

CSN5 for the European Strategy

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CSN5: Research Lines

➤ **Detector, Electronics and Computation.**

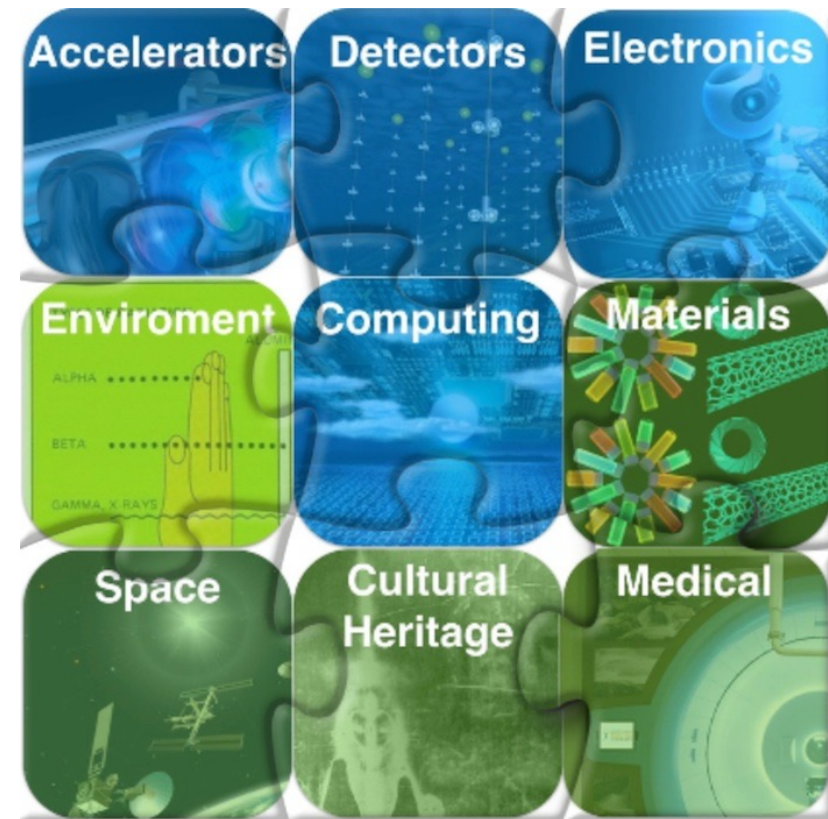
- 4D-5D detection.
- Imaging.
- Quantum sensing with superconducting and integrated optical devices (axions, squeezing...).
- Quantum computation architectures.
- Analog-digital ML circuits.
- AI and MC for experimental physics.
- Micro-nano architectures.

➤ **Accelerators.**

- Magnetic superconductors.
- RF cavity technologies.
- Accelerator technologies for life science.
- Plasma acceleration methods.

➤ **Life Science.**

- Advanced radio/hadro therapy methods.
- AI driven diagnostic methods.
- Radiation dosimetry.
- Diseases diagnostic tests, monitoring and mapping.
- Clutural heritage.

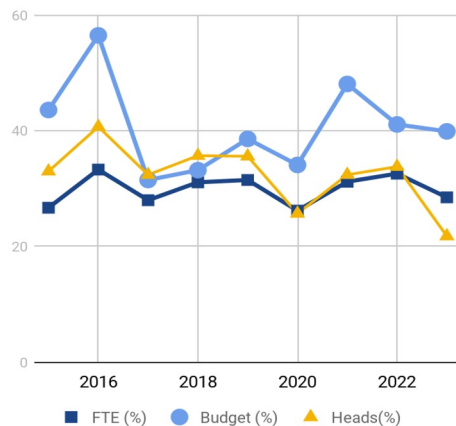


CSN5 Projects and Budget

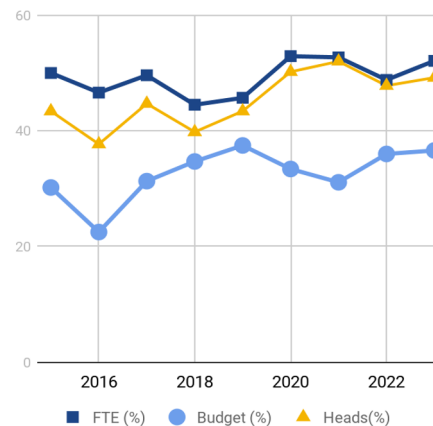
	2019	2020	2021	2022	2023
St. Projects	60	62	83	84	64
CALL	6	6	9	12	10
GfYR	12	13	19	17	12
TOTAL	78	81	111	113	86

