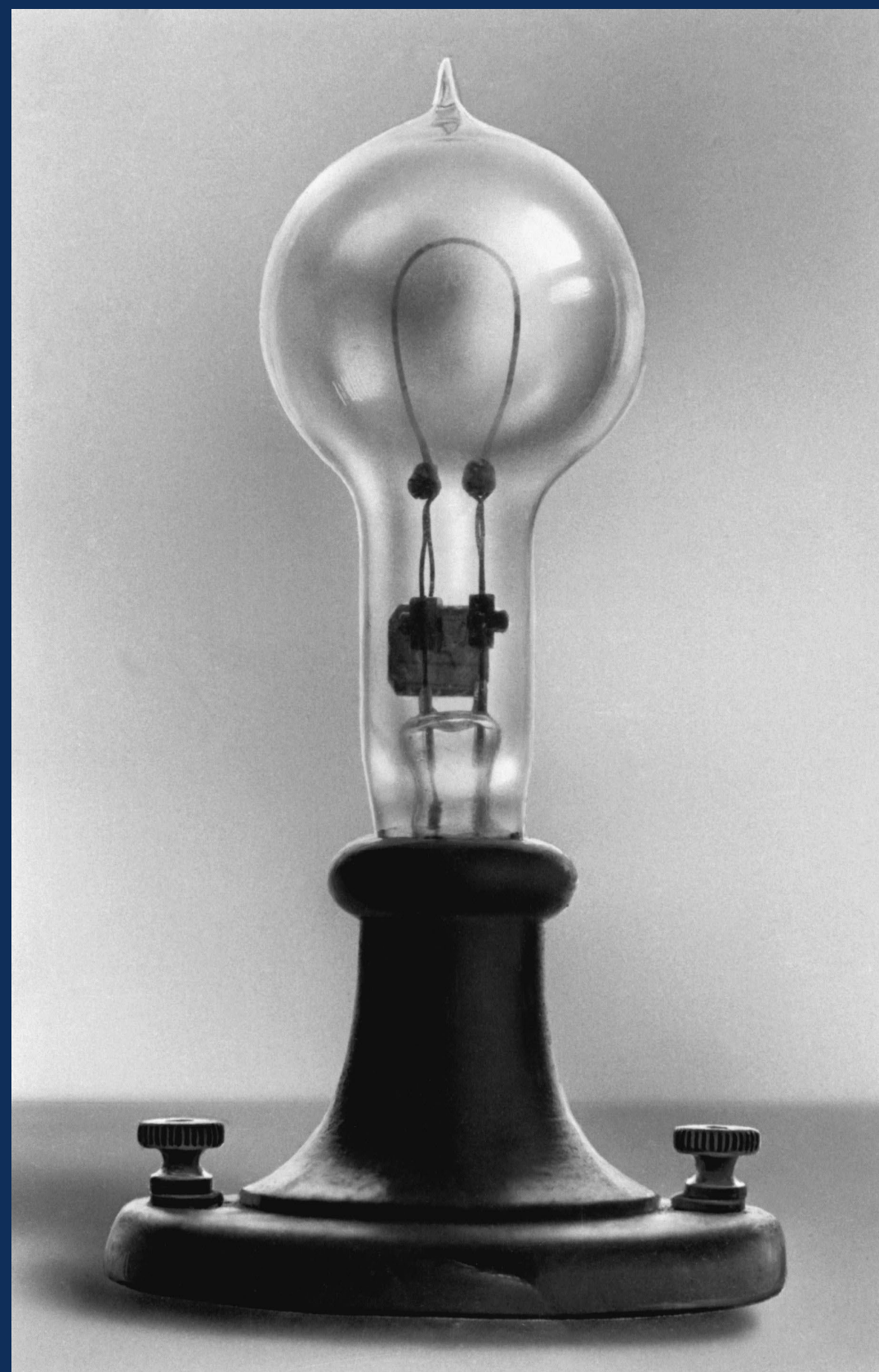
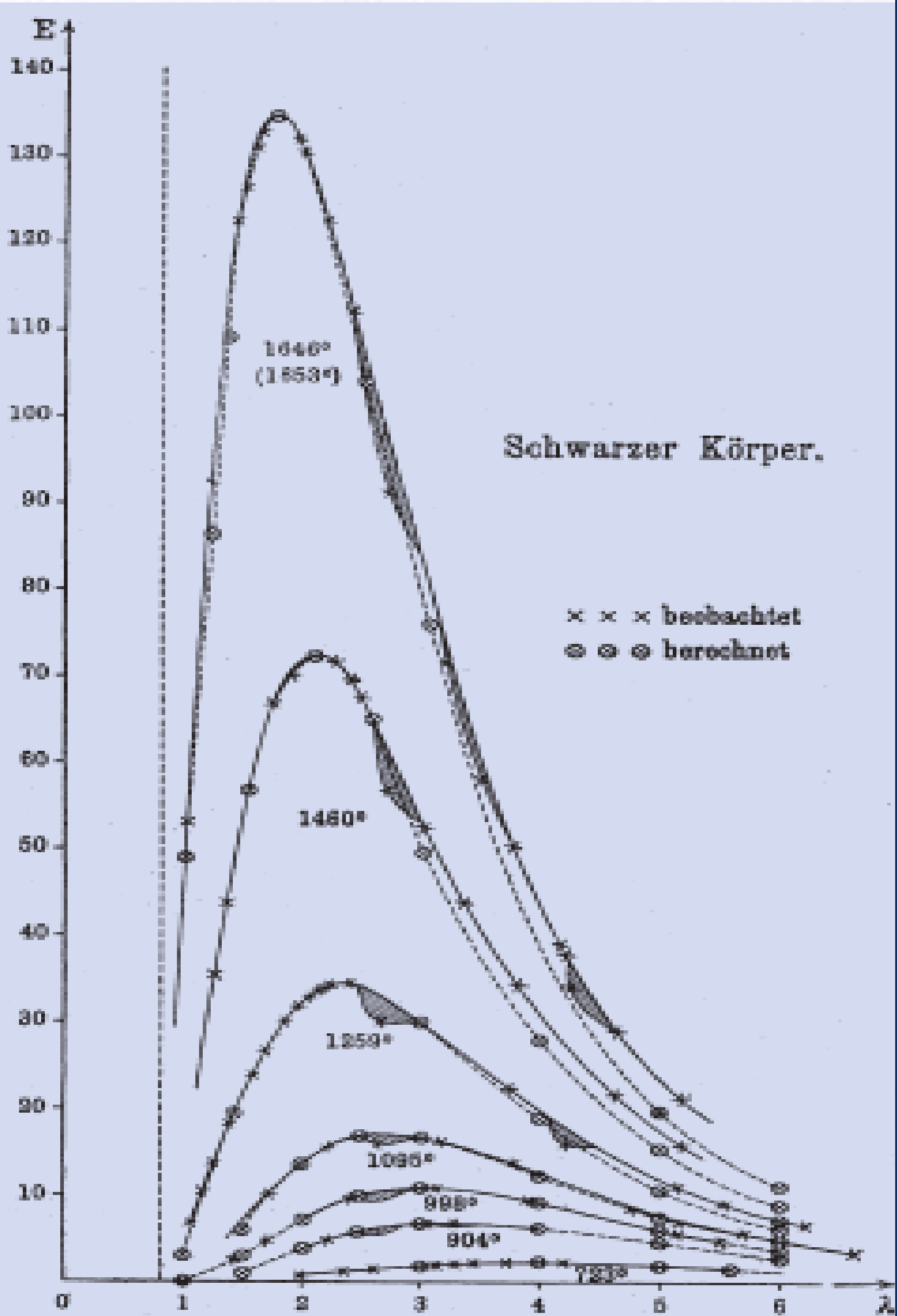


