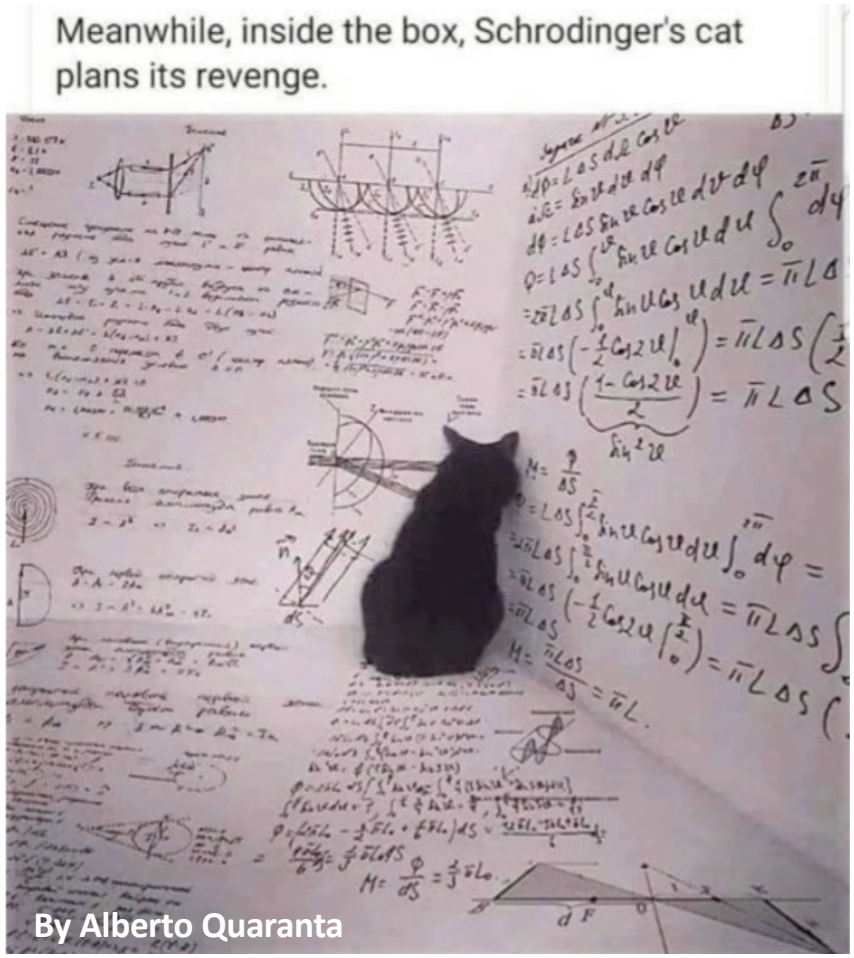


Commissione Scientifica Nazionale 5

Acceleratori di particelle, Rivelatori, Elettronica e software; applicazioni interdisciplinari della tecnologia INFN: mediche, energetiche, ambiente, beni culturali

Gianluca Quarta

INFN-Le, 2 Luglio 2025

CSN5-Ricerche tecnologiche, interdisciplinari e di fisica degli acceleratori

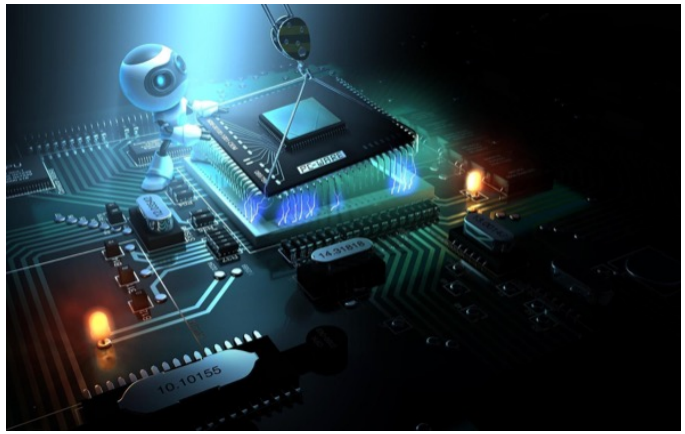
La CSN5 coordina le ricerche tecnologiche e lo sviluppo di applicazioni e promuove l'utilizzo, In altri settori, di strumenti, metodi e tecnologie della fisica fondamentale.

Presidente. Alberto QUARANTA (UniTn-TIPFA)

LINEE SCIENTIFICHE (e sottocommissioni)

- **Acceleratori di particelle (G.Quarta)**
- **Rivelatori di particelle**
- **Elettronica e software**
- **Applicazioni interdisciplinari della tecnologia INFN**

CSN5
Ricerca
Tecnologica



Categorie di Esperimenti

- **Sigle Standard**: progetti di 2-3 anni a budget medio-basso (∼ 50k€/y).
  - Incubatori di attività e idee promettenti e interessanti per l'Ente.
  - Supporto ad attività di più ampio respiro di altre commissioni.
  - Possono avere livelli di rischio elevati.

Deadline 05/07

- **Grant Giovani**: Esperimenti (max 75k€/y) di 2 anni per giovani (PhD ≤ 6y). Viene finanziata l'attività sperimentale e il contratto del PI.
  - Supporto per giovani ricercatori che presentino idee originali.
  - Supporto all'autonomia scientifica e alle capacità direzionali.

(….)

- **Call**: Progetti ad alto budget e ampio network (∼1M€ max su 3y da bando).
  - Supporto alla formazione di network ampi per progetti di frontiera su argomenti strategici.
  - Finanziamento di posizioni.

Deadine 31/05

(….)

Grant Giovani

- Verrà pubblicato prima della fine del mese il bando Grant Giovani dove i **6 vincitori** avranno **Contratti di Ricerca biennali.**

- Potranno applicare i giovani con massimo 5 anni dal dottorato o che dichiarano di conseguire il titolo di dottore di ricerca **entro 6 mesi dalla scadenza del bando**.

- Le modalità di selezione saranno le stesse di sempre: un panel esegue una preselezione dei progetti e una commissione interna valuta i candidati selezionati dopo il seminario.

- Un giovane che ha avuto un contratto di ricerca potrà in seguito avere anche borse post-doc, quando saranno istituite. **Ad oggi l'unica forma disponibile di contratto è il Contratto di Ricerca**.

- Non possono applicare al bando Grant Giovani chi ha avuto un contratto TD, un articolo 36 o un RTT.

- Può altresì applicare (in deroga) chi ha avuto un RTDA-PNRR.

Call

Le proposte di Call pervenute sono 4 :

STARS, linea rivelatori, PI Roberta Arcidiacono (TO)
MULTI-GRAPH, linea interdisciplinare/rivelatori, PI Daniela Calvo (TO)
INCANTO, linea rivelatori, PI Ivano Sarra (LNF)
DIOMEDES, linea rivelatori, PI Stefano Capra (MI).

Panel Esterno per le Call:

Patrizia Azzi
Maria Giuseppina Bisogni
Antonio Falone
Agostino Lanza
David Mascali
Enrico Robutti

Flowchart call esperimento standard

Scadenze per i proposal:

- Call: 31 Maggio
- Exp. Standard: 14 Luglio (entrambi previa approvazione in Consiglio di Sezione/Laboratorio)

→

Riunione Luglio:

- Call: Report del Panel esterno di valutazione
- Exp Standard: Prima analisi nella sottocommissione di afferenza
- Discussione e prima selezione per entrambi-Assegnazione Referee

→

Prima della riunione di Settembre:

Incontro proponenti-referee ed eventuale rimodulazione

↓

Riunione Settembre :

- Presentazione in Plenaria
- Approvazione definitiva
- Assegnazione fondi

→

Riunione Aprile (anno successivo):

- Inserimento Consuntivi (tutti)
- Presentazione Call –Exp Standard che hanno chiuso l'anno precedente

Courtesy C.Vaccarezza (CSN5)

Highlights-Riunioni commissione

Febbraio-Aprile 2025

Workshop 2025

- Workshop on Electronics for Physics Experiments – Torino 5-7 Marzo.
- IFD 2025 – INFN Workshop on Future Detectors – Sestri Levante 17-19 Marzo.
- III Giornata Acceleratori – LNL 3-4 Aprile.
- WORKSHOP AIFM-INFN: Oltre la Diagnosi e la Terapia: La Ricerca che Rivoluziona la Clinica – Catania 7-9 Aprile.
- Workshop on Future Research at the SPES Cyclotron – 12-13 Maggio.

Organizzazione

- 3 riunioni plenarie del Comitato Organizzatore e diverse riunioni dei sottorguppi relative alle sessioni
- 4 sessioni previste
  - Terapia
  - Terapia e teranostica
  - AI: sfide e opportunità
  - Imaging
- Relazioni su invito e programma ultimato
- Locandina con prgramma in uscita a giorni, in modo da poterlo diffondere al più presto

REVISIONE MODALITA' CONSUNTIVI

Proposta per linee guida consuntivi CSN5

Gdl Bortolussi – Romano – Scifoni

Riunione CSN5 – Firenze – 5-6 Febbraio 2025

REVISIONE MODALITA' CONSUNTIVI

- Carenza nella rendicontazione scientifica scritta in fase di consuntivo
- Bassa efficacia delle presentazioni nella riunione di aprile/maggio.
- Migliorare le presentazioni orali.
- Migliorare il consuntivo scritto per aiutare la valutazione (CVI) e per dare feedback sull'esito di sigle passate ai referee che devono valutare nuove proposte da stessi proponenti.