2023	# projects
Detectors	37
Interdisciplinary	33
Accelerators	16

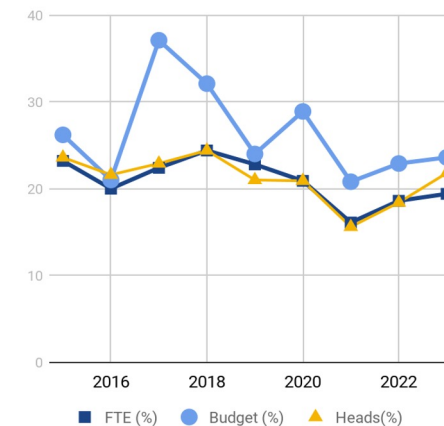
Detector



Interdisciplinary



Accelerator

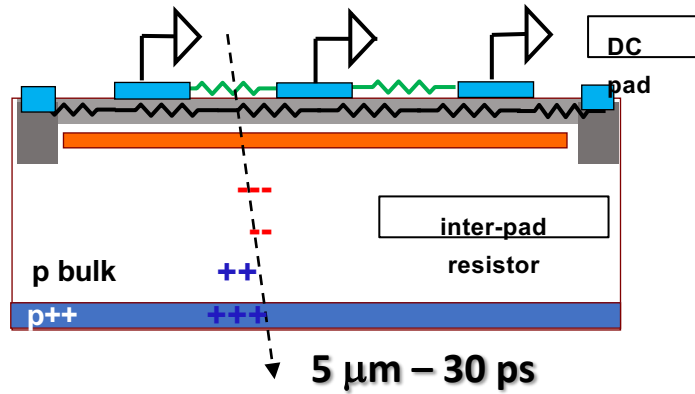


CSN5: Organization

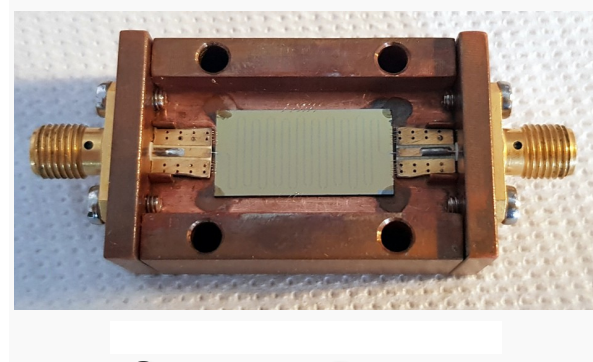
- **Standard projects:** 2-4 y activities funded with medium-low budget ($\sim 50/y$).
- **Grants for Young Researchers (GfYR):** 2y experiments proposed by young researchers (PhD $\leq 6y$). Both the activity and the grant for the PI are funded.
- **Calls for proposals (Calls):** high budget ($\sim 1M\text{€}$ max on 3-4y) and large networks projects (highly competitive).

- Every year 20-30 new proposal are submitted , spanning all the activities of interest for INFN.
- A careful selection of the proposals is demanding as a safeguard of the scientific level of CSN5.
- Submission is always bottom-up.
- No prearranged funds are allocated for any specific topics.
- Sometimes thematic Call for proposal on emerging topics are required and selected.