Fiber-optic networks



Satellite-based links





I- PHOQS

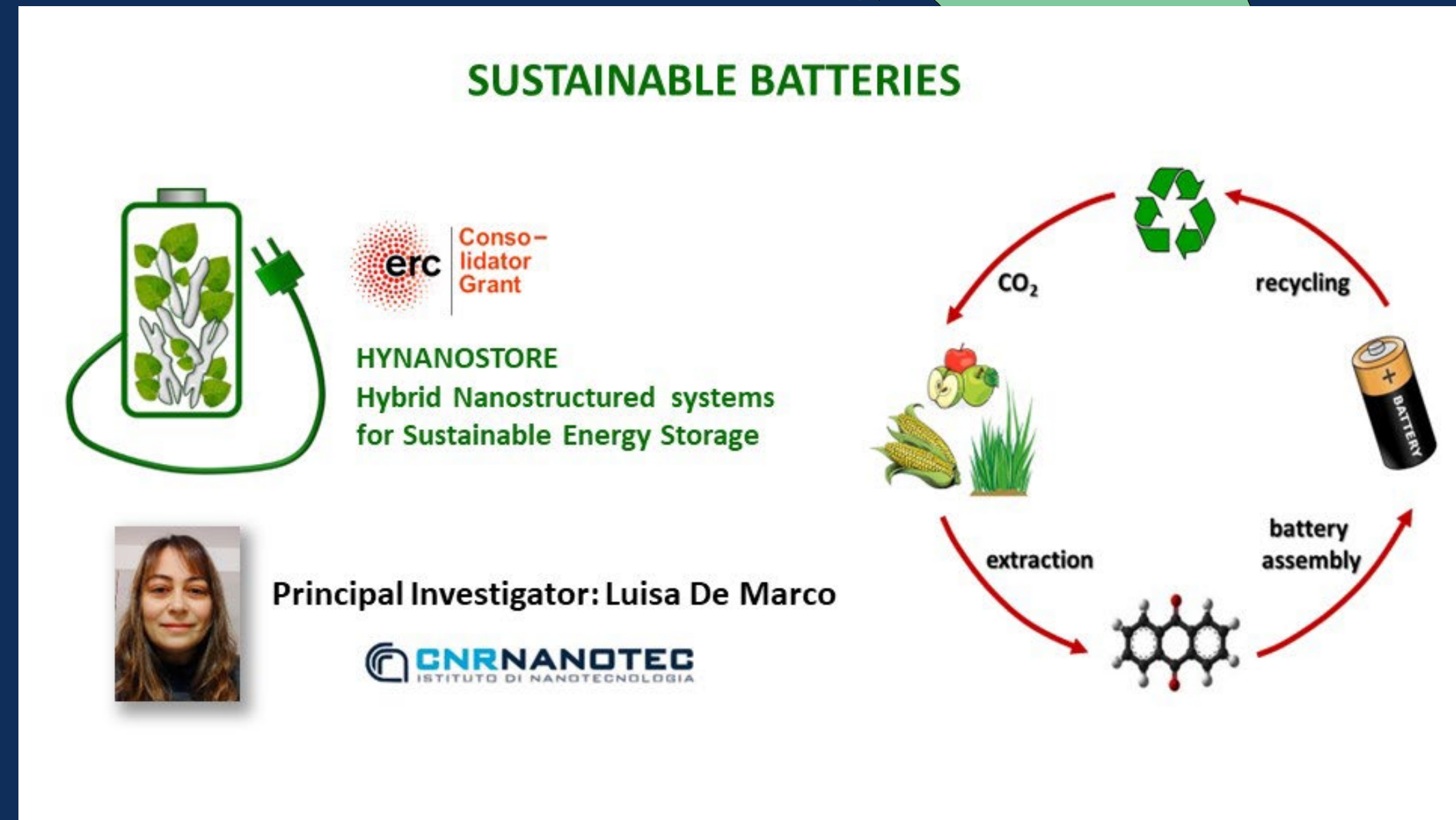
Integrated infrastructure initiative in PHOtonic and Quantum Sciences

Progetti ERC

- Milano 8 + 1 PoC
- Firenze/Pisa 8 + 1 PoC
- Lecce 3 + 1 PoC

Startup

- Lecce 7
- Milano 6
- Firenze 5
- Padova 1



I- PHOQS



Integrated infrastructure
initiative in PHOtonic and
Quantum Sciences

Proponenti

Proponente: CNR (capofila di LENS, ELI e BEYOND NANO)

Co-proponente: Politecnico di Milano (capofila di CUSBO)

Infrastrutture

LENS (Lab. Europeo per le Spettroscopie Non-lineari)

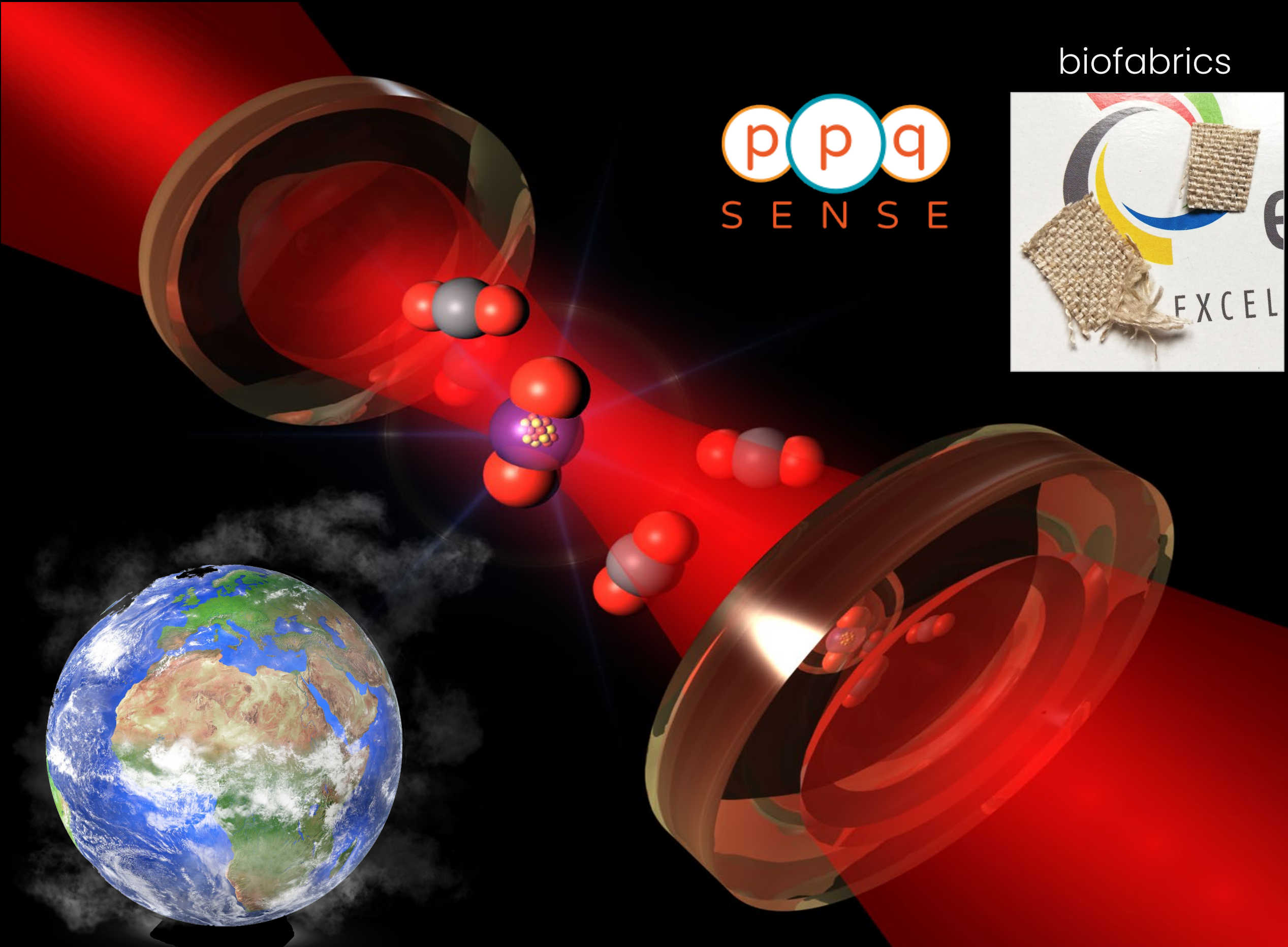
ELI (Extreme Light Infrastructure)