CSN5

Prossimi appuntamenti

15-19 Luglio (LNF)

- Discussione nuove proposte di esperimento

15-19 Settembre (Ortigia)

- Approvazione nuove proposte di esperimento

10-11 Novembre (Roma-Presidenza)

CSN5-Sezione di Lecce

2025-2026

- Esperimenti in Corso
- Assegnazioni
- Attività
- Nuove proposte

ESPERIMENTI in Corso (2025)

7 esperimenti

SIGLA	NOME	RN	RL	Research Line	FTE (persone)-Le
AIM_Mia	Artificial Intelligence in Medicine: focus on Multi-Input Analysis	A. Retico (Mi)	G. De Nunzio	**Interdisciplinary**	**2.0 (3)**
HASPIDE	HAmorphous Silicon Pixel Detector for ionizing radiation	M. Menichelli-L. Servoli (Pg)	A. Monteduro (Le)	**Detector and electronics**	**Chiude**
QUARTET	The QUantum Architectures for Theory & Technology	A. Giachero	G. Maruccio (Le)	**Interdisciplinary**	**1.6 (6)**
PROVIDE	PeROVskIte DEtectors for innovative strategies in radiation therapy and diagnostics	M. Bruzzi (Fi)	A. Rizzo (Le)	**Detector and electronics**	**1.7 (6)**
FUSION	Gold- based Nanostructures to support radiotherapy treatments for Radioresistant Tumors	P. Cirrone (LNS)	R. Rinaldi	**Accelerator and related technologies**	**Chiude**
SHINE	Plastic **S**cintillators P**h**antom v**i**a additive ma**n**ufacturing t**e**chniques	A.P. Caricato(Le)	C. Corcione (Le)	**Detector and electronics**	**Prolungamento**
EPISE	Epidermal Piezoelectric Sensors for cardiovascular function assessment	A. Proto (Fe)	S. Rizzato (Le)	**Interdisciplinary**	**1.20(6)**
				Totale FTE (Le)	**12.35**

Assegnazioni 2025

TOTALE: 106.0 k€

RENDICONTO MENSILE (Riepilogo competenza per programmatico)

I.N.F.N. - ISTITUTO NAZIONALE DI FISICA NUCLEARE

Istituto Nazionale di Fisica Nucleare

Data Stampa 26-GIU-2025

Struttura: Sezione di Lecce

Esercizio: 2025

Dal 01-GEN-2025 al 30-GIU-2025

Programmatico				GESTIONE DI COMPETENZA			
Cat.	Gruppo	Esperimento	Descrizione Esperimento	Previsioni aggiornate	Spese Impegnate	Differenze	Pagato
4	500	AIM_MIA	CSN 5: esperimento AIM_MIA	2.500,00	412,67	2.087,33	412,67
4	500	DOTAZIONI GR 5	CSN 5 - DOTAZIONI	10.000,00	2.975,40	7.024,60	1.347,18
4	500	EPISE	CSN5 : esperimento EPISE	12.500,00	88,84	12.411,16	23,08
4	500	FUSION	CSN 5: Esperimento FUSION	4.000,00	0,01	3.999,99	0,01
4	500	HASPIDE	CSN 5: esperimento HASPIDE	11.500,00	497,23	11.002,77	497,23
4	500	PROVIDE	CSN 5: esperimento PROVIDE	32.000,00	25.829,71	6.170,29	0,00
4	500	QUARTET	CSN 5: esperimento QUARTET	8.000,00	0,00	8.000,00	0,00
4	500	SHINE	CSN 5: Esperimento SHINE	25.500,00	16.908,40	8.591,60	0,00
Totale Gruppo : 500				**106.000,00**	**46.712,26**	**59.287,74**	**2.280,17**

Persone CSN5-Le

FTE 2025: 12.35

Aziz Saba
Buccolieri Giovanni
Calcagnile Lucio
Calora Mario
Caricato Anna Paola
Chekkallur Amal Chandran
Corrado Massimo
De Matteis Valeria
Ferdinando De Tommasi
Di Giulio Massimo (OVER 65)
Esposito Corcione Carola
Fragola Mattia
Leo Angelo
Lovergine Nicola

Maffezzoli Alfonso
Manno Daniela Erminia
Martino Maurizio
Maruccio Giuseppe
Maruccio Lucio
Monteduro Anna Grazia
Morello Giovanni
Prete Paola
Quarta Gianluca
Rinaldi Rosaria
Rizzato SIlvia
Rizzo Aurora
Romano Salvatore
Serra Antonio
Tarantino Simona

UNIVERSITÀ DEL SALENTO

Dipartimento di Matematica e Fisica "Ennio De Giorgi"

DIPARTIMENTO DI **INGEGNERIA DELL'INNOVAZIONE**

CNR NANOTEC INSTITUTE OF NANOTECHNOLOGY

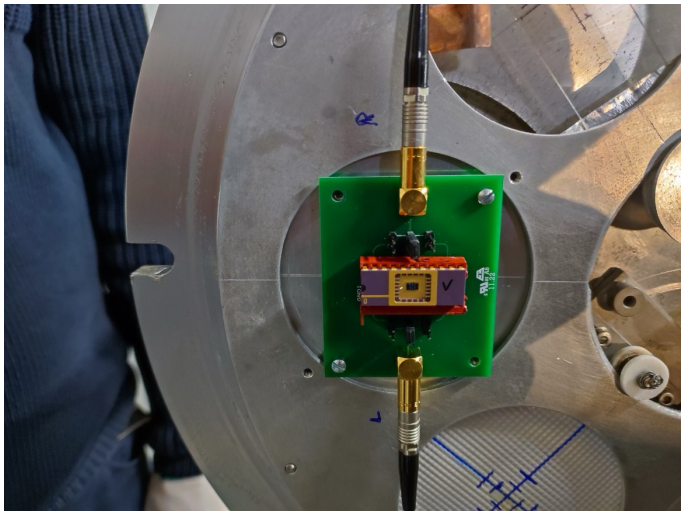
IMM Istituto per la Microelettronica e Microsistemi
Consiglio Nazionale delle Ricerche

ESPERIMENTI 2026

A livello nazionale 26 nuove sigle proposte:
1 calcolo, 13 rivelatori, 5 interdisciplinare, 7 acceleratori

6 esperimenti

SIGLA	NOME	RN	RL	Research Line	FTE (persone)-Le
AIM_Mia	Artificial Intelligence in Medicine: focus on Multi-Input Analysis	A. Retico (Mi)	G. De Nunzio	**Interdisciplinary**	**2.0 (3)**
QUARTET	The QUantum Architectures for Theory & Technology	A. Giachero	G. Maruccio (Le)	**Interdisciplinary**	**1.6 (6)**
PROVIDE	PeROVskIte DEtectors for innovative strategies in radiation therapy and diagnostics	M. Bruzzi (Fi)	A. Rizzo (CNR-Le)	**Detector and electronics**	**1.7 (6)**
SHINE	Plastic **S**cintillators P**h**antom v**i**a additive ma**n**ufacturing t**e**chniques	A.P. Caricato(Le)	C. Corcione (Le)	**Detector and electronics**	**Prolungamento**
EPISE	Epidermal Piezoelectric Sensors for cardiovascular function assessment	A. Proto (Fe)	S. Rizzato (Le)	**Interdisciplinary**	**1.20(6)**
PHOTOHASPIDE	PHOTO-HAmorphous Silicon Pixel Detector for ionizing radiation	M. Menichelli (Pg)	A. Giuri (CNR-Le)	**Detector and electronics**	**Nuova sigla**
				Totale FTE (Le)	**10.85**



Call 2022

Hydrogenated **A**morphous **S**ilicon **PI**xel **DE**tectors
for ionizing radiation

HASPIDE

Responsabile per INFN-Le: Annagrazia MONTEDURO

WP6 leader: Gianluca QUARTA

UNIVERSITÀ DEL SALENTO

INFN

Dipartimento di Matematica e Fisica
"Ennio De Giorgi"

NUOVA PROPOSTA

PHOTO

Hydrogenated Amorphous Silicon PIxel DEtectors for ionizing radiation

The objective of the Photo-HASPIDE experiment is the construction and test of an indirect a-Si:H (Hydrogenated Amorphous Silicon) photodetector + scintillator assembly on a flexible substrate for the detection and measurement of particles (x-rays, electrons, protons and nuclei) fluxes and for dosimetric measurements).

- Sigla: Photo-HASPIDE
- Durata proposta: 3 Anni
- Area di Ricerca: Rivelatori
- Responsabili Nazionali: Mauro Menichelli (0.4 FTE), Arianna Morozzi (0.3 FTE)
- Unità partecipanti: Perugia (3.1 FTE), Firenze (1.0 FTE), Lecce (1.1 FTE), LNL (1.1 FTE), Padova (0.1 FTE Personal partecipation), Roma 1 (1 FTE), TIFPA (1 FTE), with the external participation of CNR Istituto Officina dei Materiali – Perugia and University of Wollongong (UoW) (Australia)

NUOVA PROPOSTA

PHOTO

Hydrogenated Amorphous Silicon PIxel DEtectors for ionizing radiation

The objective of the Photo-HASPIDE experiment is the construction and test of an indirect a-Si:H (Hydrogenated Amorphous Silicon) photodetector + scintillator assembly on a flexible substrate for the detection and measurement of particles (x-rays, electrons, protons and nuclei) fluxes and for dosimetric measurements).

Ruolo della sezione di Lecce:

Development of the scintillator to be coupled with the photodetector

NUOVA PROPOSTA

PHOTO

Hydrogenated Amorphous Silicon PIxel DEtectors for ionizing radiation

The objective of the Photo-HASPIDE experiment is the construction and test of an indirect a-Si:H (Hydrogenated Amorphous Silicon) photodetector + scintillator assembly on a flexible substrate for the detection and measurement of particles (x-rays, electrons, protons and nuclei) fluxes and for dosimetric measurements).

Anagrafica

Antonella Giuri 0.3 (RL) RTDA
Anna Paola Caricato 0.2 PA
Carola Corcione 0.2 PA
Giuseppe Maruccio 0.1 PO
Anna Grazia Monteduro 0.1 RTDA
Gianluca Quarta 0.2 PO
Silvia Rizzato 0.1 RTDA
Aurora Rizzo 0.2 Primo ricercatore

Budget

5 keuro di consumo (precursori della perovskite)
2 keuro missioni
5 keuro beamtime CEDAD
10 keuro sistema Alimentazione + DAQ per SiPM per misure di energia e tempo
Il sistema Alimentazione + DAQ per SiPM per misure di energia e tempo serve per testare i campioni in loco.

AIM_MIA
Artificial Intelligence in Medicine: focus on Multi-Input Analysis

WP2. Handling incomplete/missing/limited datasets

Task2.1 Traditional approaches for data curation and augmentation

Lecce is involved in the development of ML applications on various datasets, with:

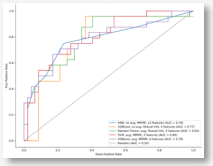
- **multi-input data** (various imaging modalities with the addition of clinical data)
- **heterogeneous sources** (data from **multicentric studies**; **MRI standardization**; **Federated Learning**)
- if possible, use **public** data
- classic data curation approaches (**data augmentation** for dataset **balancement or size increase**; **missing data**)
- development of code in the **XNAT data platform**
- various **classification targets**

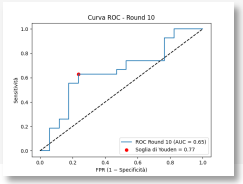
Datasets currently used:

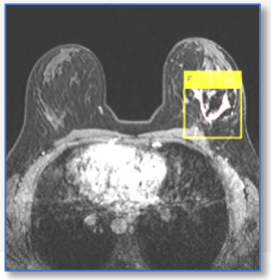
- **MAMA-MIA** multicentric MRI **breast-cancer dataset (PUBLIC)**; **target: TNBC** (Triple-Negative Breast Cancer, in which three receptors are absent: ER, PR, and HER2, resulting in a particularly aggressive cancer, difficult to treat)
- (secondly) **breast cancer dataset from Brindisi (PROPRIETARY DATASET)**; **target: invasive vs in situ cancer**
- (secondly) **multicentric dataset from a large international collaboration on glioblastoma (PROPRIETARY DATASET)**; **target: prediction of recurrence**, including (roughly) forecasting its location and extent.