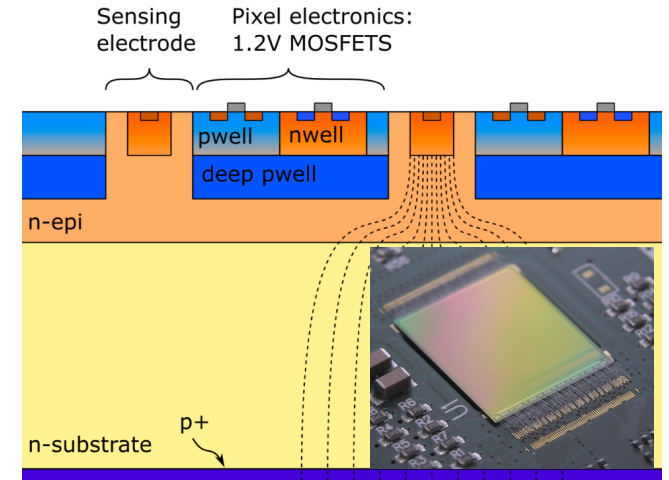
Activities for the Strategy: Detectors



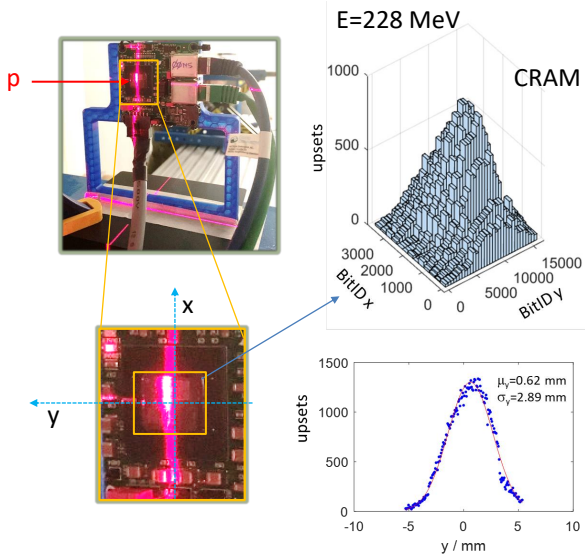
4D-5D Detectors for High Fluences



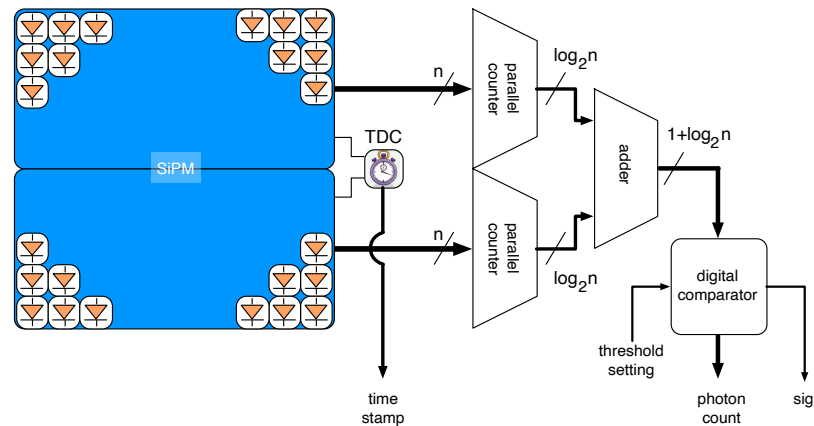
Quantum Detectors



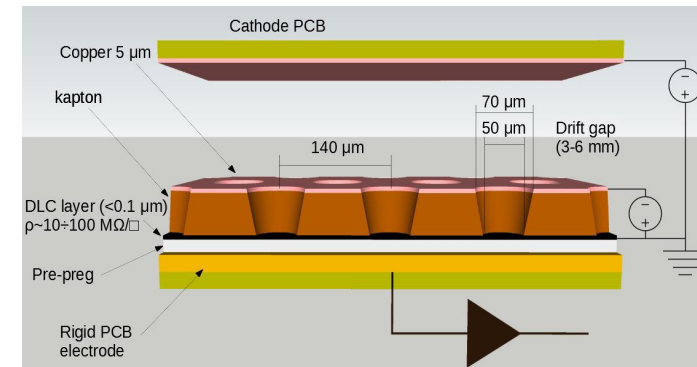
New CMOS Architectures



Imaging of Particle Beams

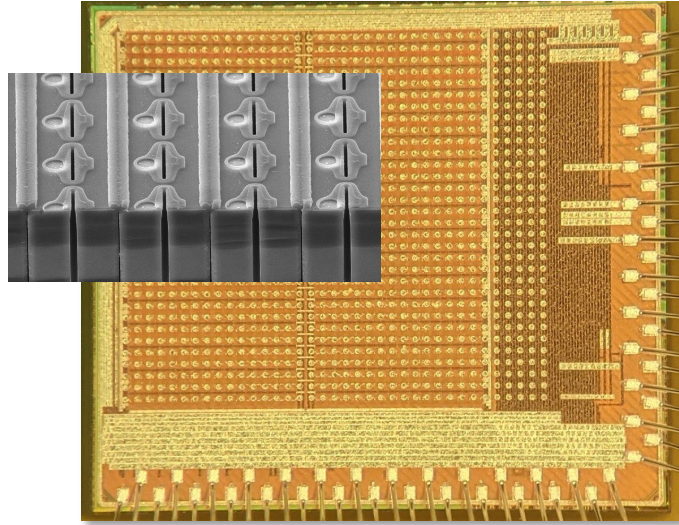