CUSBO (Center for Ultrafast Science and Biomedical Optics)

BEYOND NANO (Materials and processes BEYOND the NANO scale)



Ultra - sensitive detection of radiocarbon dioxide **C14-SCAR**



ppq
SENSE

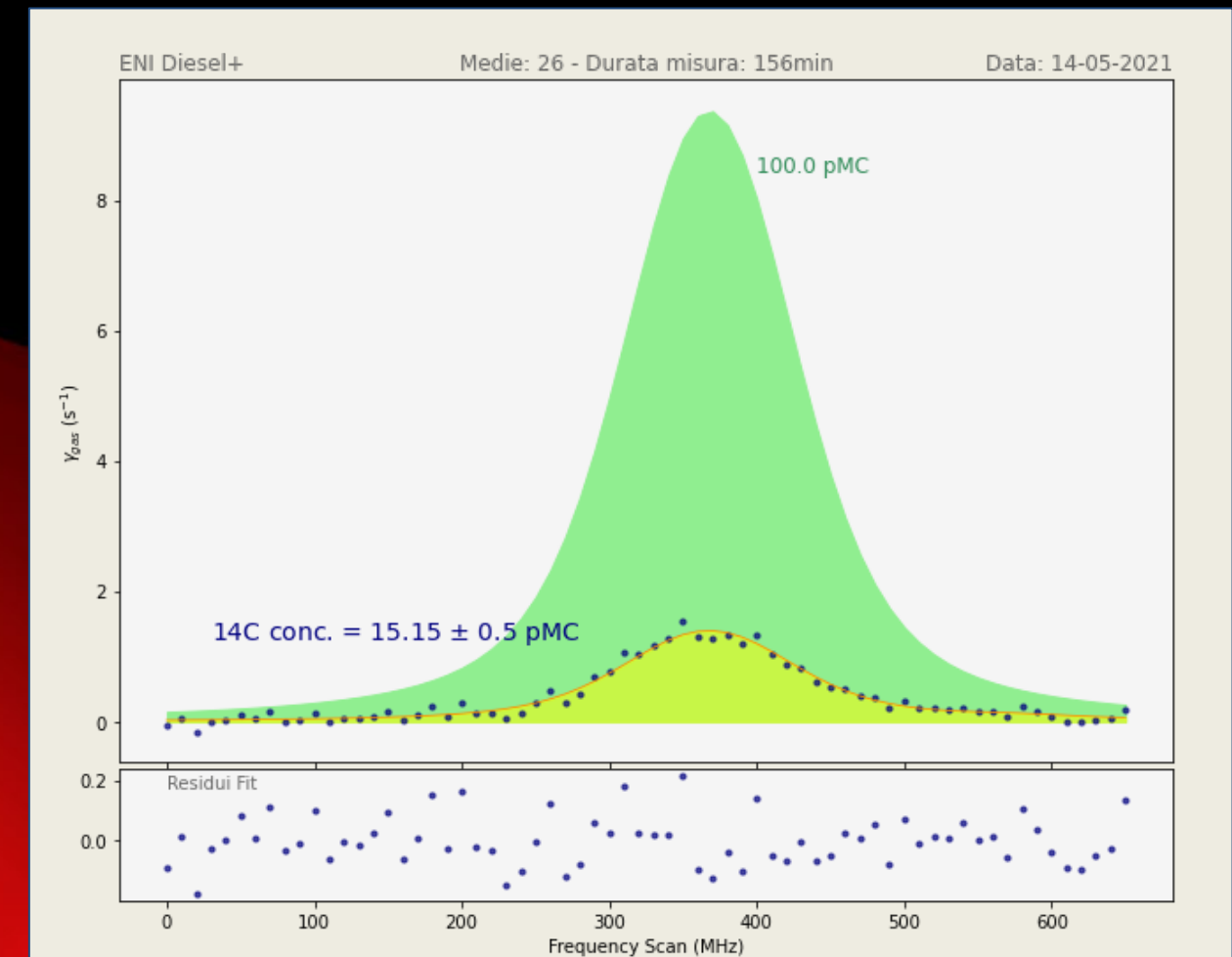
biofabrics



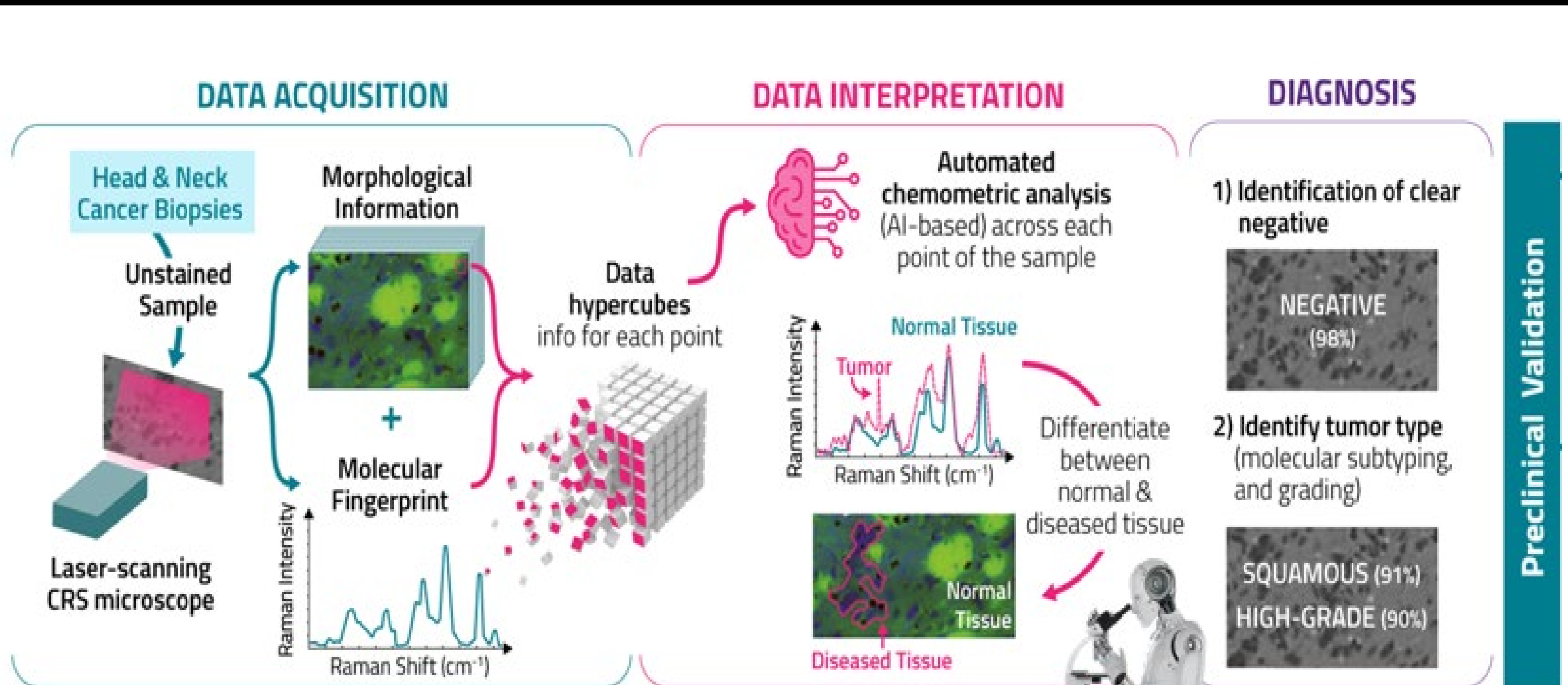
biofuels



climate



Coherent Raman scattering (CRS) microscopy to improve cancer diagnosis



UNIVERSITY OF
CAMBRIDGE