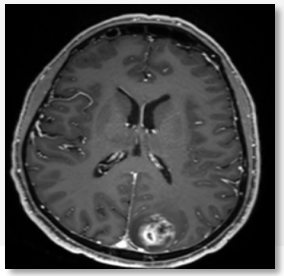
Results at present:

- **Pipeline partially built** (not yet in XNAT)
- **Good results** on the dataset from **Brindisi**
- **"Some" results** on **MAMA-MIA** in **Federated Learning**
- **Data collection for glioblastoma in progress**









Richieste e FTE

Le richieste coincidono con quelle del 2024:

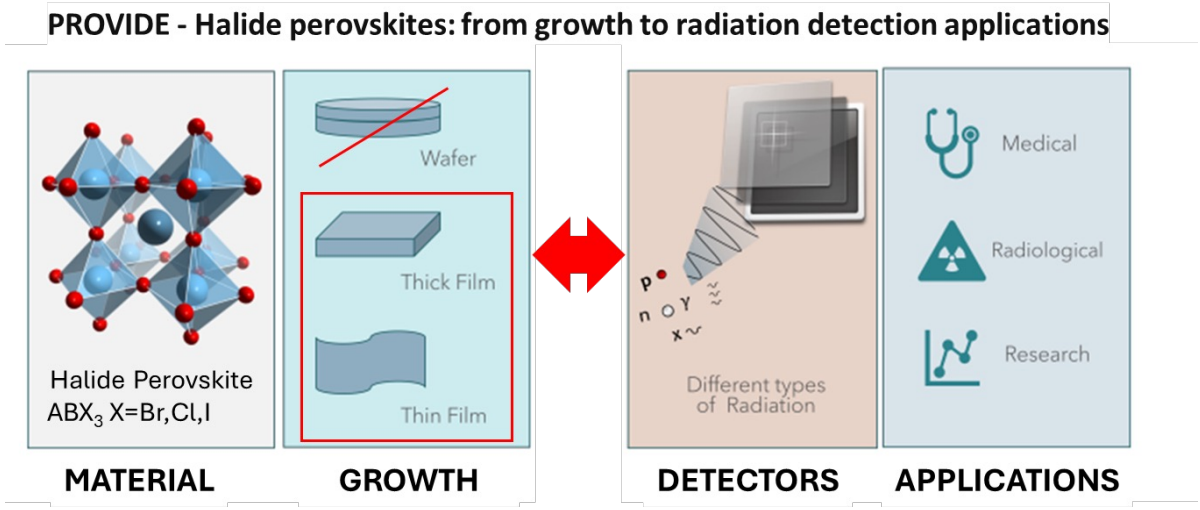
Sez. & Suf.	MISS				CON			
		Sj	Dot.	Ant.		Sj	Dot.	Ant.
LE	2.0				0.5			
	2.0				0.5			

La situazione FTE attesa coincide con quella attuale, ossia:

SEDE	NOMINATIVO		TIPO	CONTRATTO	QUALIFICA	RICERCATORI	TECNOLOGI	NOTE
LE	De Nunzio Giorgio		ASSOC	Scientifica Ricercatori/Prof...	Ricercatore Univer...	80		
	Quarta Gianluca		ASSOC	Incarico di Ricerca scientif...	Prof. Ordinario	20		
	Rizzo Rocco		ASSOC	Tecnologica Assegno universi...	Assegnista	100		% attiva dal 2025-02-01 ins. corso d'anno (2025-03-26)
LE (3 PERSONE - 2 FTE)						2 fte 3 pers.	0 fte pers.	
						2.00 fte / 3 pers. (media 0.67)		

PROVIDE - PeROVskIte DEtectors for innovative strategies in radiation therapy and diagnostics

Durata proposta 3 anni
Area di ric. Rivelatori
Responsabile nazionale: Mara Bruzzi INFN-FI
Unità partecipanti BO – FI – LE - PI - TIFPA



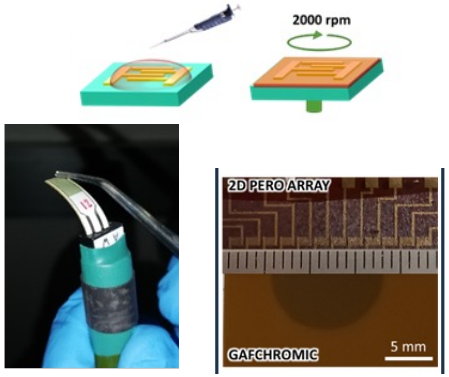
Objectives

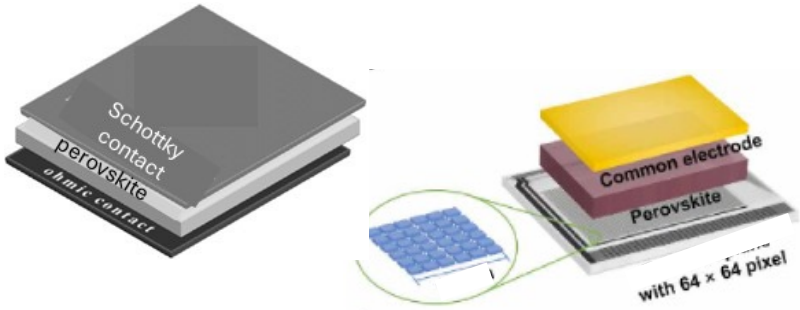
1) manufacturing and testing novel perovskite detector systems (direct and indirect), improving their relevant figure-of-merit, by impacting on:
   - ❑ velocity of response
   - ❑ spatial resolution
   - ❑ Sensitivity
   - ❑ S/N ratio
   - ❑ Detection limit
   - ❑ LY

2) Explore novel functionalities in radiation therapy and diagnostics for optimized perovskite-based detection systems.

This will require a significant upgrade of material and detector processing beyond present status

(only planar electrodes, geometries and materials not optimized, resistive configuration, single pad or arrays)

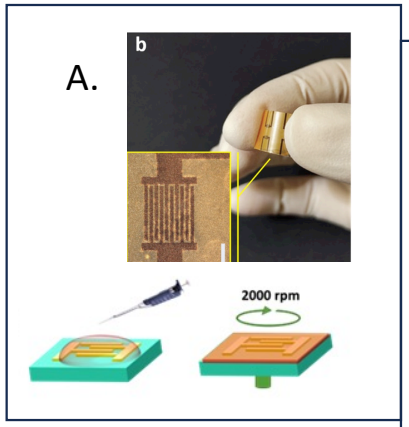


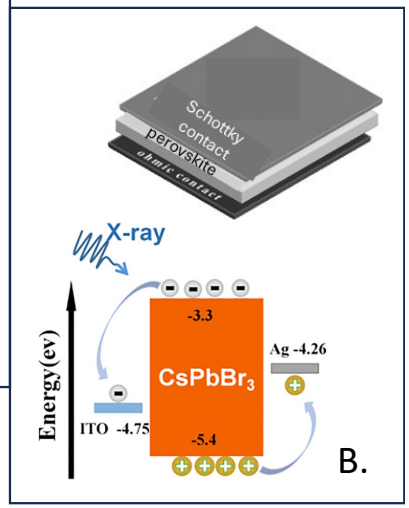


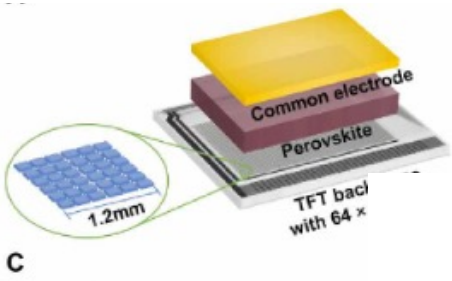
Objectives

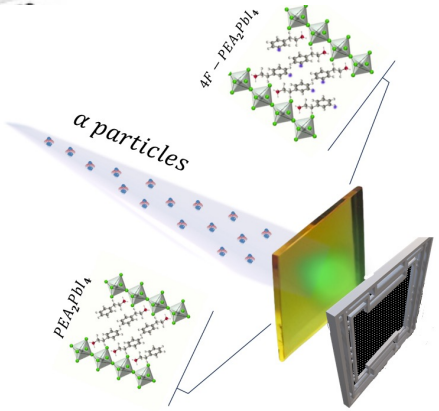
1) Manufacture novel perovskite detectors (direct and indirect), with the purpose to expand their relevant figures of merits;
2) Explore novel functionalities of HP-based detection systems, such as flash radiotherapy with electrons and protons, VMAT, flexible in-vivo and transmission modalities, 2D/3D dose mapping, advanced imaging for X-ray diagnostics, TOF-PET.
3) systematically investigate radiation damage and develop mitigation strategies to ensure reliable detector performances over realistic periods of time for each specific application.

The Unit of Lecce will develop HP materials for scintillator detectors on flexible substrate for bendable and fast X-ray imaging and on LYSO to achieve a short Coincidence Time Resolution (CTR).