Digitalization Methods

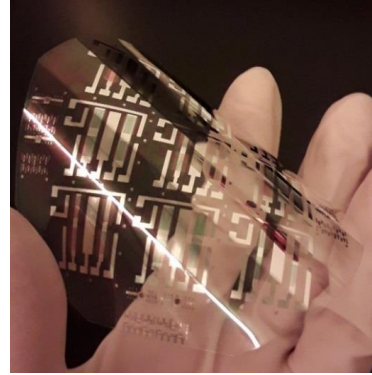


Improvement of MCP and MGPD

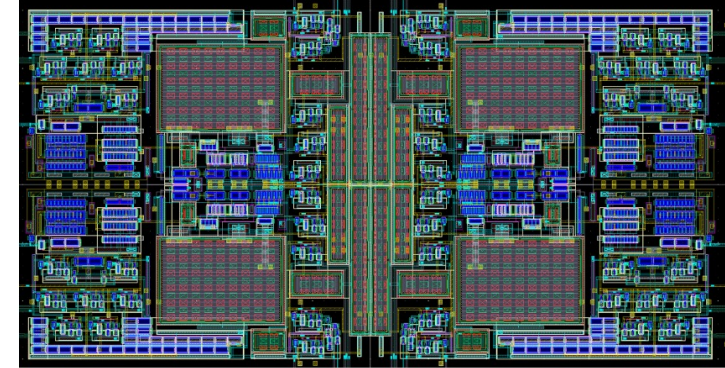
Activities for the Strategy: Detectors



Tracking Systems



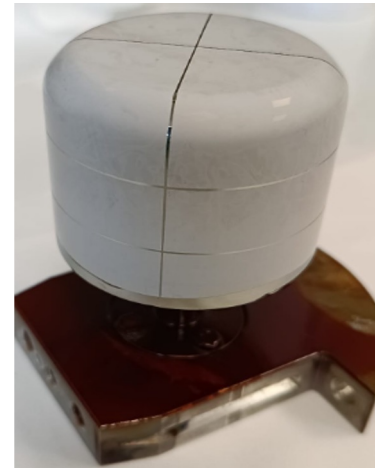
Flexible Detectors



Optoelectronic Hybrid Integrations

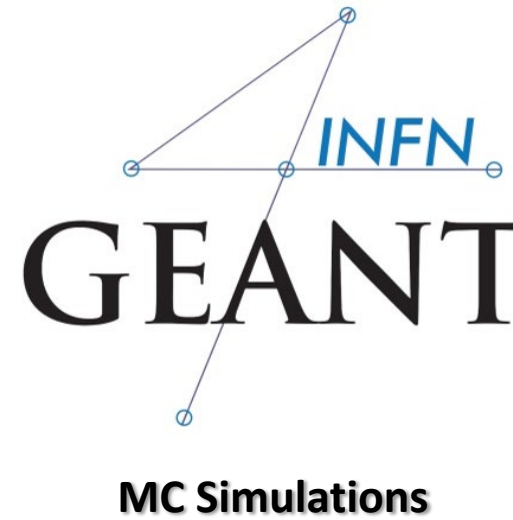
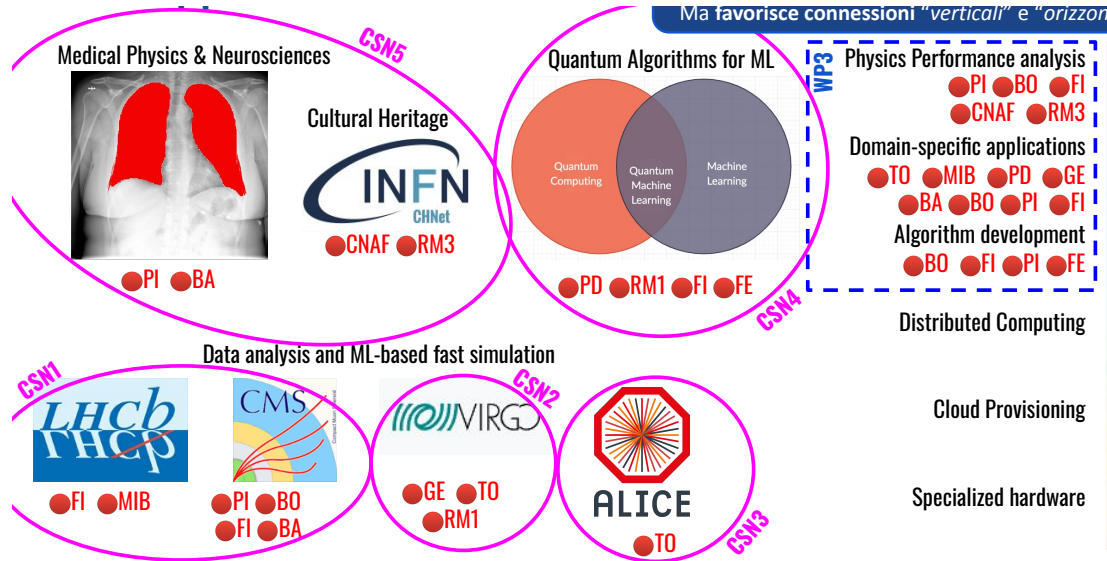


