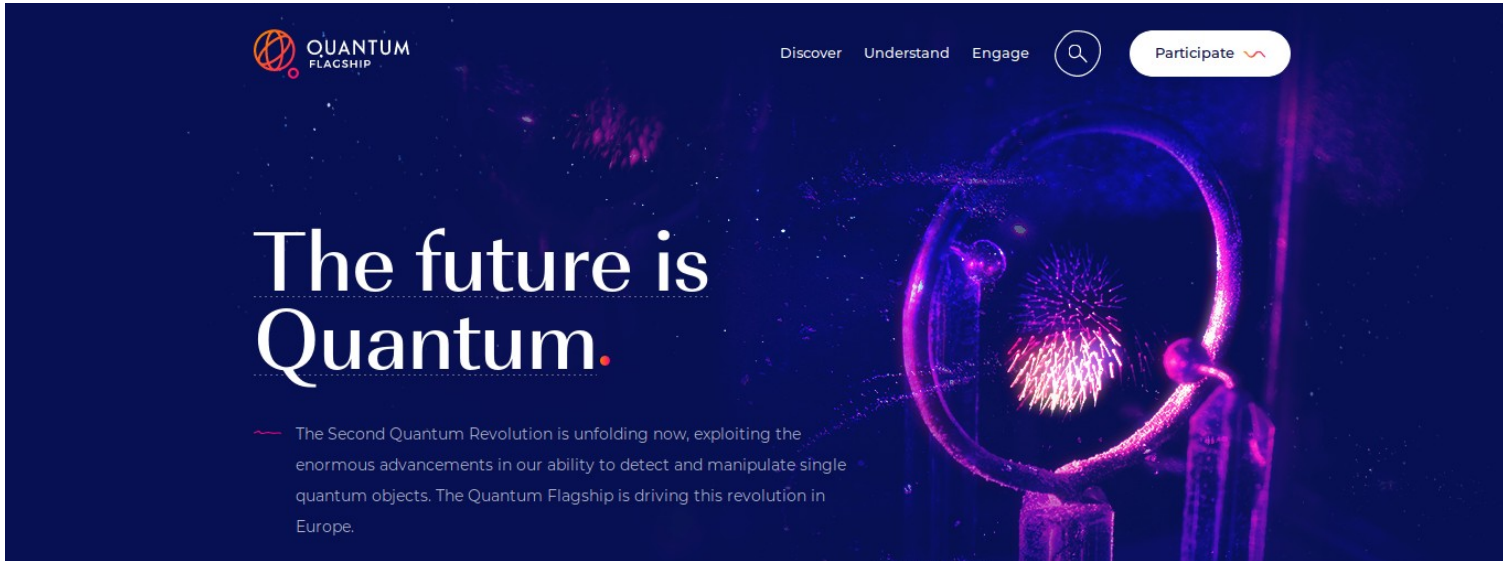
QUICHE
QUantum Integrated CHip Experiment

- RN: A. Salamon (INFN RM2)
- Sezioni : RM2, MI, Camerino-PG, Salerno
- Durata: 2 anni (sigla esplorativa in vista di un progetto piu` ambizioso → la call **QUANTEP**)
- Scopo del progetto:
  - disegno e simulazione (senza produzione) di circuiti integrati per applicazioni di quantum computing basati su guide d'onda in tecnologia Silicon On Insulator a 1550 nm (RM2-MI)
  - test di semplici dispositivi a “componenti discreti” in fibra a 1550 nm su banco ottico (RM2-PG)
  - caratterizzazione e test a 1550 nm di un APD (Avalanche Photo Diode) con giunzione Si-Bi2Se3 (RM2-NA)