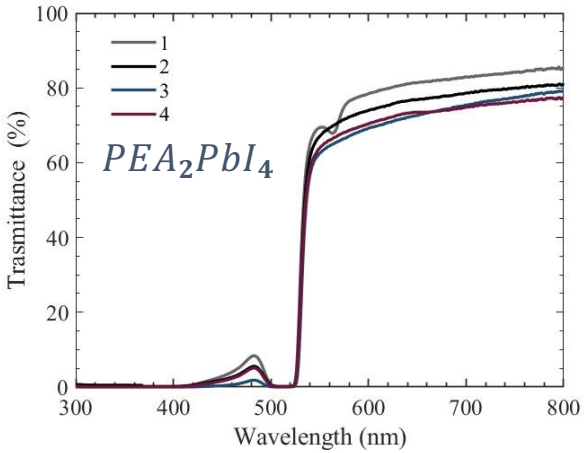


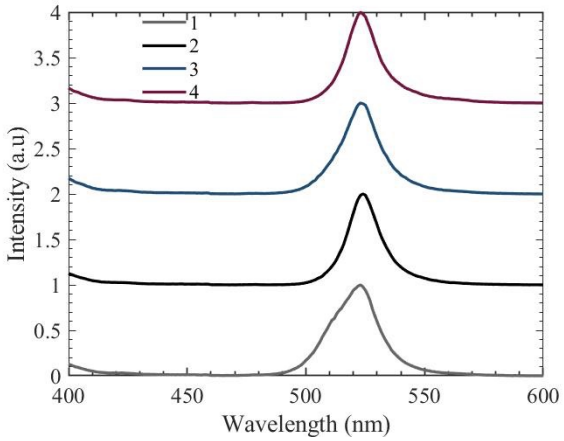


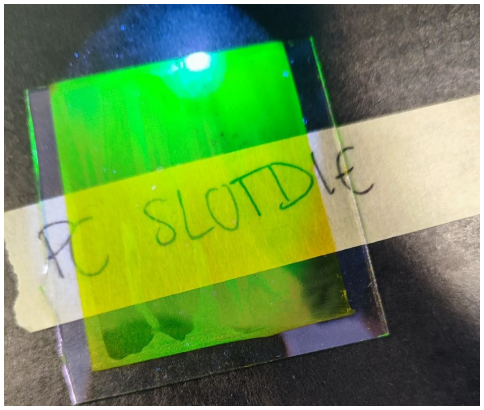


Provide - First Year Activity

- **Task 2.3 Scintillating materials growth/characterization**

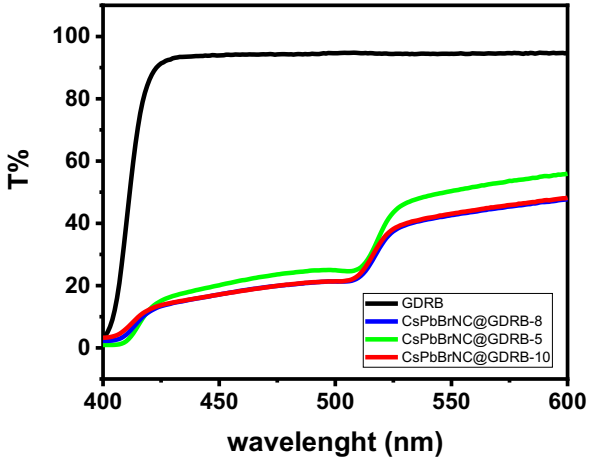


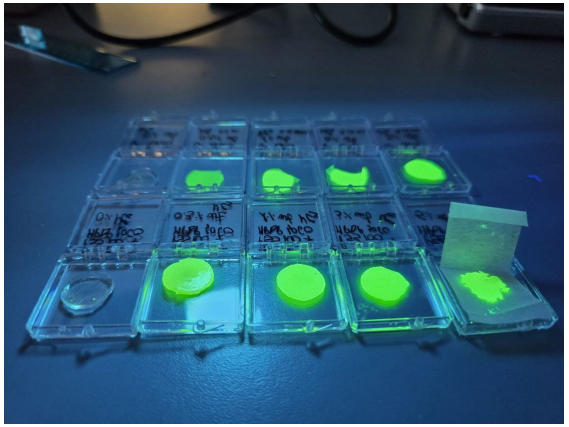




Slot Die Coated samples

- **Task 3.4 High efficiency indirect scintillating detectors**





	G-DRB	G-DRB + 0.15%wt NCs	G-DRB + 0.2%wt NCs	G-DRB + 0.3%wt NCs
Thikness (mm)	2.8	2.8	2.8	2.8
Max T%	94	55	48	48
AVT	≈90	n.a	n.a	n.a

People and Budget

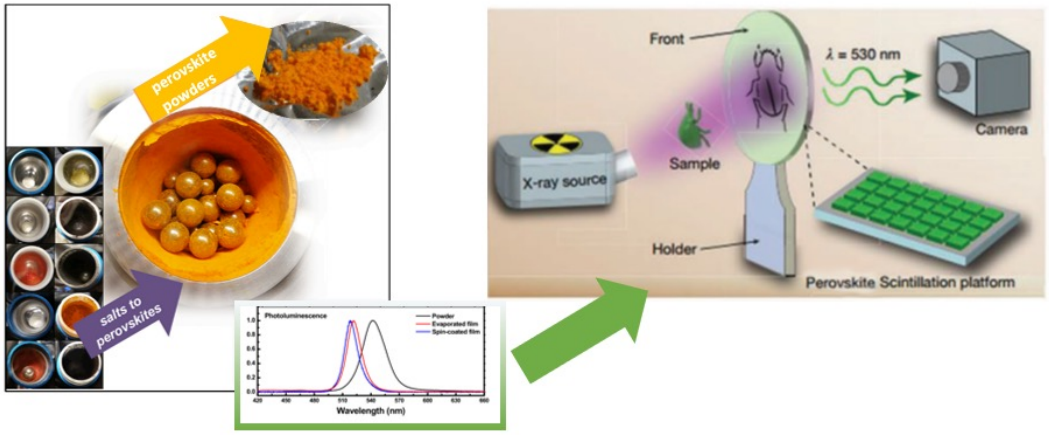
	Resercher	Home Institution	Position	FTE@2026
INFN-Le (1.6 FTE)	A. Rizzo (RL)	CNRNanotec	Primo Ricercatore	0.3
	L. Calcagnile	Dip. Mat.Fis.	PO	0.2
	M. Calora	Dip. Mat.Fis.	PhD	0.5
	A.P. Caricato (PI)	Dip. Mat.Fis.	PA	0.2
	C. Corcione (RL)	Dip. Ing. Inn.	PA	0.2
	G. Quarta	Dip. Mat.Fis.	PO	0.2

Lecce	**2026**
Missioni (2.0 keuro per 2 persone a Pisa per turni di misura)	2 K€
Inventario (fotomoltiplicatori 1.1 keuro)	1.1K€
Consumo (scintillatori di riferimento 2.8 keuro; reagenti chimici per perovskiti 5.5 keuro)	7.8 K€
Spedizioni (invio campioni Pisa)	0.5 K€

SHINE

Plastic **S**cintillators P**h**antom v**i**a additive ma**n**ufacturing t**e**chniques

A.P. Caricato – R.N.



3 years experiment

Research Units:
INFN - Lecce (C. Corcione)
INFN-LNL (S.M. Carturan)
INFN-PD (S. Moretto – dotazioni)
TIFPA (D. Maniglio)
INFN-Ba (S. My)

Consiglio di sezione, 2 luglio 2025

SHINE

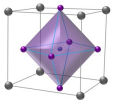
AIM: Design and Develop, by means of additive printing (stereolithography), of reproducible, low cost and innovative plastic scintillators with complex shapes, using

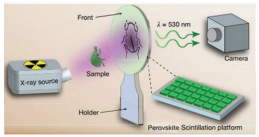
- polysiloxanes added with dye or perovskites
- nanocomposites containing perovskites using commercial resins or polysiloxanes.

Possible applications:
time-resolved dosimetry;
high energy physics (LHCb).....

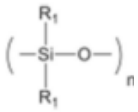
New and promising materials

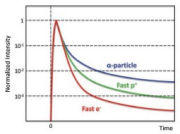
- **Perovskite Material ABX_3:** large stopping power; high mobility-lifetime product; fast response (~ ns); large bulk resistance





- **Polysiloxane** have demonstrated interesting properties as scintillator





+

Additive manufacturing (AM) is a well-known technique for the fast fabrication of complex objects with different geometries and different polymers can be 3D

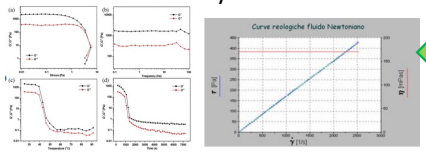
WP

WP1 Development and fabrication of scintillators by AM (LNL; INFN-Le)

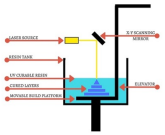
1.1 Development of photocurable polysiloxanes-based resin

1.2 Development of perovskite-polymer photocurable formulations

1.3 Printability assessment

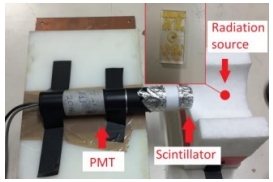


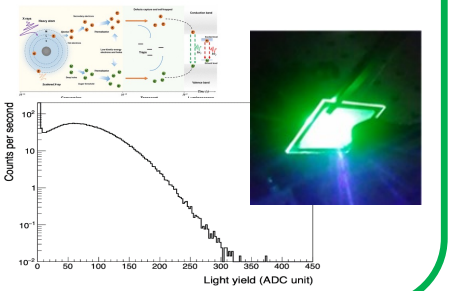
1.4 Additive manufacturing



WP2 Characterization of produced scintillators by AM (LNL, TIFPA)

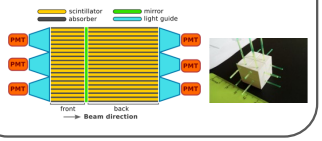
2.1 Tests under irradiation



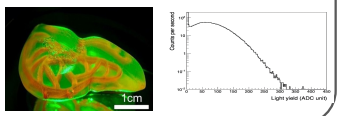


WP3 Proof of concept (INFN-Le; LNL; TiFPA; APSS; CERN)

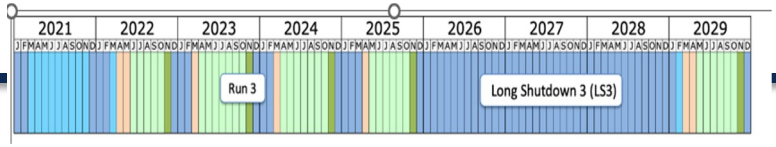
3.2 HEP applications



3.1 Radiotherapy applications



GANTT Chart



2023 2025

Months	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
WP1 Development and fabrication of scintillators by AM																		
Task 1.1: Development of photocurable scintillating polysiloxanes-based resin							★ M1.1											
Task 1.2: Synthesis of perovskite and development of perovskite-polymer photocurable formulations							★ M1.2											
Task 1.3: Printability assessment										★ M1.3								
Task 1.4: AM												★ M1.4						
WP2 Characterization of produced scintillators by AM																		
Task 2.1: Tests under irradiation														★ M2.1				
WP3 Proof of Concept																		
Task 3.1: Radiotherapy applications																	★ M3.1	
Task 3.2 HEP applications																	★ M3.2	

Task 1.1: Caratterizzazione e selezione di formulazioni fotopolimerizzabili con rese di luce ≥ al 50% della resa di luce dell'EJ212 (circa 5000 ph/Me);
Task 1.2: Ottimizzazione e selezione di formulazioni di compositi con perovskiti con l'obiettivo di trasparenza ≥ 60% alla lunghezza d'onda di scintillazione;
Task 1.3: verifica della stampabilità delle formulazioni composite attraverso la costruzione di forme benchmark mediante SLA

OUR NEEDS AND OBJECTIVES

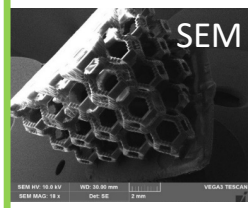
- medium-low viscosity (50-500 cst) → the application of 3D printing processes via digital light processing (DLP) or SLA (Stereolithography);

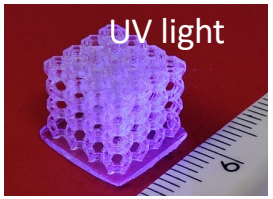
- **transparency at the curing wavelength** (380-410 nm);
- **transparency at the waveshifter emission wavelength** (430 nm) to reduce the reabsorption of scintillation light;
- **light output comparable to a commercial plastic scintillator** (EJ-200/EJ-212).