Highly Granular Calorimeters

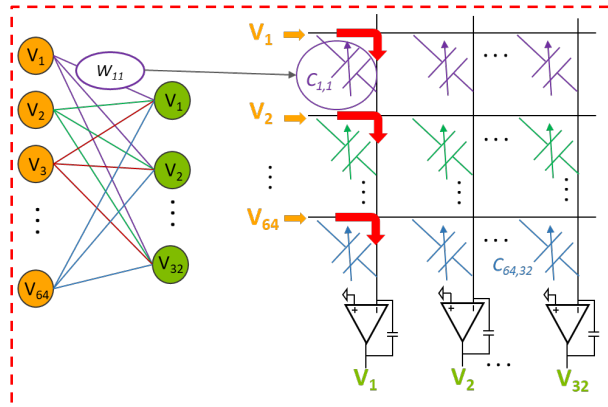


Architectures for Germanium Detectors

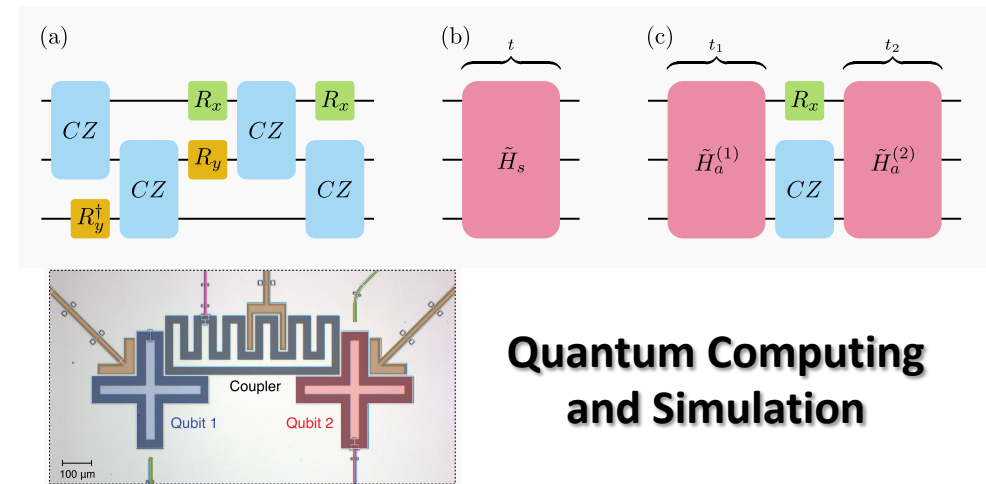
Activities for the Strategy: Computation



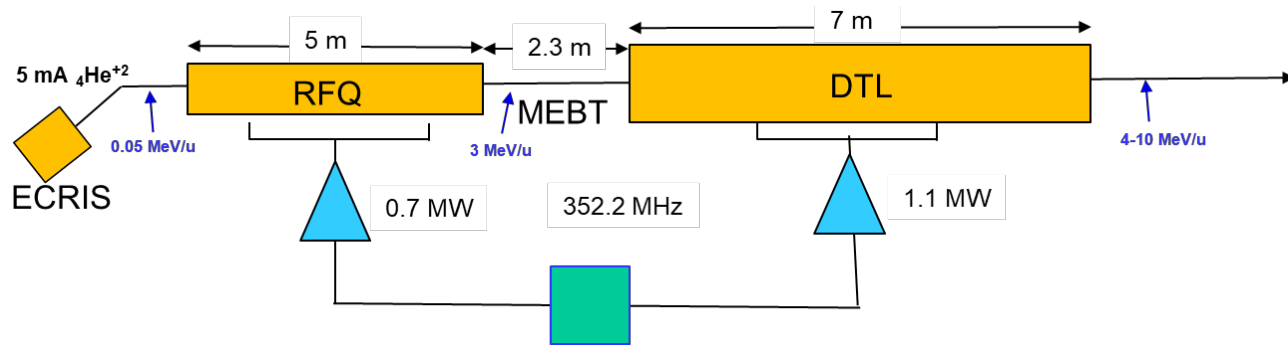
AI for...



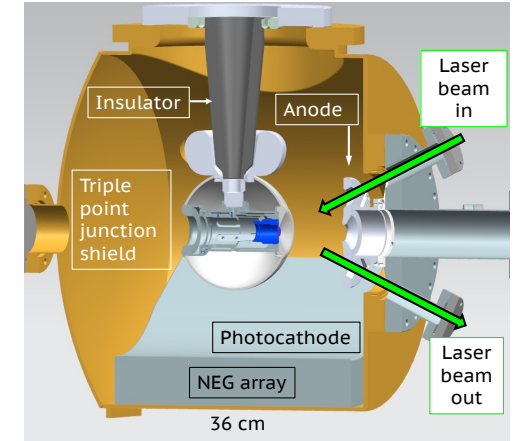
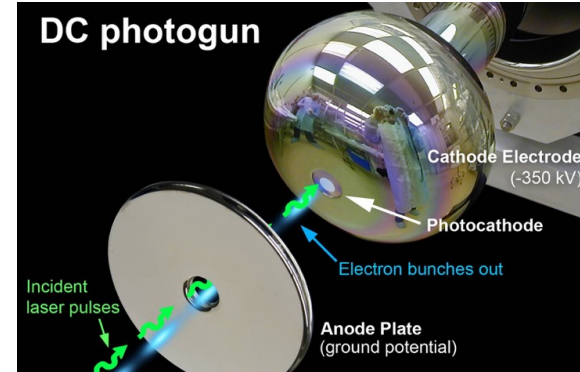
ML Circuits