È stata presentata la call QUANTEP, in caso di approvazione QUICHE verrà chiuso

Quantum Technologies Flagship

https://qt.eu

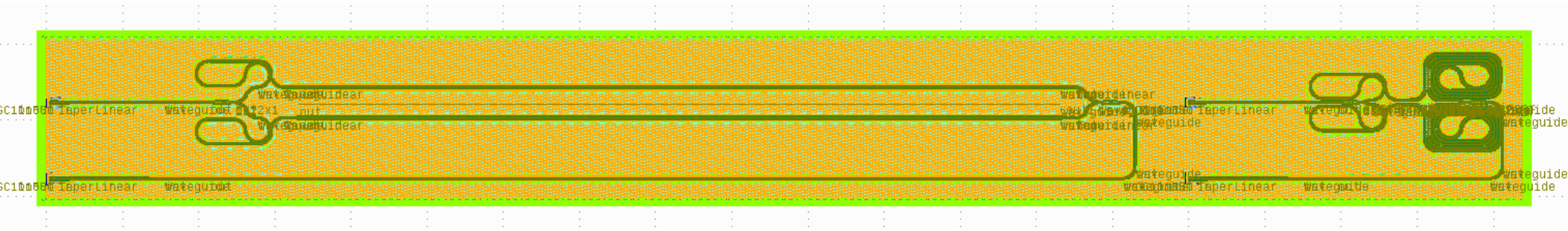


10 anni - 1000 MEuro

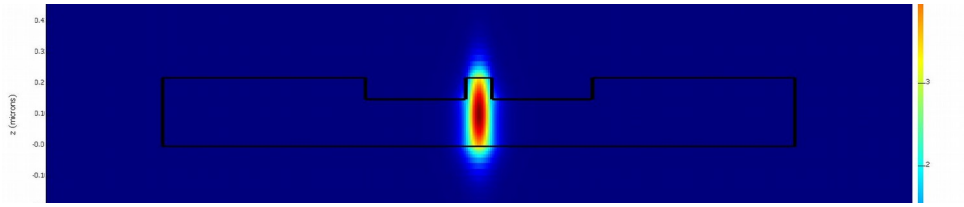
Nota del MIUR sul Piano Triennale 2019-2021

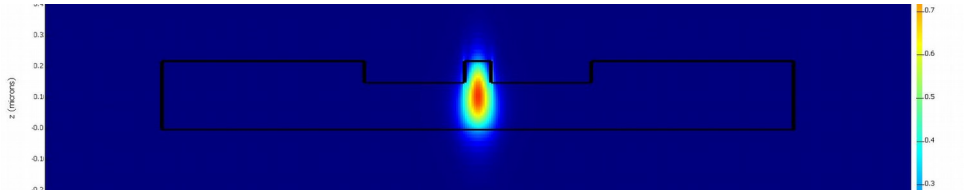
Con riferimento al ricco e prezioso bagaglio di know-how nell'ambito delle architetture di calcolo, e delle tecnologie associate, si incita l'INFN ad avere un ruolo significativo nelle attività di ricerca e sviluppo del settore, non tralasciando la nuova sfida connessa con le Tecnologie Quantistiche che la UE ha lanciato con una nuova Flagship ad esse dedicata.

Interferometro di Mach-Zehnder

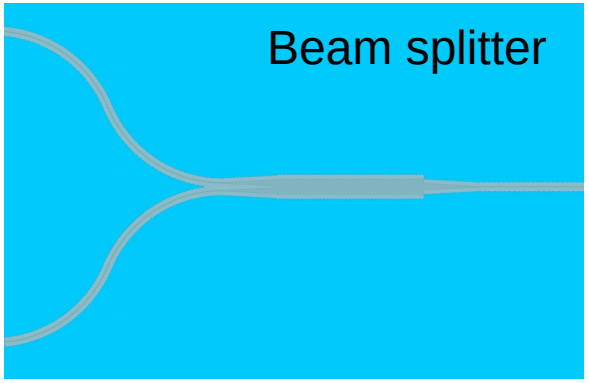


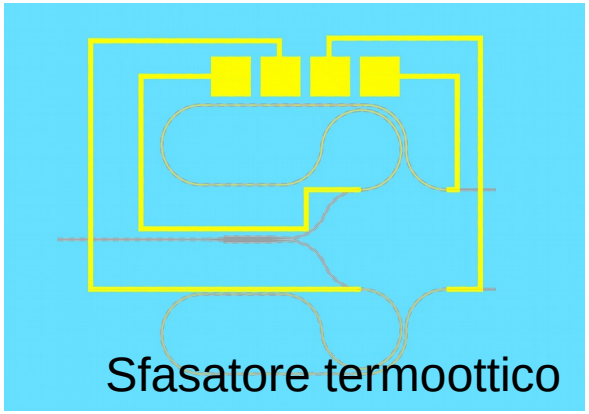
Luca Colavecchi (tesi Ing. Tor Vergata)