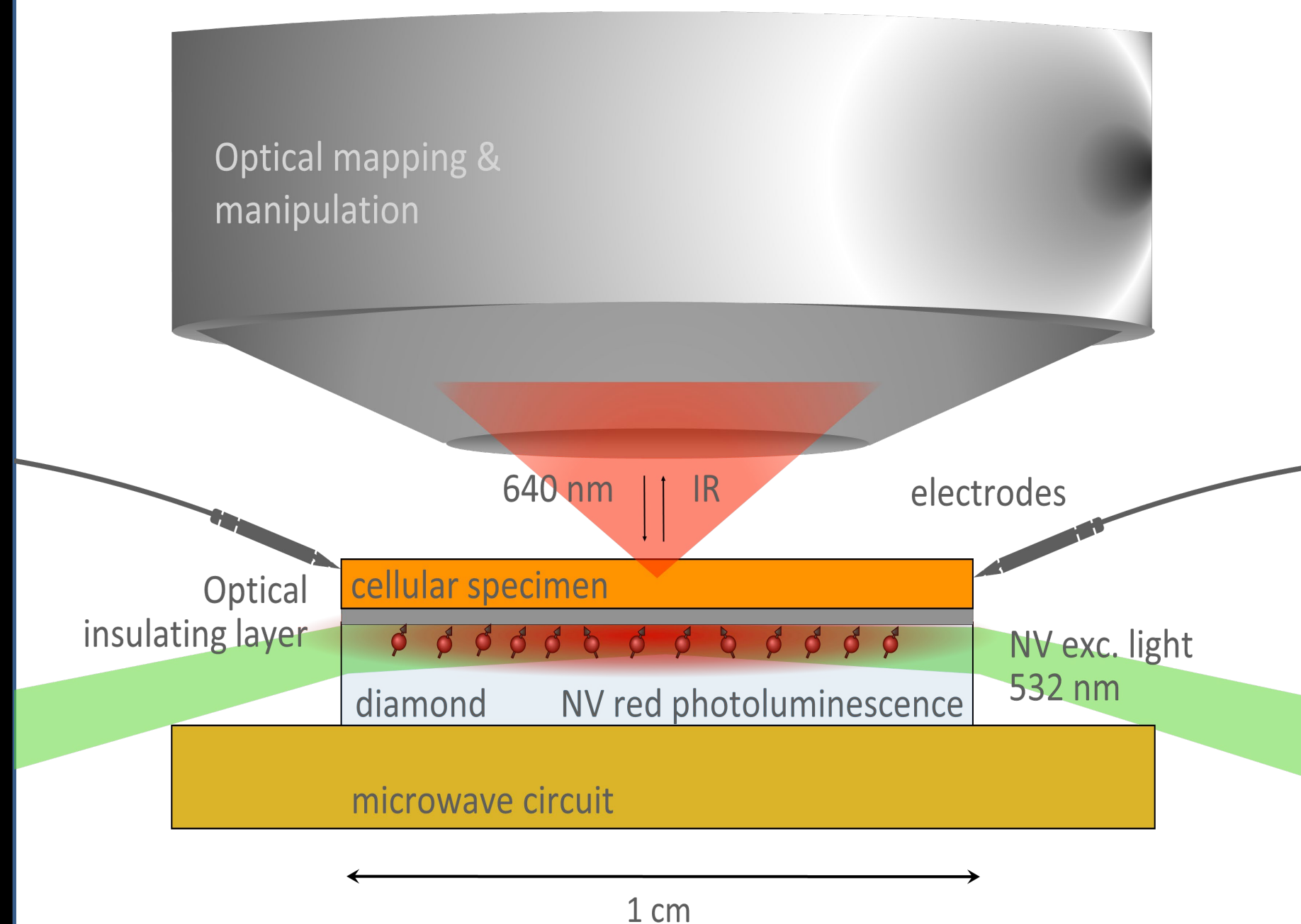
POLITECNICO
MILANO 1863



chemometric imaging

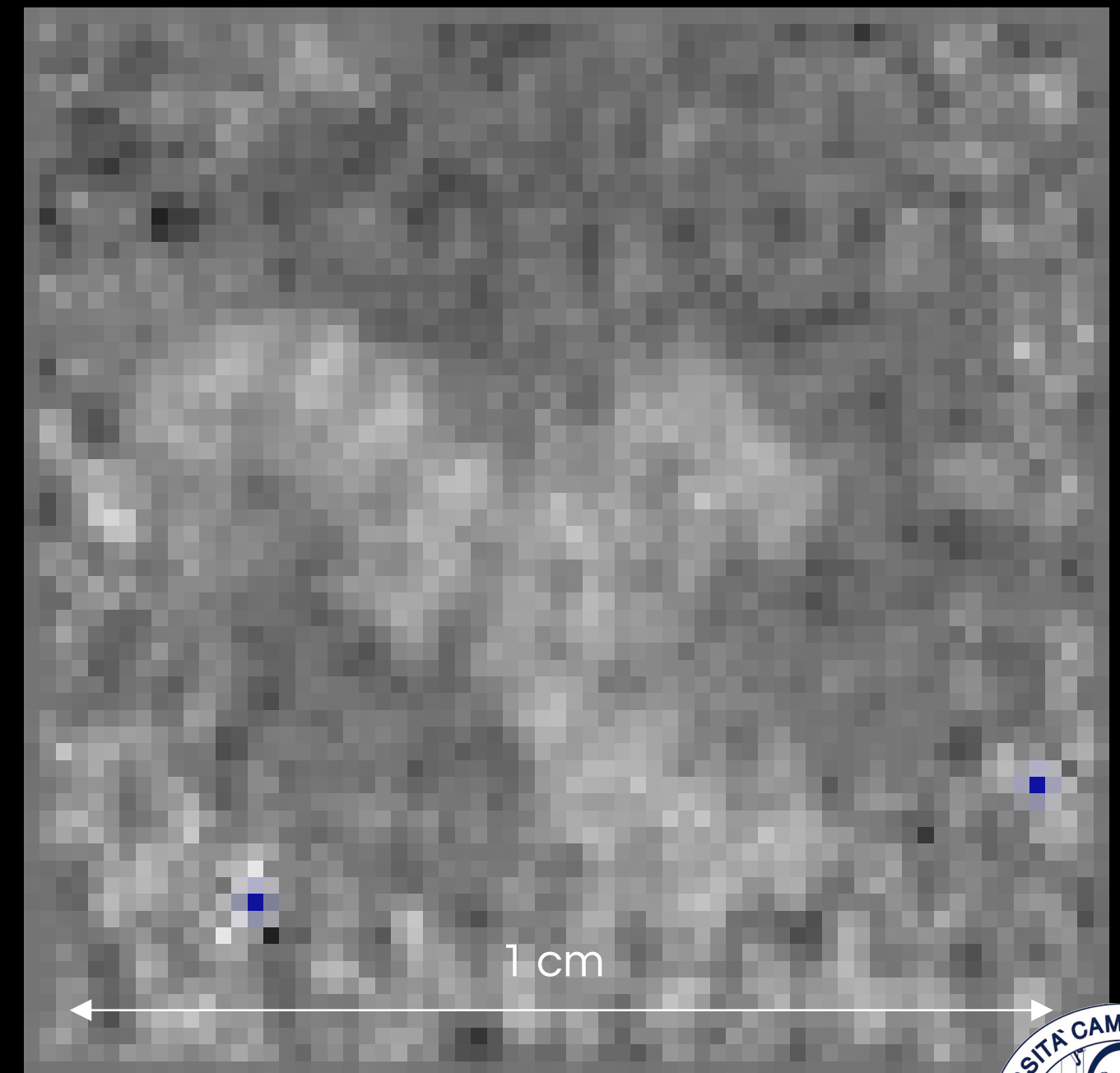
Novel technologies for quantum biosensing & biomodeling

Rivelazione NMR ad altissima sensibilità con nanosensori NV



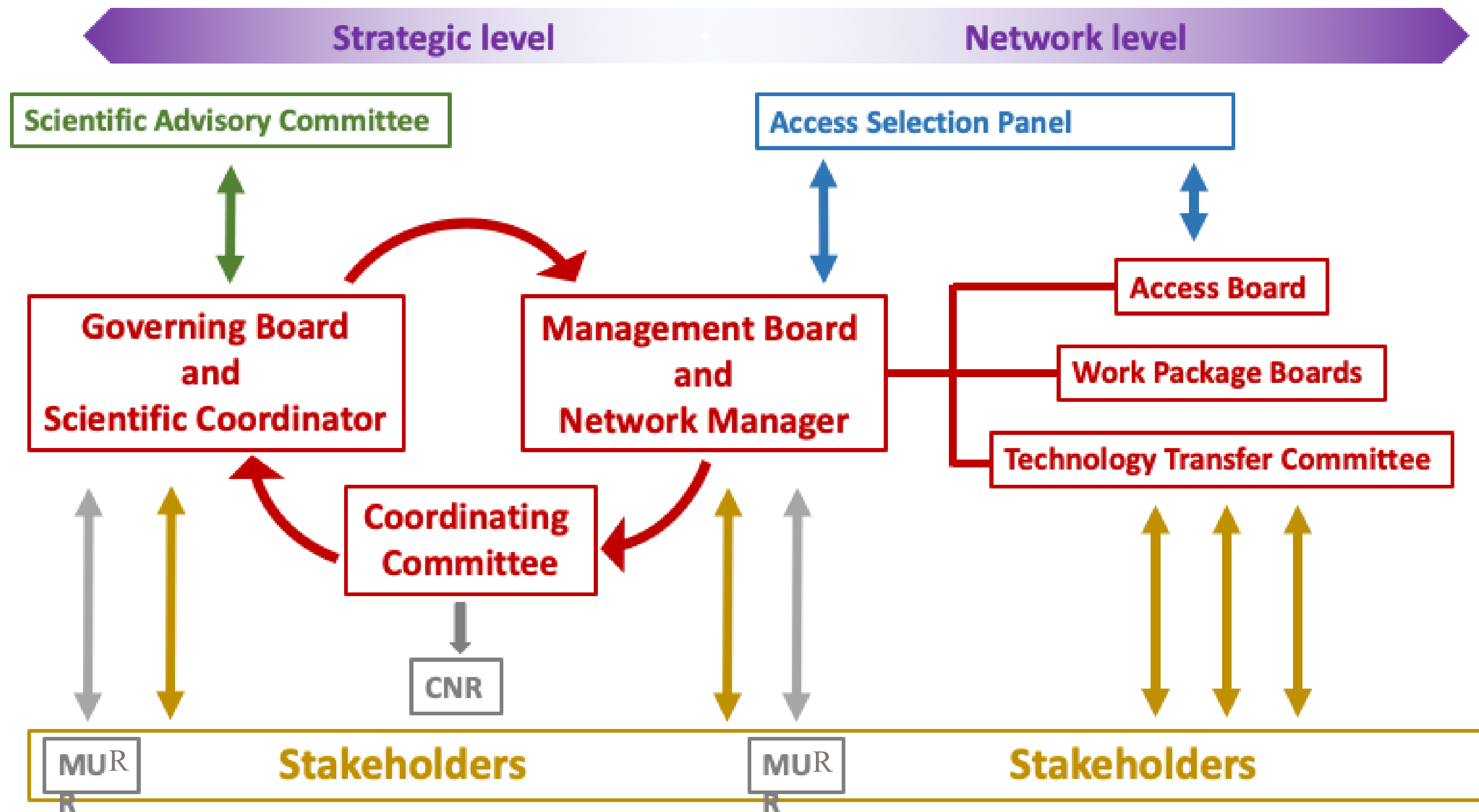
fabri@lens.unifi.it

Colture di cellule cardiache di embrione di pollo in fluorescenza



I- PHOQS Governance

Coordinatore: Paolo De Natale (CNR-INO, LENS)