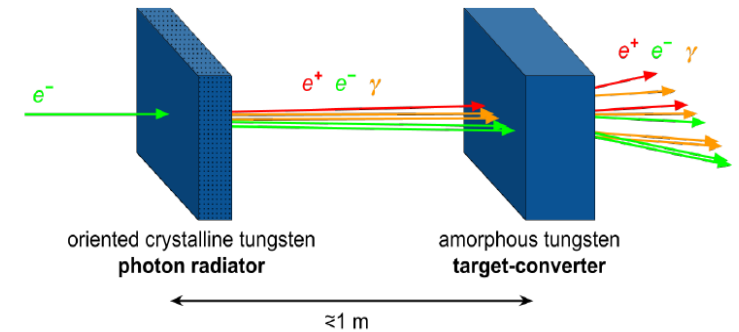
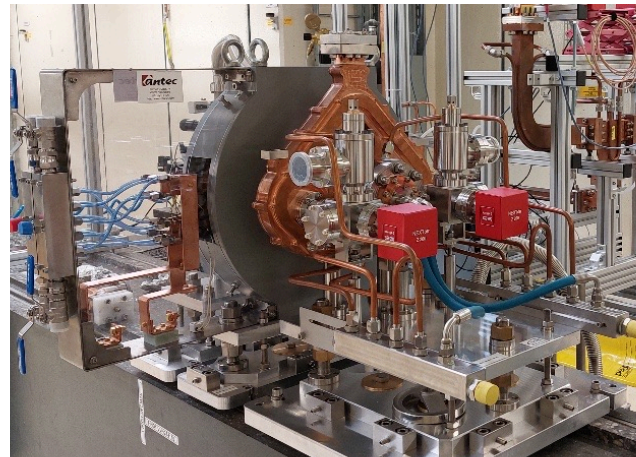
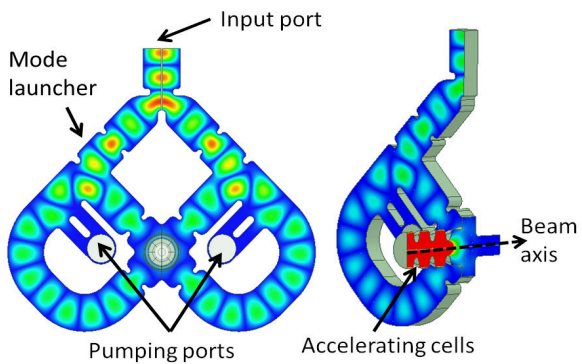
Activities for the Strategy: Accelerators



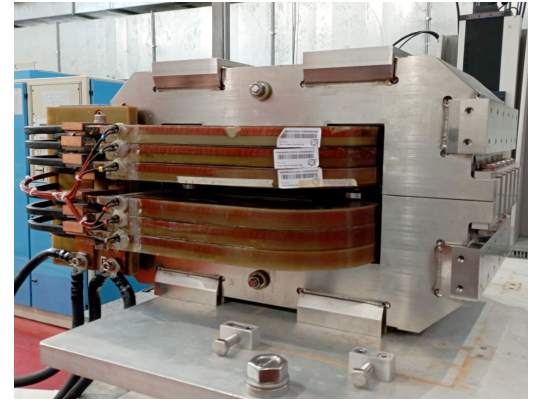
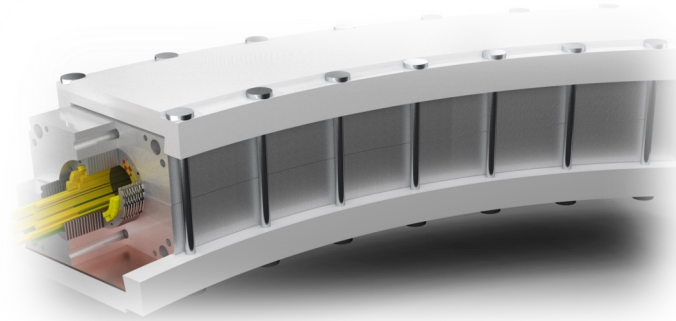
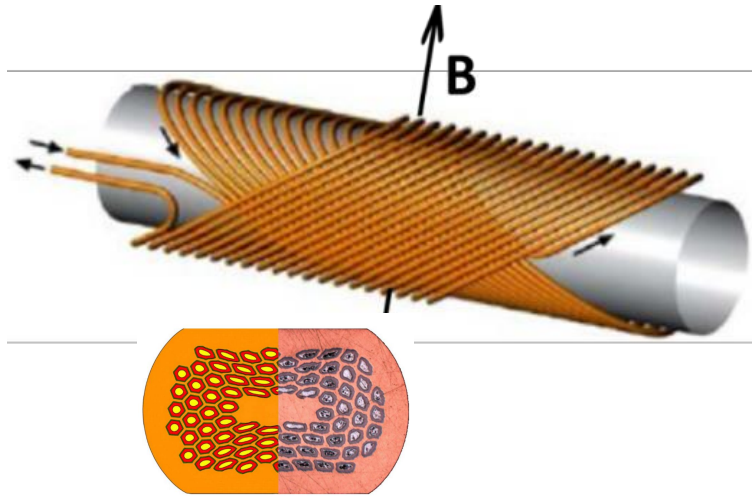
High Current Linear Accelerators