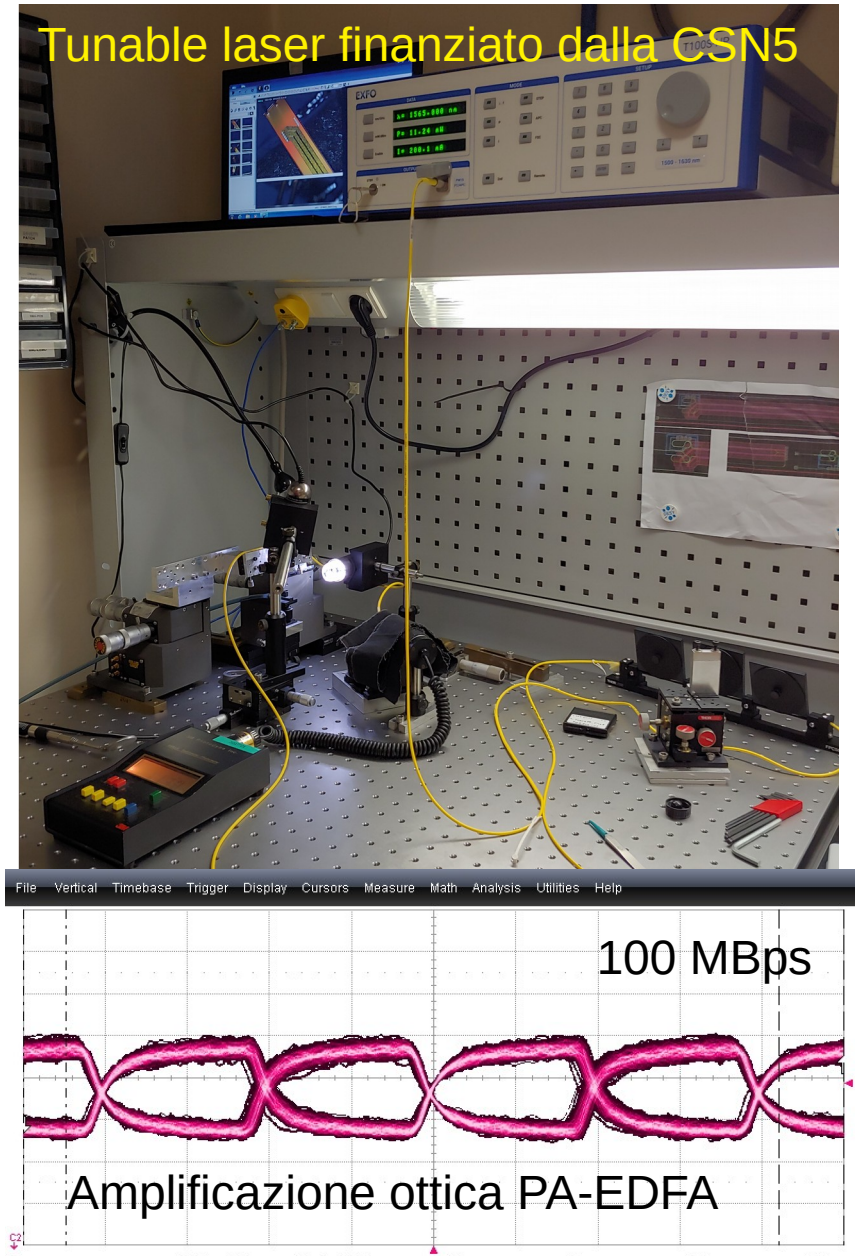


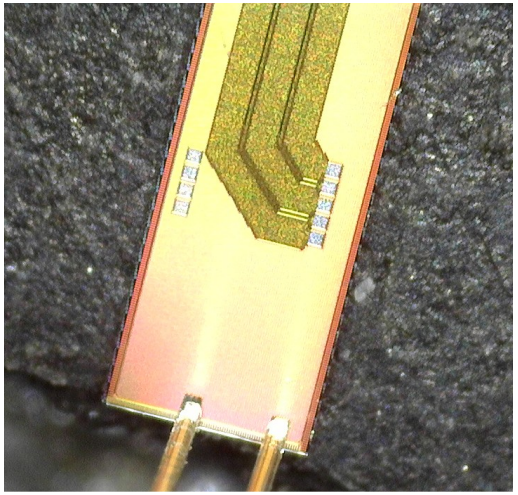
Simulazione Lumerical FDTD post produzione sul GDSII del modo che si propaga dentro la rib waveguide