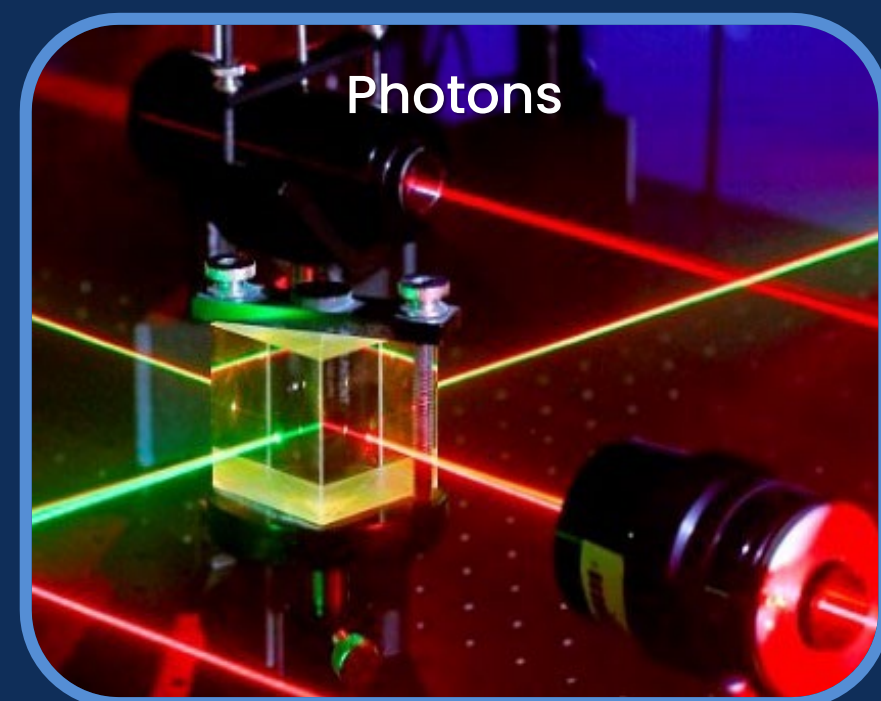
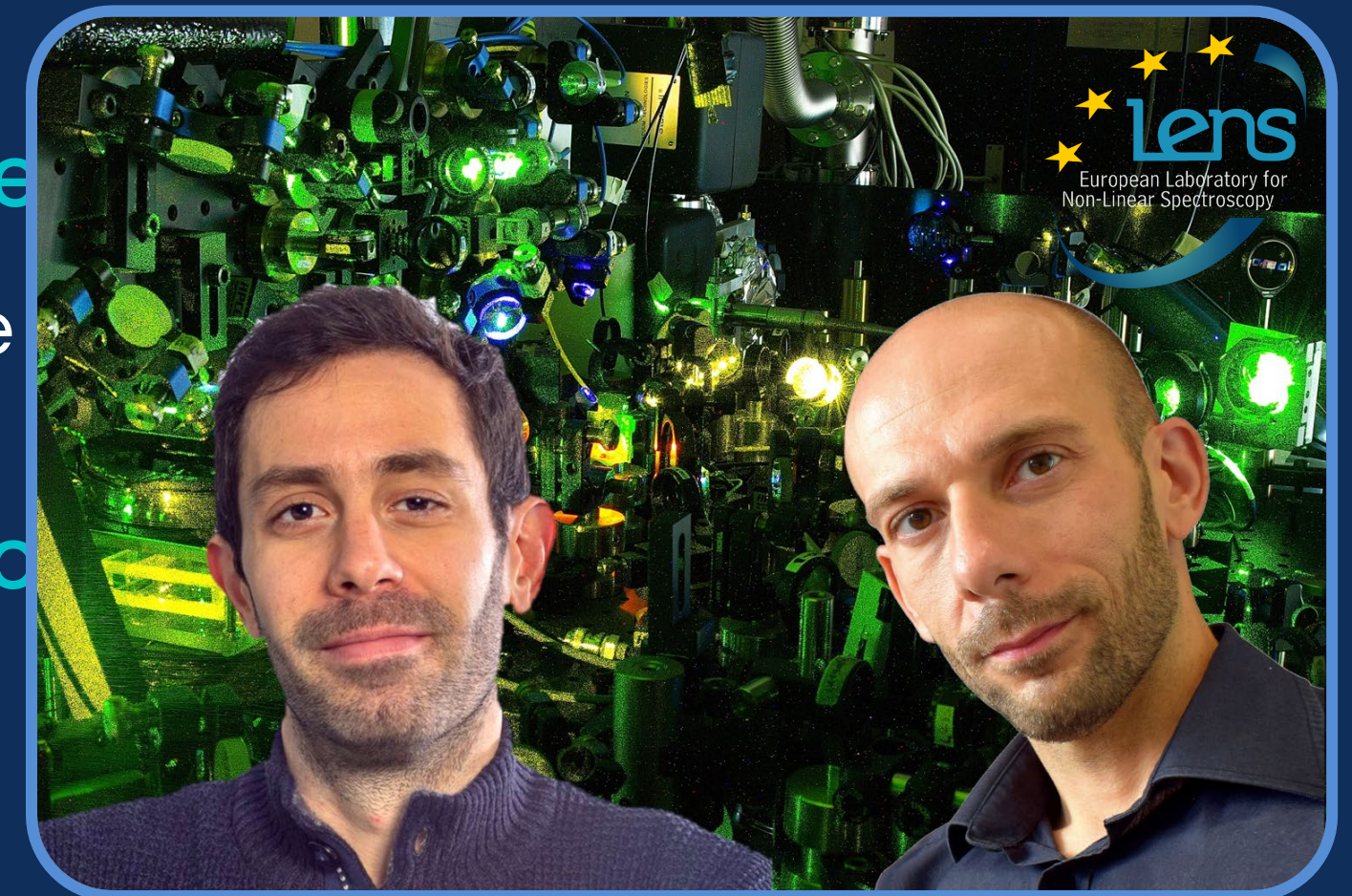
Quantum actions in PNRR

National Institute for Quantum Science and Technology

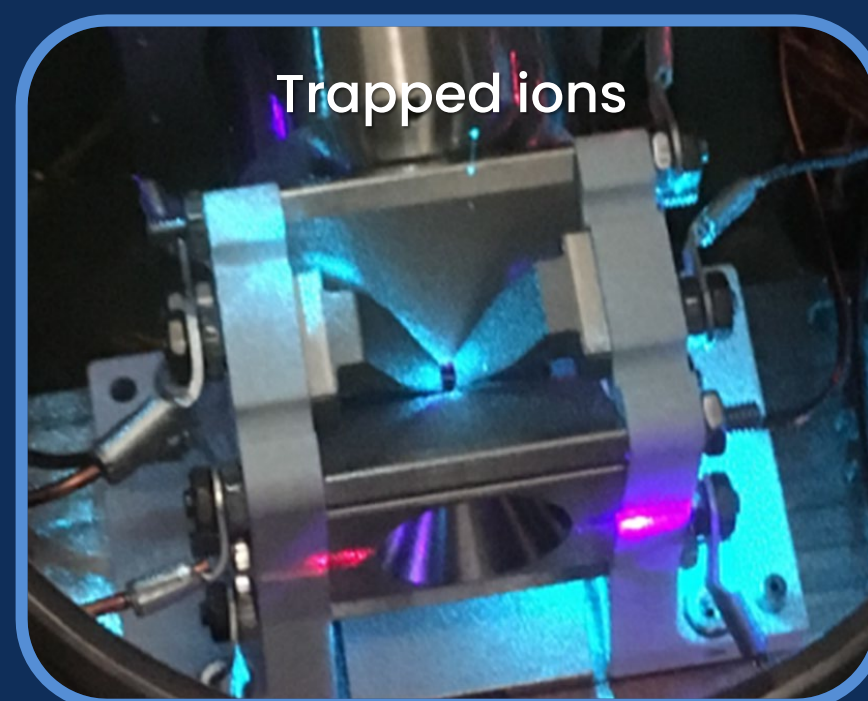
PNRR M4C2 Partenariati estesi enti-università-impres