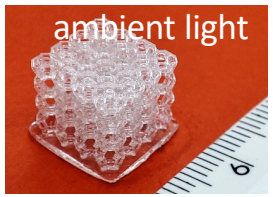
Activities and Summary of Results WP1 (**Task 1.1, 1.3, 1.4**) and WP2 (**Task 2.1**)

polysiloxane-based scintillator:

light output comparable to a commercial plastic scintillator (EJ-200/EJ-212).

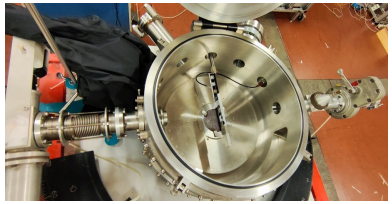


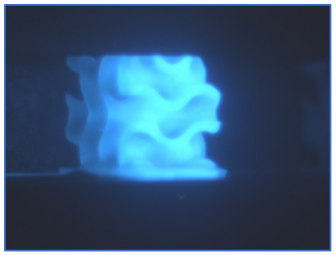




High flexibility

Proof of concept test: H^+ 4.5 MeV @CN → Scintillation light collected as images with CCD camera (DR)

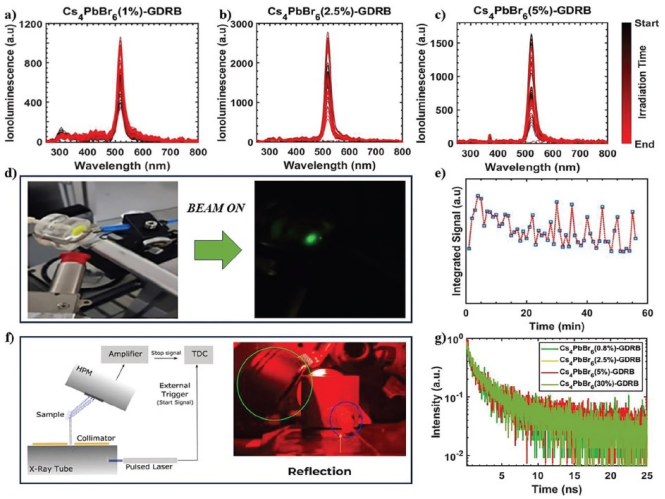




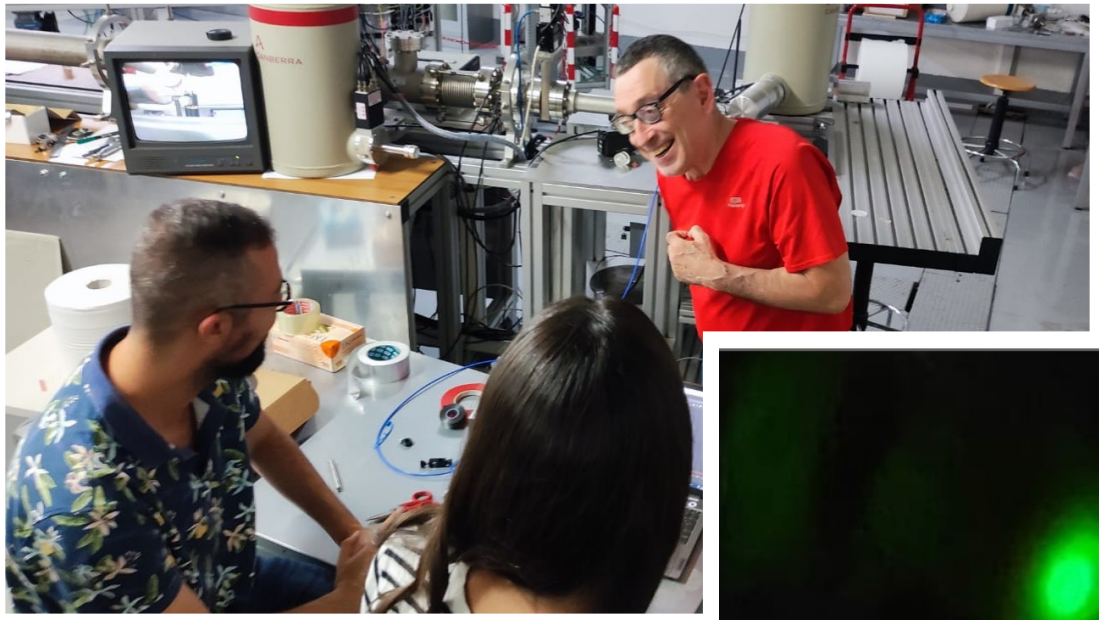
To be carried out : test beam sessions at the Proton Therapy Center

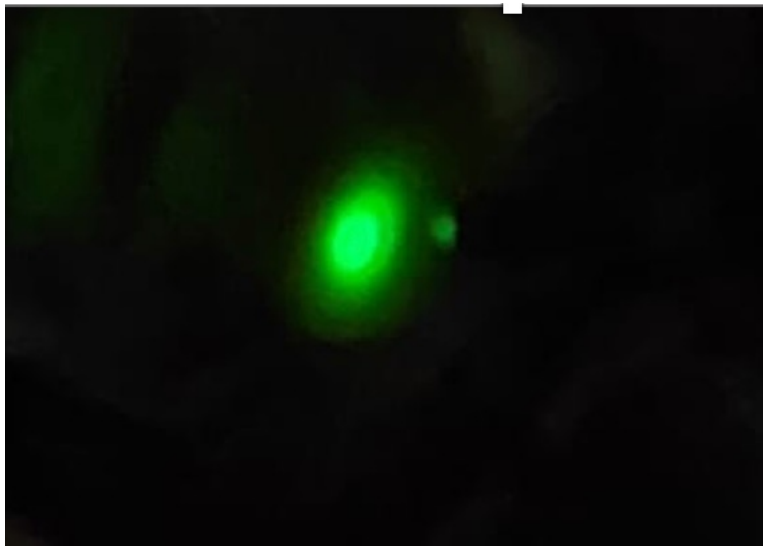
perovskite-based scintillator

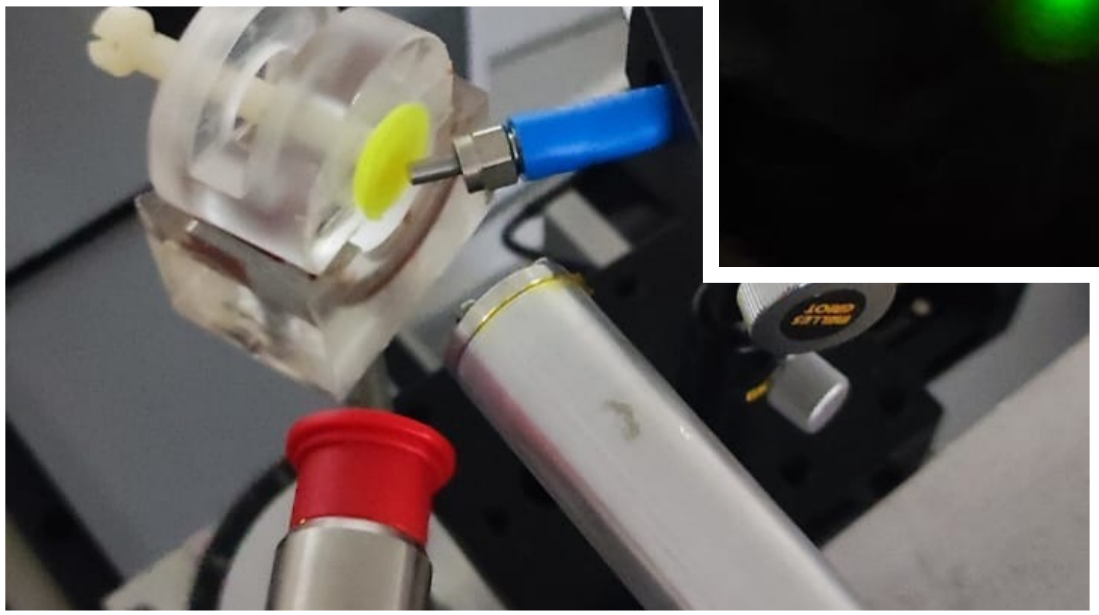
Ultrafast sciltillators. light output ~ 10% EJ/212

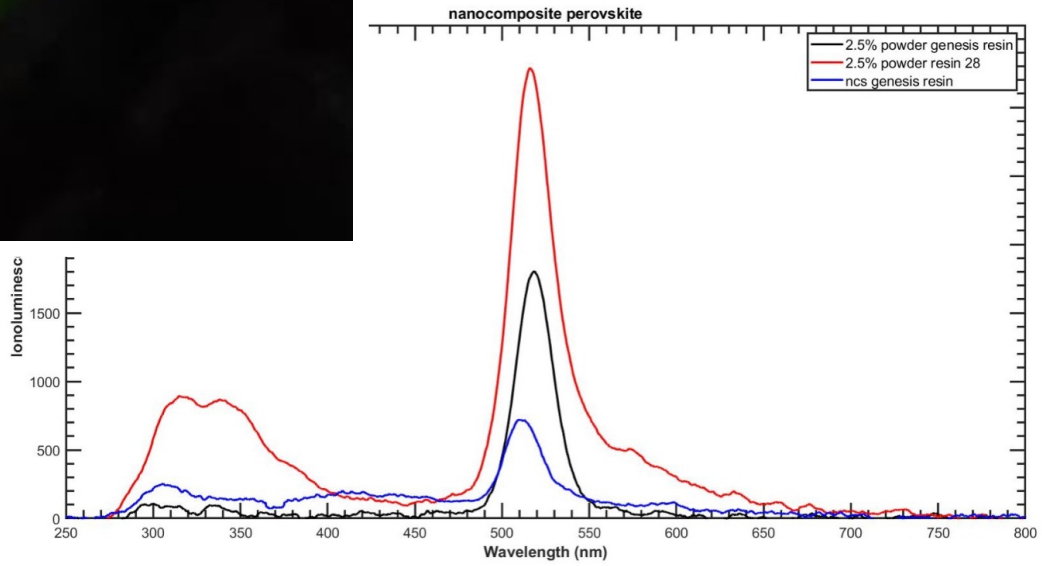


To be carried out : improve LY (NCs-based composites); tests for proof of concept








nanocomposite perovskite
2.5% powder genesis resin
2.5% powder resin 28
ncs genesis resin
Ionoluminesc
1500
1000
500
0
250
300
350
400
450
500
550
600
650
700
750
800
Wavelength (nm)