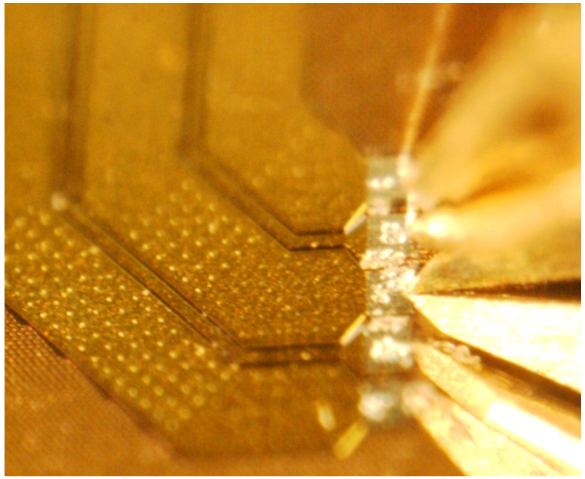


Laboratorio di fotonica a Tor Vergata

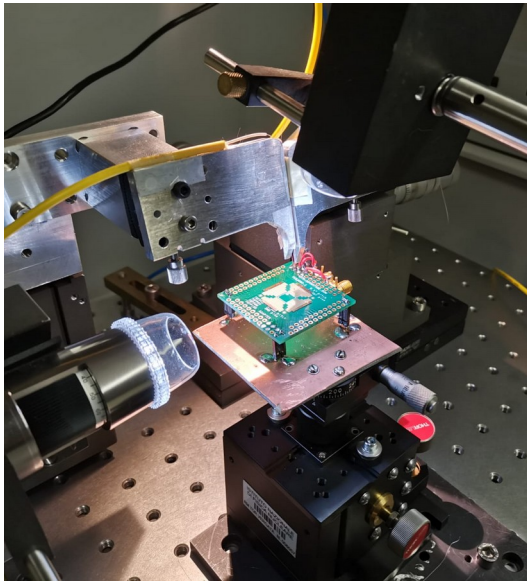




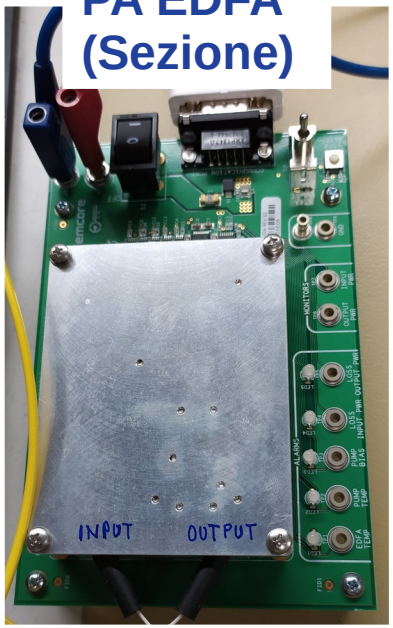
Fibre e Bragg coupler passo 500 um



Microprobe pitch 100 um

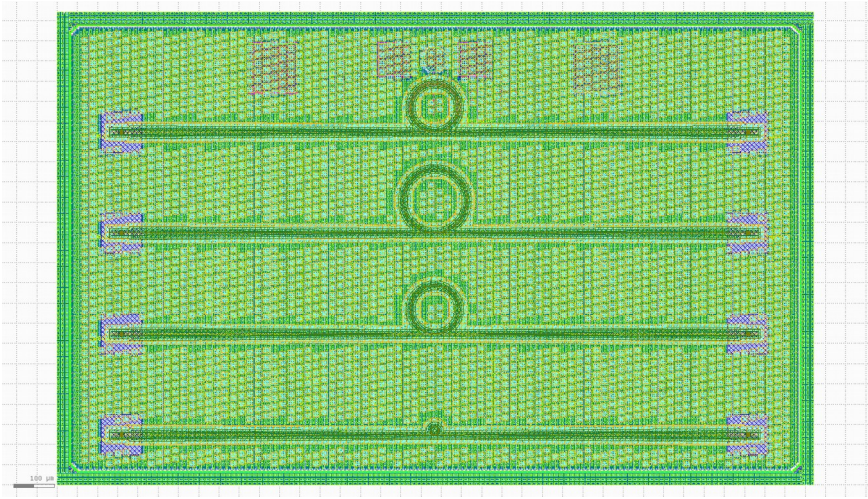


PA EDFA (Sezione)

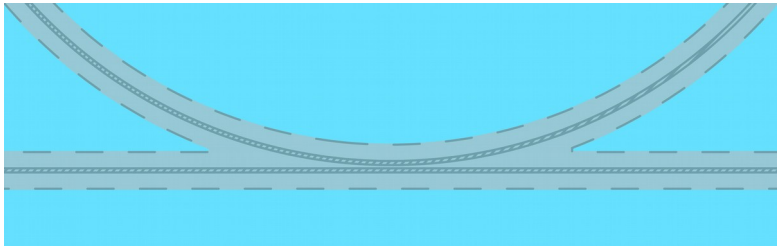