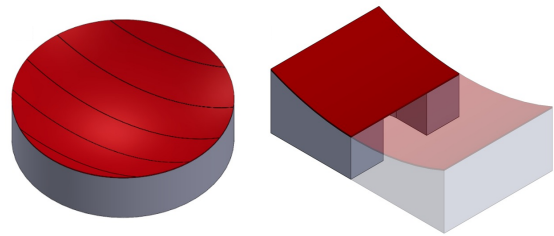
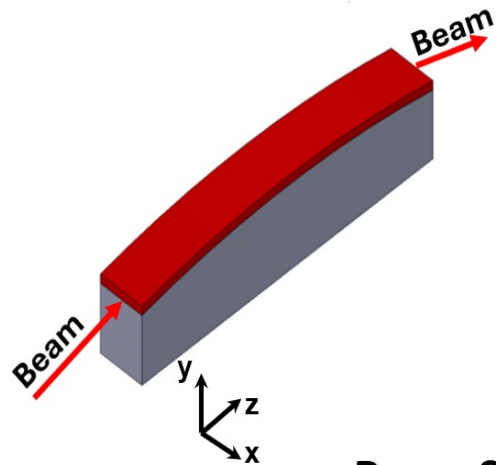
Electron, Positron and Ion Sources



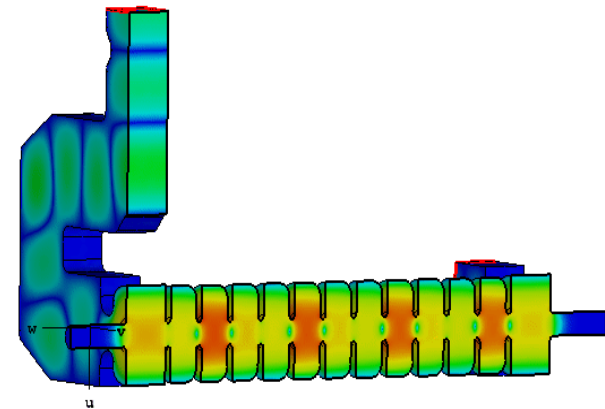
Activities for the Strategy: Accelerators



Superconducting Cables for Extra-Strong Magnets

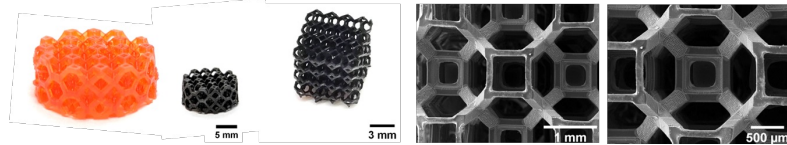


Beam Steering Methods

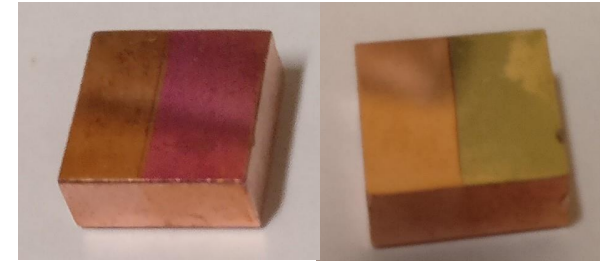


High Intensity Pulsed Systems

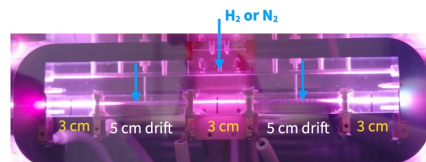
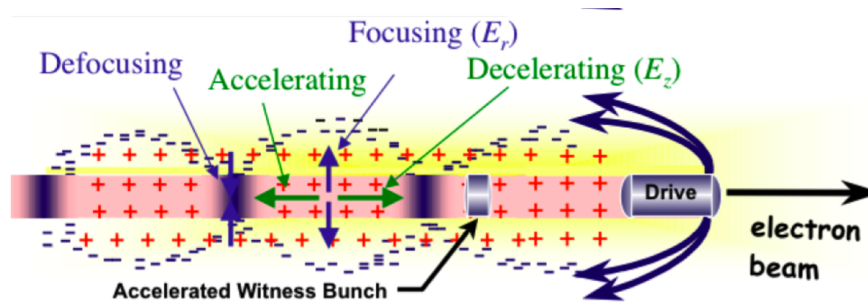
Activities for the Strategy: Accelerators