Students

- Mario Calora, Ph.D. Candidate, XXXVIII Cycle - Doctorate in Physics and Nanosciences, University of Salento;
- Amal Chandran Chekkallur, Ph.D. Candidate, XXXVIII Cycle - Doctorate in Materials Science, University of Salento;
- Ivan Pavone, Thesis Title: "Development of Photocurable Polysiloxane Resins for the Production of Innovative Scintillators via 3D Printing," Bachelor's Degree, Department of Engineering, University of Padua;
- Simone Papiri, Thesis Title: "Non-Hydrolytic Sol-Gel Synthesis of Silicone Resins for 3D Printing of Particle Detectors," Bachelor's Degree, Department of Engineering, University of Padua.
- Daniele Godi, Thesis Title " Development and characterization of perovskite ($CsPbBr_3$) nanocomposite scintillator for 3D printing" Master Thesis Department of innovation Engineering, University of Salento

Conferences

- MEDICTA Conference 16° mediterranean conference on calorimetry and thermal analysis (Porto (Portogallo), July 19-21, 2023)
“Kinetic study of the curing process of Perovskite-photocurable Polymer based nanocomposite for scintillators”

- E-MRS Fall Meeting (Warsaw (Poland) September 18-21, 2023)
“ Luminescent zero dimensional inorganic perovskite powder-photocurable resin composite for scintillator application”

-E-MRS 2024 SPRING MEETING (Strasbourg (France) from May 27 to May 31) Symposium S - Nanomaterials for radiation detection “2D metal-halide perovskite-thin polycrystalline films enable bright and fast scintillaϴons”

Papers

- S.M. Carturan et al., Additive manufacturing of high-performance, flexible 3D siloxane-based scintillators through the sol-gel route, Applied Materials Today 39 (2024) 102313;

- A. Giuri et al, 3D Printed Ultra-Fast Plastic Scintillators Based on Perovskite-Photocurable Polymer Composite, Adv. Funct. Mater. 2024, 2417653;

- C. Esposito et al., The effect of perovskite on photopolymerization reaction of photocurable resin for plastic scintillators by stereolithography, JTAC-D-23-02432R1 (in press);

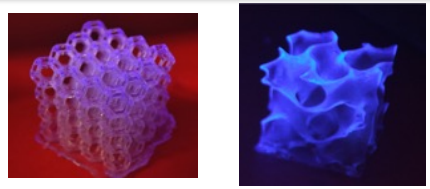
-

People

	Resercher	Home Institution	Position	FTE@2025
	A.P. Caricato (PI)	Dip. Mat.Fis.	PA	0.45
INFN-Le (3.05 FTE)	C. Carcione (RL)	Dip. Ing. Inn.	PA	0.4
	A. Rizzo	CNRNanotec	Primo Ricercatore	0.4
	G. Quarta	Dip. Mat.Fis.	PO	0.3
	M. Montagna	Dip. Ing. Inn.	Tecnico laureato	
	A. Maffezzoli	Dip. Ing. Inn.	PO	0.3
	M. Calora	Dip. Mat.Fis.	PhD	0.5
	A. Chekkallur	LNLDip. Ing. Inn.	PhD	0.7
LNL (1,1 FTE)	Sara M. Carturan (RL)	DFA- UNIPD	Tecnico Laureato	0.3
	Giorgia Franchin	DII-UNIPD	RTDB	0.1
	Gianluigi Maggioni	DFA- UNIPD	Tecnico laureato	0.1
	Marco Cinausero	LNL	Ricercatore	0.6
TIFPA (1.5 FTE)	D. Maniglio (LR)	Univ. Trento	PA	0.5
	A. Quaranta	Univ. Trento	PO	0.1
	A. Tirella	Univ. Trento	PA	0.5
	M. Polo	Univ. Trento	PhD	0.4
INFN – Ba (1.4 FTE)	A. Colaleo	Uniba	PO	0.1
	R. Iftikhar	Uniba		1
	L. Longo	Uniba	Ricercatore	
	S. My	Uniba	PA	0.2
	R. Radogna	Uniba	PA	0.1
	P. Verwilliger	INFN - Ba	Ricercatore	

Activities and Summary of Results WP1 (**Task 1.1, 1.3, 1.4**) and WP2 (**Task 2.1**)

Task 1.1 (Development of scintillating photo-curable silicone resins – LNL-TIFPA);
Task 2.1 (Irradiation testing – LNL-TIFPA);
Task 1.3 (Printability – University of Padua)

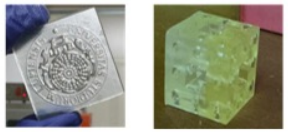


Procedure for polysiloxane scintillators: non-hydrolytic sol-gel process

Where we were	Main results	What we have done
Characterization of the response of polysiloxane scintillators (0,5 mm) under proton beam irradiation at CEDAD (4,5 MeV; 0,1 – 10 nA);	Stable and comparable behavior to the EJ-212 signal under low-current beam conditions was observed for both DPDM50-NH and DPDMM_H-H formulations.	Definition of the calibration curve for the Ar signal versus protons/s
Investigation of the rheological behavior of **new** resins as a function of the variation in phenyl group content and the molar ratio of -OH/-OR, relative amount of di- and tri-functional precursors and the concentration of acrylate groups. Addition of a third dye component (**9,9-dimethyl-9H-fluorene**) to the resins prior to UV polymerization.	Phenyl group content and the -OH/-OR molar ratio do not appear to correlate with either the onset of photopolymerization or the plateau value of the complex modulus. In contrast, the amount of di- and tri-functional precursors, as well as the concentration of acrylate groups, seem to play a significant role in governing the behavior."	- Study of the energy transfer mechanism between the phenyl-containing matrix and the primary fluorophore, 2,5-diphenyloxazole (PPO), using fluorescence/excitation spectroscopy, in the presence of a **third fluorophore, 9,9-dimethyl-9H-fluorene**.
Characterization of the irradiation response of the **new resins** under α particles for the best formulation, through rheological measurements using 1% wt TPO as a photoinitiator and 0.02% wt LV, with increasing amounts of fluorene (up to 5% wt). The light yield (LY)	DPDM4530-NH formulation exhibited the best performance according to rheological tests **LY = 44%** than EJ212	

Activities and Summary of Results WP1 (**Task 1.1, 1.3, 1.4**) and WP2 (**Task 2.1**)

Task 1.1 (development of scintillating photopolymerizable resins based on perovskite),
Task 2.1 (irradiation testing),
Task 1.3 (printability assessment at the University of Salento)



Where we were	Main results	What we have done
Study of the properties of various Cs_4PbBr_6 **powder** formulations with different water contents, focusing on their structural characteristics and radioluminescence behavior	Modulation of powder composition (Cs_4PbBr_6 in $CsPbBr_3$). Understanding of the process. Average lifetime of 41 ns and a quantum yield of 33%. Radioluminescence lifetime < 1 ns LY ~ 1000 Ph/MeV	Improving trasparency and LY using perovskite **nanocrystals NCs**
Characterization of the response of composites (perovskite **powder** + commercial resin) under proton beam irradiation at CEDAD (4,5 MeV; 0,1 – 10 nA);	Although the signal is lower than that of EJ-212, the signal remains stable over time	
Characterization of the response of composites (**perovskite powder** + commercial resin) under a Cs-source and under pulsed X-ray	LY under Cs source: scintillation, too low for a precise estimate (about 700 Photons/MeV for the powder): Scintillation Kinetics with X-Rays ○ Significant difference observed between Genesis and CsPbBr samples ○ 3 components observed: (0.1 ns; ~2 ns ; ~20 ns)	
Printability test usign **perovskite powder**	Good results	
Optical, structural, and rheological characterization of perovskite composites (**perovskite NCs embedded in commercial GDRB resin**)- % vol 1-40. IBIL measurements	The photopolymerization peak after 3s. Photopolymerization is slightly reduced in the presence of CsPbBr3 NCs. Good dispersion of the NCs in the matrix. PL lifetime < 4 ns. Transmittance ≥ 60%. Stable signal under proton irradiation but signal 2 order of magnitude lower	Conversion %vol in %wt. Optimization of the composite formulation and synthesis process. Inclusion of the NCs in polysilossan-based resins

Richieste

Unità	Consumo (keuro)	Missioni (keuro)	Inventario	Servizi (keuro)
Lecce	**6**	**2**	**0,5***	**3 (turni APSS)**
LNL	2	3		
TiFPA	1.5	1		
Bari		2		
Totale				21.5

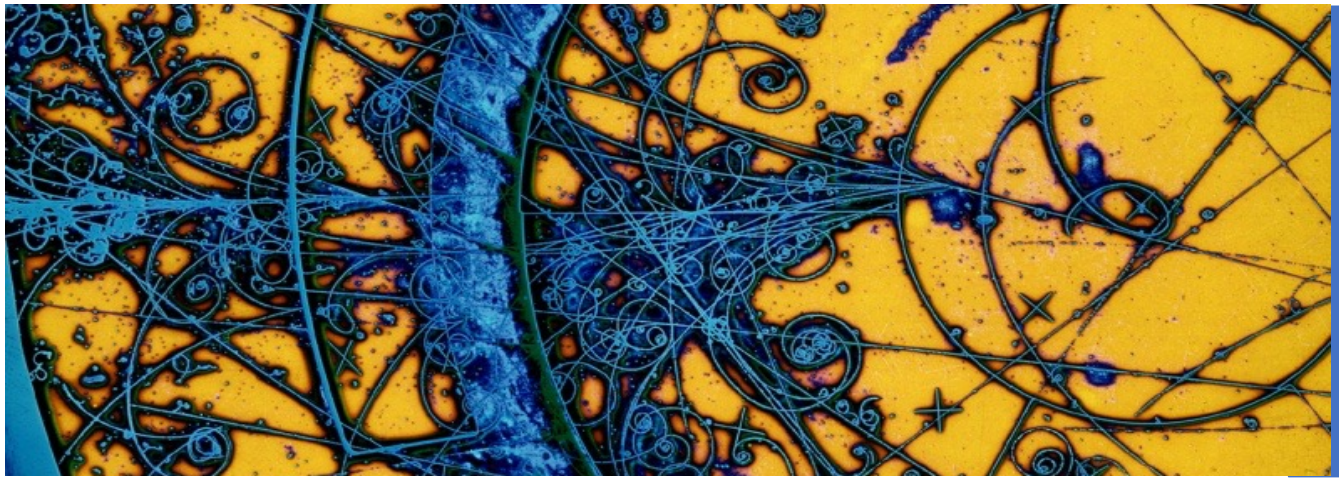
* Stampante per piccoli volumi

SHINE RICHIESTE 2026

Lecce	
Missioni (Trento, Milano)	2 K€
Inventario (Stampante per piccoli volumi)	0,5 K€
Consumo (precursori per perovskiti, resine)	6 K€
Servizi (Turni APSS)	3 K€

EPiSe

Epidermal Piezoelectric Sensors for cardiovascular function assessment



Durata: 3 anni (2024/2026)
Resp. Nazionale: Antonino Proto (Resp. Locale **FE**)

Unità INFN partecipanti:

LNL – Resp. Locale: **--- Oscar Azzolini**

LE – Resp. Locale: **Silvia Rizzato**

Centri di ricerca esterni coinvolti

- Centro Malattie Vascolari, UNIFE
- Centro Studi Biomedici applicati allo sport, UNIFE