Centro nazionale Hpc, Big Data e Quantum Computing

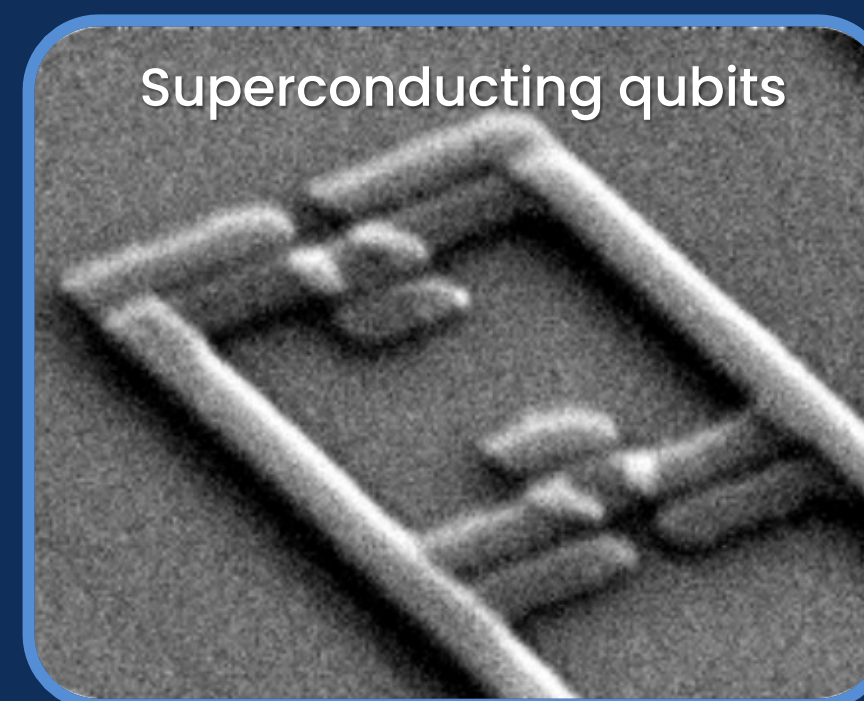
PNRR M4C2 Campioni nazionali di ricerca e sviluppo