Ring Resonator

(disegno ritardato dai problemi con Cadence, produzione dal COVID...
→ arrivo previsto agosto 2020)



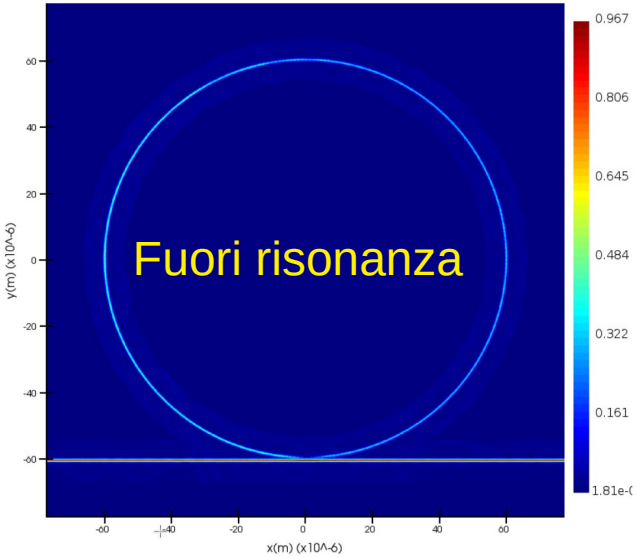
Luca Bianchi (tesi UNIMI)

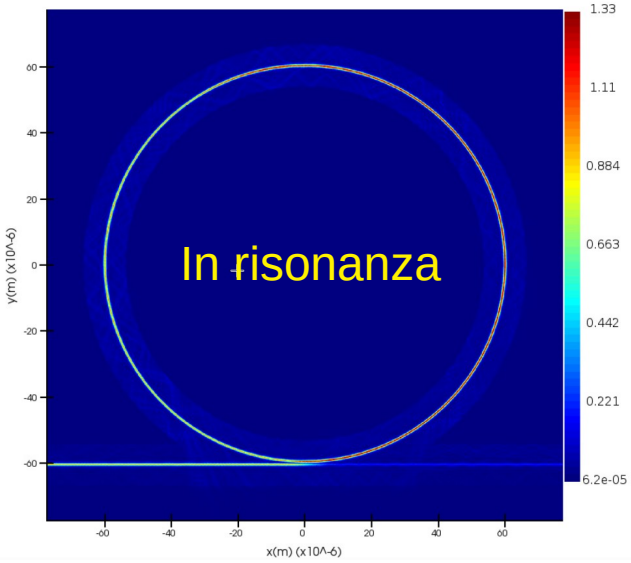


Diametri ring resonator:
20 um, 120 um, 160 um
120 um (attivo)