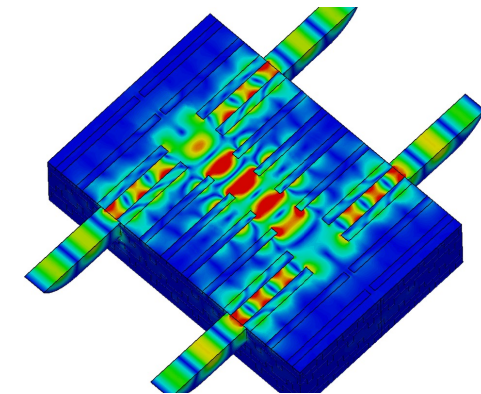
Targets for High Fluences



Superconducting Coatings for RF Cavities



Plasma Acceleration

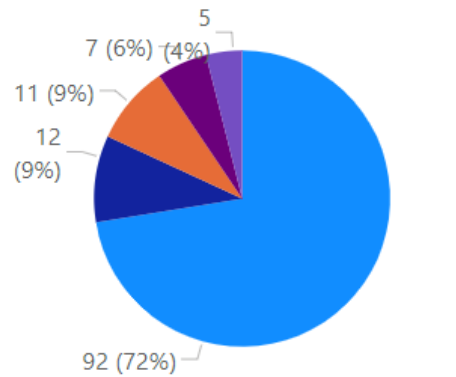


Miniaturizations

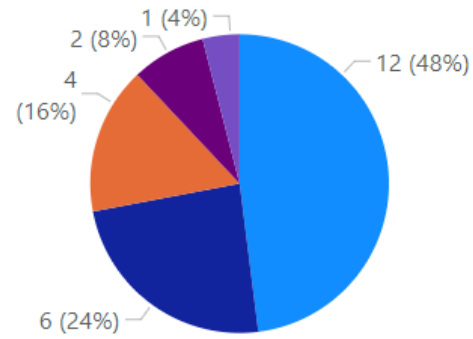
Technological Transfer – Patents & R4I



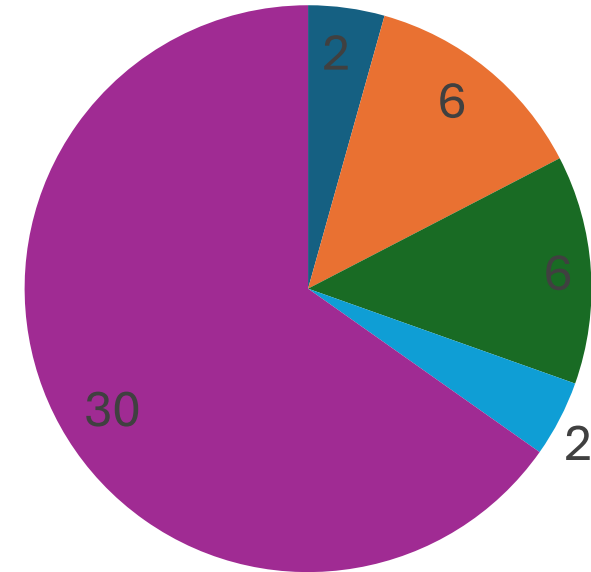
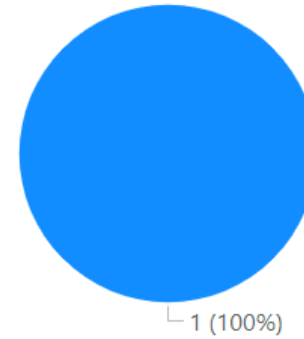
FAMIGLIE DI BREVETTI



KNOW-HOW



SOFTWARE



- CSN1
- CSN2
- CSN3
- CSN4
- CSN5

● CSN5 ● CSN1 ● CSN2 ● CSN3 ● CSN4

● CSN5 ● CSN1 ● CSN2 ● CSN3 ● CSN4

● CSN5

Challenges and Opportunities

- Low energy consumption architectures.
- Integration methods of detector arrays for large scale experiments.
- Implementation AI and Quantum Computation for signal and data management.
- R&D development projects can create research prospects in the medium term.
- Implementation of strategic top-down processes can be foreseen, but through review and selection.



The whole is more than
the sum of its parts