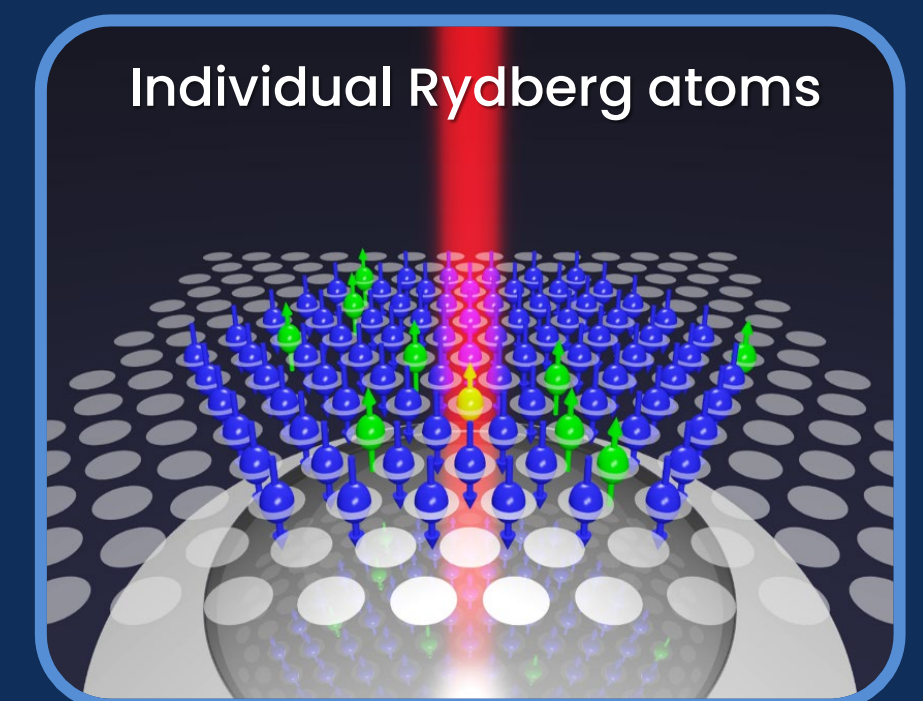
Photons



Trapped ions



Superconducting qubits



Individual Rydberg atoms

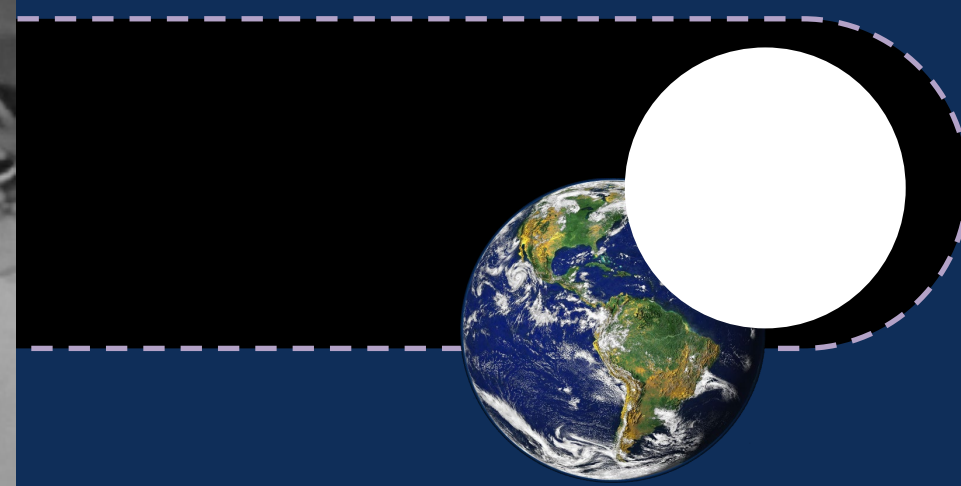
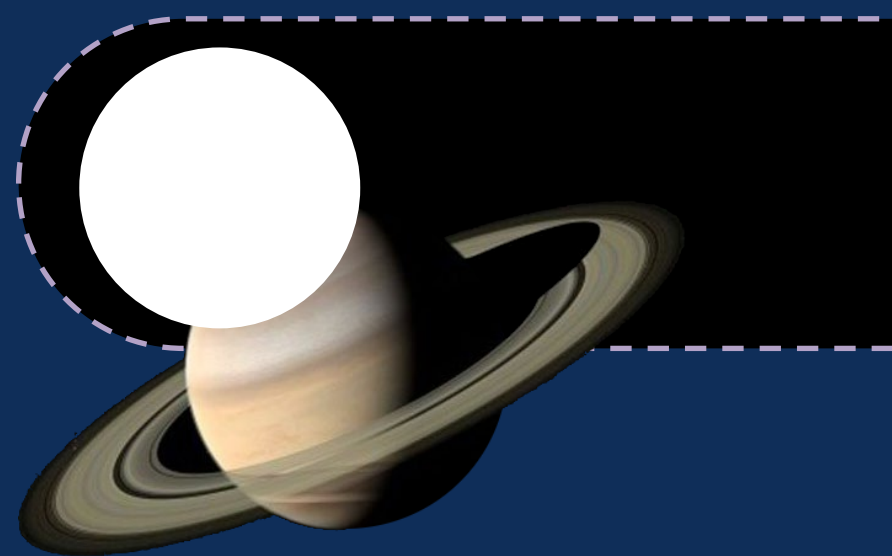
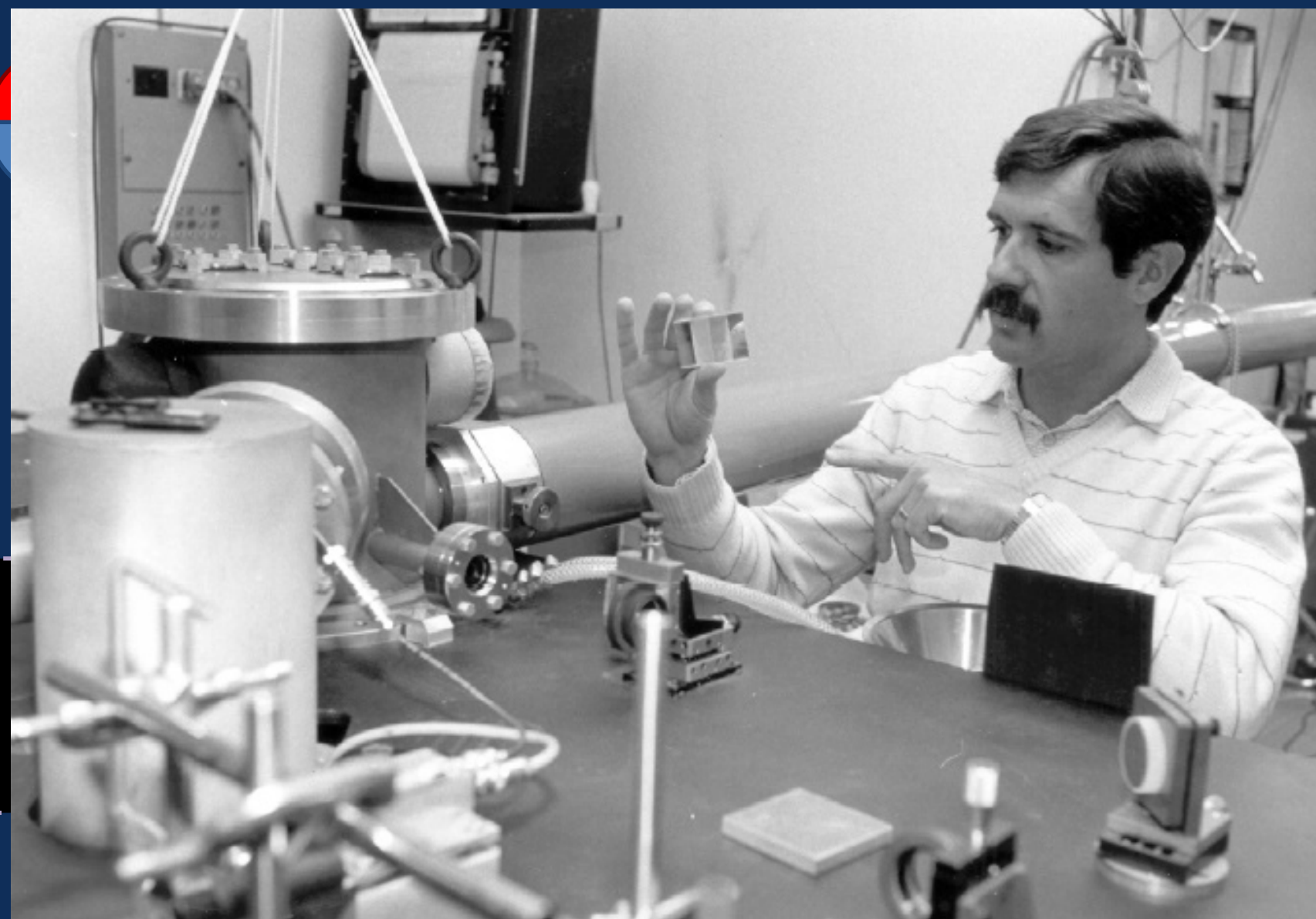
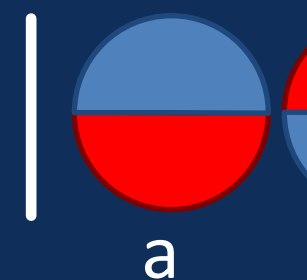
Computing & Communicating



A fiber-optic quantum backbone to exploit time and frequency metrology for quantum technologies

Quantum entanglement

Due sistemi quantistici, ciascuno in uno stato di sovrapposizione, ma perfettamente correlati (anche senza una connessione fisica!)



una spaventosa azione a distanza!?