Simulazioni Lumerical FDTD post produzione sui GDSII

Martina Brandi (tesi UNIMI)





Anagrafica

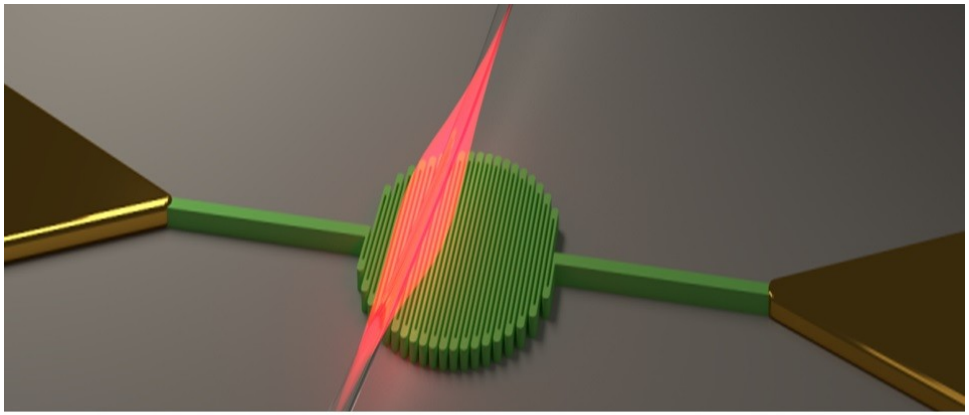
V. Bonaiuto (30%), M. Casalboni (10%), F. De Matteis (60%), P. Prosposito (60%), A. Salamon (70%), G. Salina (0%), M. Salvato (60%), F. Sargeni (20%)

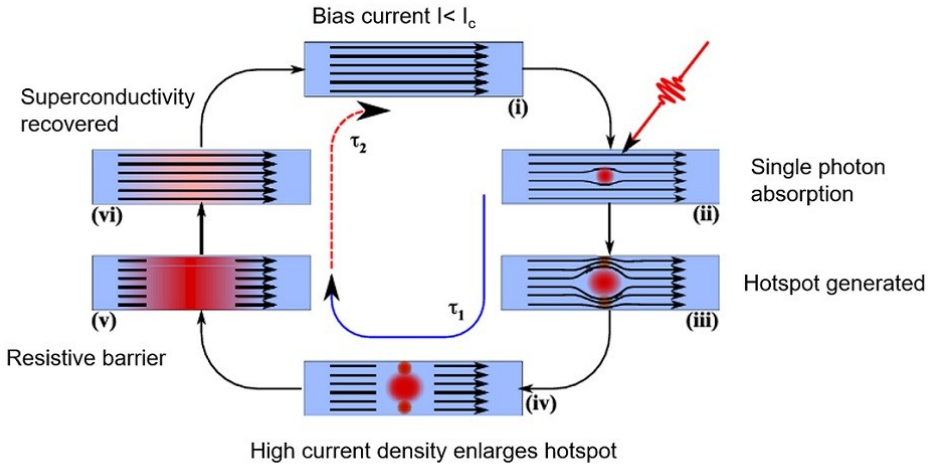
Richieste

- Missioni (collaborazione + deposizioni Goteborg): 1 kEuro + 3 kEuro SJ
- Consumo (fibre ottiche di vario tipo, splitter, connettori): 2 kEuro
- Inventario (tunable bandpass optical filter): 5 kEuro

SNSPD

Superconducting Nanowire Single Photon Detector





- The superconducting nanowire single photon detector (SNSPD) is constituted by a thin film of superconducting material shaped into a meandering nanowire.
- The detectors are operated at 2.5 Kelvin and a constant current below the critical current of the superconductor is applied to the device.
- Once a single photon is absorbed in the meandering nanowire, superconductivity is locally broken. As a result, the current is directed towards the amplification electronics and creates a voltage pulse.

Anticipati al 2019: 64 kEuro (CSN5) + 11 kEuro (Sezione)
capitolato tecnico finito, a breve richiesta in giunta - upgrade in QUANTEP