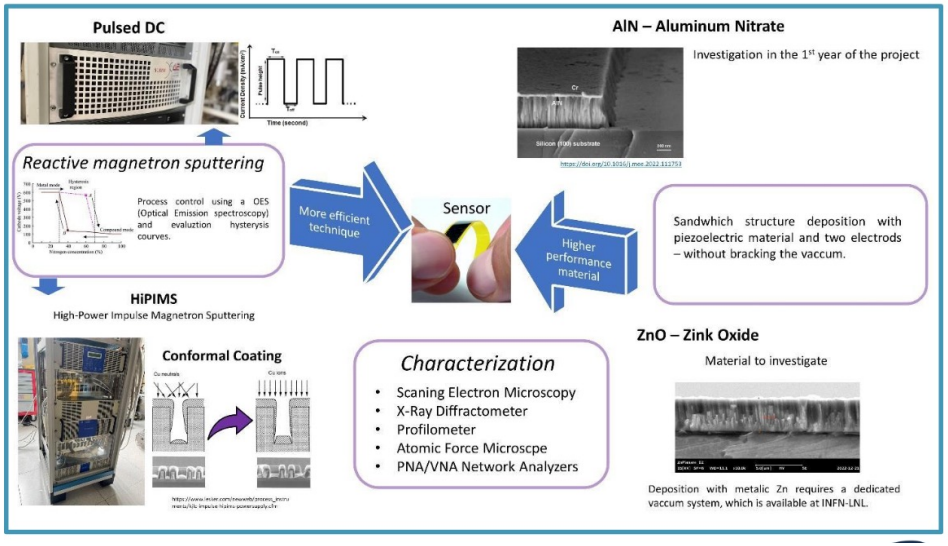
EPISE

Study and implementation of an advanced technological solution for Jugular Venous Pulse (JVP) monitoring toward Personalized and Preventive Medicine

Design, development and tests of an epidermal electronic system

- Scalable methodology for biocompatible piezoelectric thin film deposition, contacting, and sensor coating.
- Miniaturized and low-power electronics; wireless connectivity, and intuitive user interface.
- Calibration, in-vitro, with Eco-Fluidodinamica Lab's instrumentation; and experimentation, in-vivo, with clinical partners (UNIFE), under study protocol n°:

Patch worn on the neck, University of California San Diego



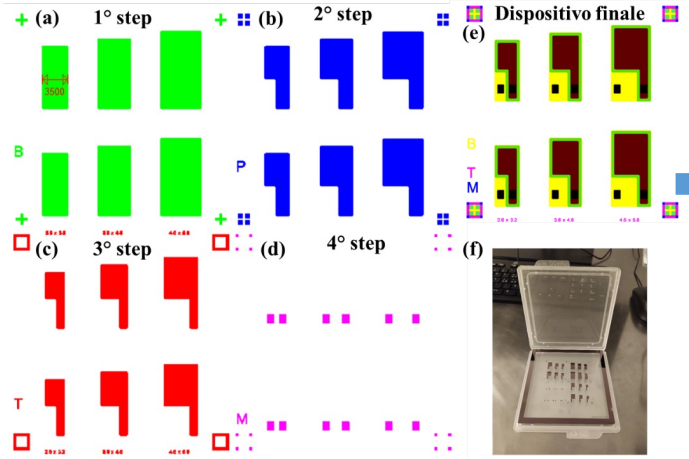
INFN-FE is working on the development of electronics and interface.

INFN-LNL and **INFN-LE** are working in a complementary way for the fabrication and characterization of the sensor based on the piezoelectric sensing element.

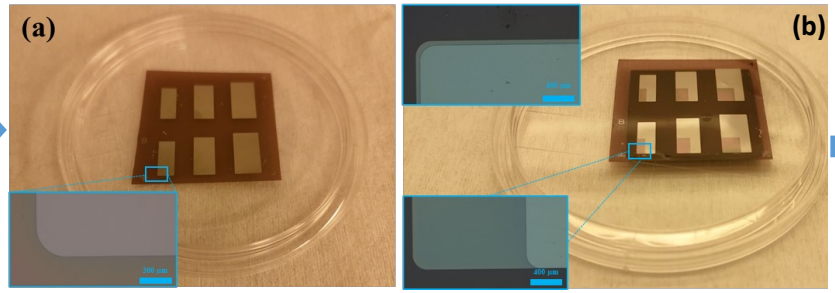
EPISE - Attività INFN Lecce

Sensor fabrication

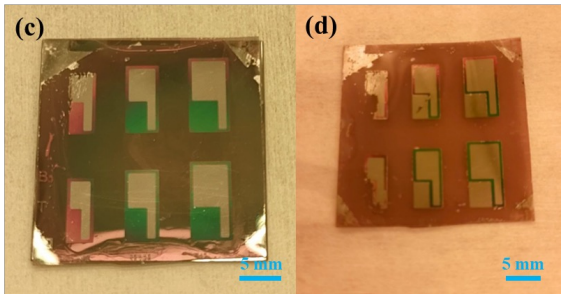
Design and fabrication of the optical lithography mask for sensor fabrication



Pictures of the sample after the first lithographic step and second lithographic steps.



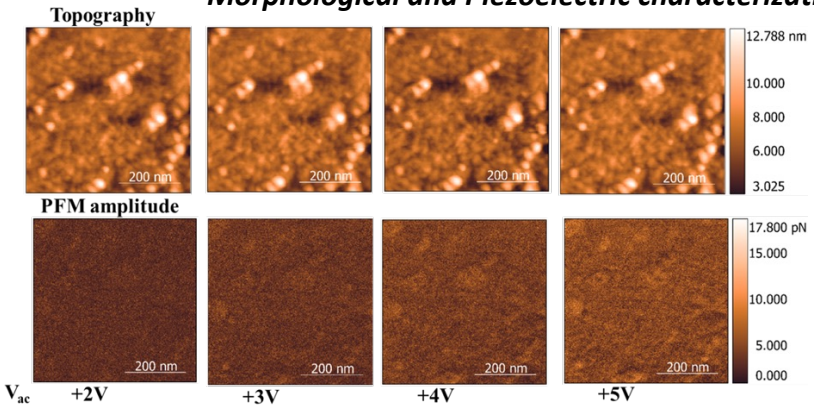
Pictures of the samples
(c) after the top electrode fabrication,
(c) after chemical etching.

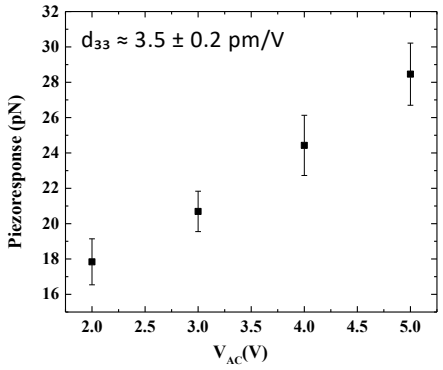


Final device

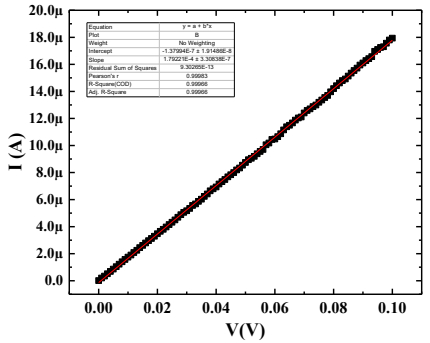
Sensor characterization

Morphological and Piezoelectric characterization of AlN Films





Electric Characterization of sensor



Costi 2026 e FTE

Categoria	Dettaglio dell'articolo	Richiesta 2026	Sezione
Missioni	Viaggi per test sperimentali tra sezioni	0.5	INFN LE
	Riunioni di collaborazione	1	INFN LE
Trasporti, traslochi e facchinaggio	Spedizione campioni alle sezioni di Legna	0.5	INFN LE
Consumabili	Maschere litografiche	1	INFN LE
	Resist	1	INFN LE
	Metalli	1	INFN LE
		5	

INFN-LE	FTE
Silvia Rizzato (Resp.)	0.30
Giuseppe Maruccio	0.20
Anna Grazia Monteduro	0.20
Maria Teresa Todaro	0.20
Anna Paola Caricato	0.10
	Tot. 1.00

QUART&T: Involved groups

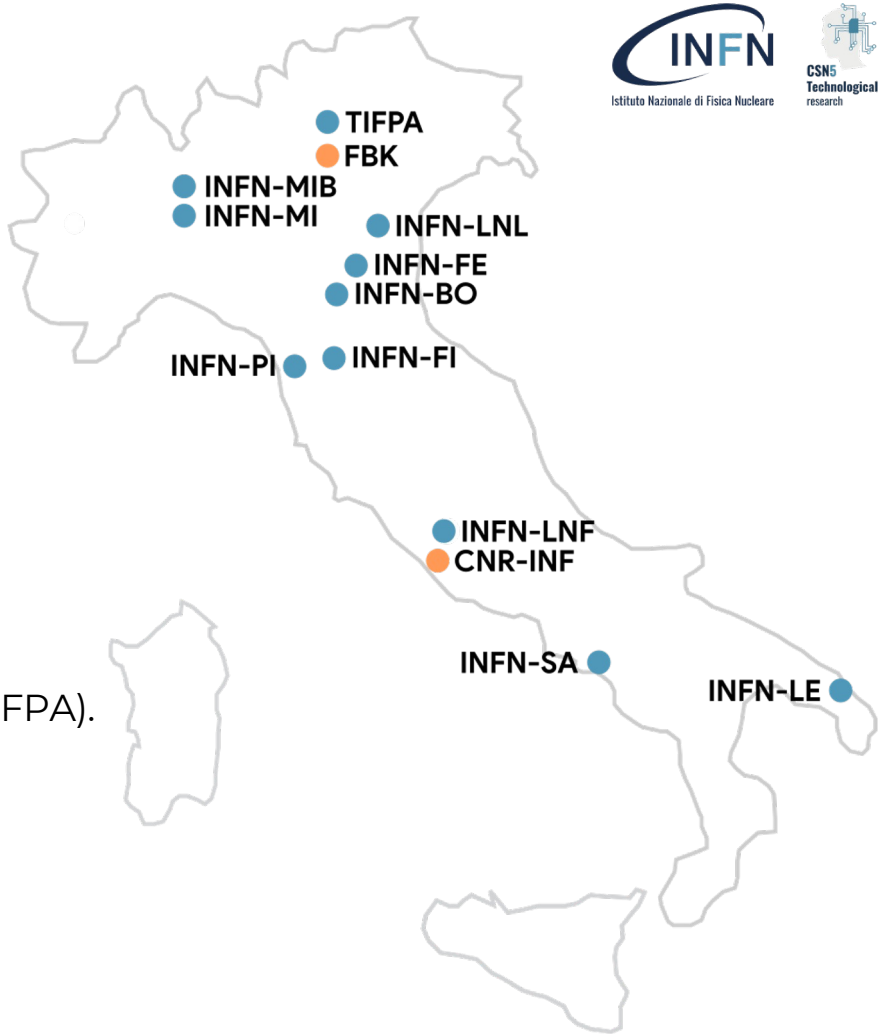
QUantum Architectures for Theory & Technology
QUART&T

8 INFN Units
- INFN Bologna
- INFN Ferrara
- INFN Firenze
- INFN Lecce
- INFN Milano
- INFN Milano Bicocca
- INFN Gruppo Collegato di Salerno (INFN Napoli)

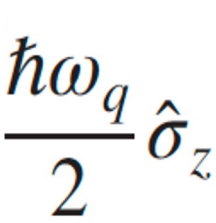
2 INFN National Laboratories
- INFN Laboratori Lazionali di Frascati (LNF)
- INFN Laboratori Lazionali di Legnaro (LNL)

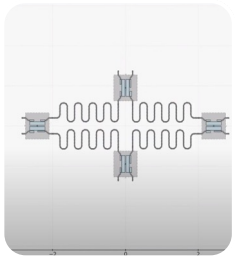
1 INFN Research Center
- Trento Institute for Fundamental Physics and Applications (TIFPA).