The Nobel Prize in Physics 2022



Ill. Niklas Elmehed © Nobel Prize Outreach

Alain Aspect

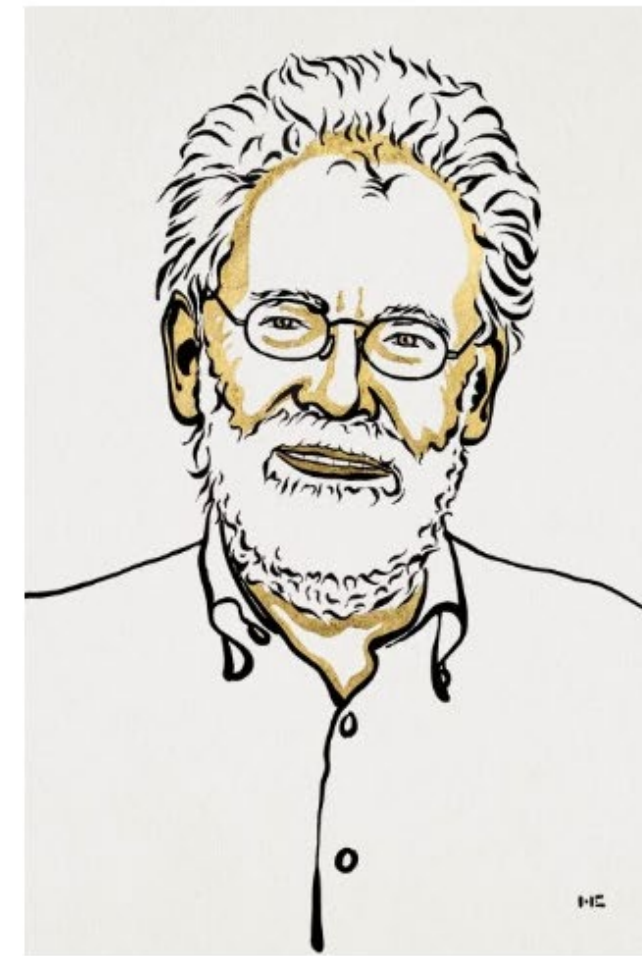
Prize share: 1/3



Ill. Niklas Elmehed © Nobel Prize Outreach

John F. Clauser

Prize share: 1/3



Ill. Niklas Elmehed © Nobel Prize Outreach

Anton Zeilinger

Prize share: 1/3

The Nobel Prize in Physics 2022 was awarded jointly to Alain Aspect, John F. Clauser and Anton Zeilinger "for experiments with entangled photons, establishing the violation of Bell inequalities and pioneering quantum information science"



Frontiers in Atomic Physics (2010, Firenze)