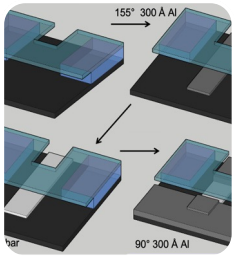
2 External Research Centers
- Fondazione Bruno Kessler (FBK, Trento)
- Istituto di Fotonica e Nanotecnologie (CNR-IFN, Roma)

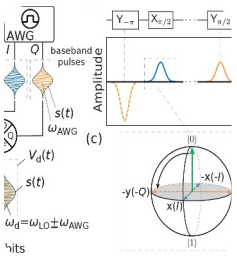


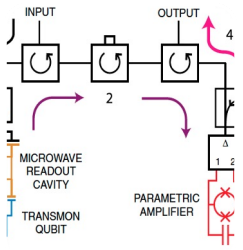
QUART&T: Challenges











Theory

INFN-Bo
INFN-Fi
INFN-MI
INFN-TIFPA

Design and Simulations

INFN-FI
INFN-Bo
INFN-LNF
INFN-MIB
INFN-PI
INFN-SA
INFN-TIFPA

Fabrication (resonator, qubit, 3D cavities)

FBK
CNR
INFN-LNL

Control

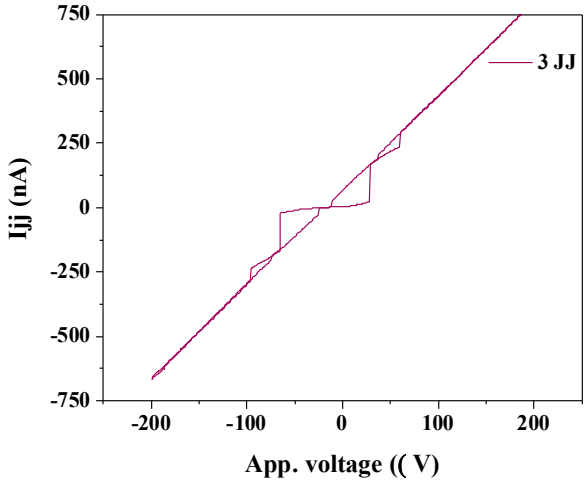
Readout

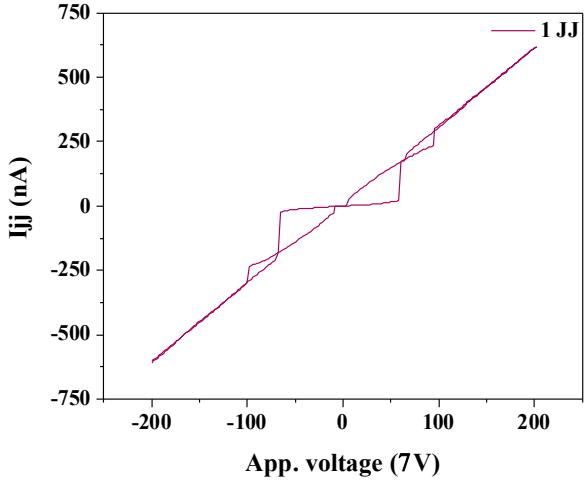
INFN-Bo
INFN-FE
INFN LNF
INFN MI
INFN MIB
INFN-PI
INFN-SA

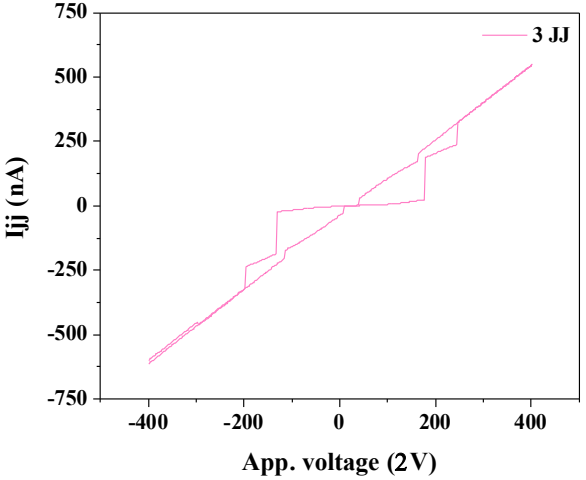
Characterizations, Experiments and Demonstrations

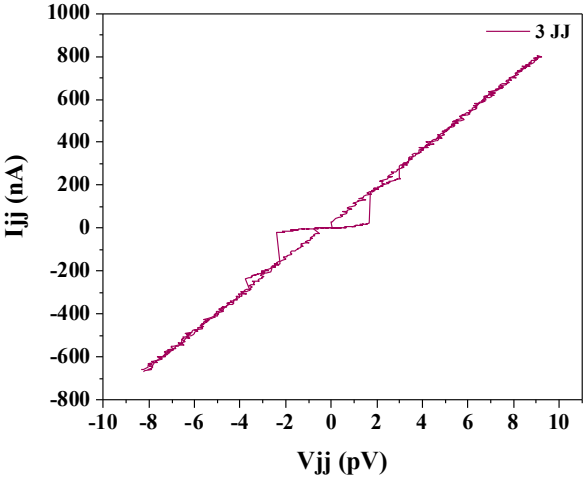
INFN-MIB
INFN-LNF
INFN-Bo
INFN-PI
INFN-LE
INFN-SA
INFN-TIFPA

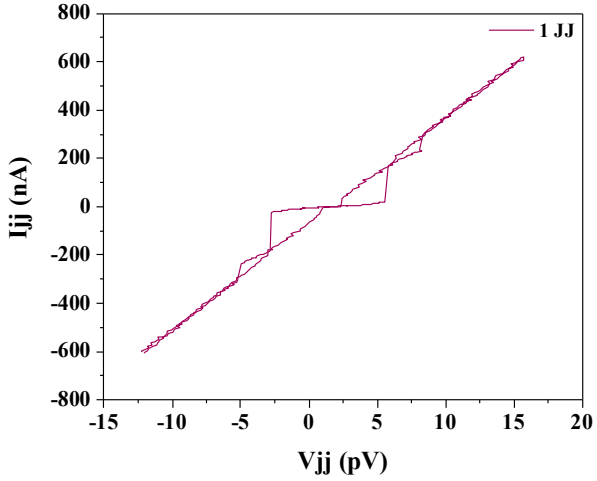
Josephson Junctions characterization

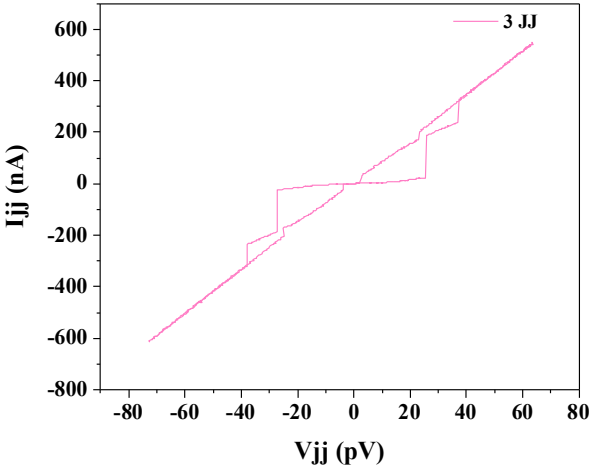












QUART&T: Lecce unit and budget

Updated

2026

Sezione	Capitolo	Descrizione	1st Y [k€]	2nd Y[k€]	3rd Y [k€]	Total [k€]
LECCE	Consumo	Materiale di consumo per linee RF (filtri, attenuatori, connettori, etc)	5	5	4	14
	Consumo	Produzione di schede PCB per set-up criogenici	4	4	5	13
	Consumo	Materiali per la fabbricazione di holder metallici (rame e niobio)	2	1	1	4
	Consumo	Cavi coassiali	2	2		4
	Consumo	Ricambi per wedge bonder (filo Al e Au, wedges)	1	1	2	4
	Consumo	Upgrade of Cryogenic RF lines in Oxford Triton (0dB attenuation lines)				0
	Invetario	Multimetro digitale da banco		3		3
	Invetario	Amplificatori low noise	4			4
	Licenze-SW					
	Missioni	Missioni presso altri laboratori per sessione di lavoro congiunte	2	2	2	6
		Totali	**20**	**18**	**14**	**52**

Richieste	*Descrizione*	*Totale euro/FTE*
Officina meccanica	/	*0.1 FTE*
Laboratorio di elettronica	/	/
Servizio calcolo	/	/

INFN-LE			
Name	**Surname**	**Position**	**FTE**
Giuseppe	Maruccio	Professore Ordinario (UniSalento) [RL]	0.3
Angelo	Leo	Ricercatore RTD-A (UniSalento)	0.3
Anna Grazia	Monteduro	Ricercatore RTD-A (UniSalento)	0.2
Silvia	Rizzato	Ricercatore RTD-A (UniSalento)	0.2
Ritu	Rawat	Assegnista (UniSalento)	0.5
Anna Paola	Caricato	Professore Associato (UniSalento)	0.1
		INFN-LE Total	**1.6**

Richiesta servizi 2026

Laboratorio di Elettronica	-	
Officina Meccanica	-	
Calcolo		

Personale tecnico Universitario coinvolto negli esperimenti

Fabio Paladini
Lucio Maruccio
Massimo Corrado
Giorgio Accoto
Carlo Pinto

GRAZIE!!

Istituto Nazionale di Fisica Nucleare

Grazie!

CSN5 Ricerca Tecnologica

INFN-Le, 2 Luglio 2025