

Esperienza ERC Consolidator

Marco Vignati, 11/10/2023

CV

CURRENT APPOINTMENTS

- Since 2019
- Associate Professor, Department of Physics - Sapienza Università di Roma, Italy (100% employment).
- Since 2020
- Senior research associate, Istituto Nazionale di Fisica Nucleare (INFN) - Sezione di Roma.

PREVIOUS APPOINTMENTS

- 2014 – 2019
- Senior Researcher (“Primo Ricercatore”), INFN Roma (permanent).
- 2014
- Assistant professor, Physics Dept. of Sapienza U. (temporary).
- 2012 – 2014
- Researcher, INFN (temporary)
- 2010 – 2011
- Post-doc, Physics Dept. of Sapienza U.
- 2006 – 2009
- Ph.D. fellowship, Physics Dept. of Sapienza U.
- 2005
- Researcher, Alef S.r.l., mathematical and statistical models for finance.
- 2004
- Software developer, Nergal S.r.l., control of satellites.

Current grants:

<i>Project Title</i>	<i>Funding source</i>	<i>Amount (Euros)</i>	<i>Period</i>	<i>Role of the PI</i>	<i>Relation to current ERC proposal</i>
BULLKID2	INFN	75000	2022-2023	Spokesperson	Seed funding for the prototype detector presented in this proposal
NUCLEUS	INFN	700000	2020-2026	PI	none

CONCLUDED GRANTS as PI (main fundings)

- 2019 – 2020
- BULLKID (INFN) “Bulky kinetic inductance detectors”, 70 k€.
- 2013 – 2019
- ERC-StG No. 335359 “CALDER- Cryogenic wide-Area Light Detectors with Excellent Energy Resolution”, <http://www.roma1.infn.it/exp/calder/>, 1.2 M€.
- 2012 – 2017
- FIRB (Italian Ministry of Research) No. RBFR1269SL, “Development of electronics and data acquisition systems for Kinetic Inductance Detectors”, 780 k€.



CV senza esperienza all'estero



piccolo finanziamento esplorativo dell'idea



- ERC-StG in precedenza
- Pro: obiettivi raggiunti
 - Con: spiegare differenza del nuovo ERC

Progetto

Difficoltà per chi lavora in collaborazione con altri istituti:

- dimostrare il carattere “individual” della proposta
- dimostrare che obiettivi intermedi significativi possono e devono essere raggiunti

Mio approccio:

- L’obiettivo rimane quello di rispondere a grandi domande in futuro
- L’ERC aggiunge un tassello fondamentale che nessuno ha messo prima

Abstract del progetto

Grandi domande



In Particle Physics the research on neutrinos is continuously producing new results and further discoveries might just be around the corner. They could provide answers to crucial questions on how matter was created in the Universe or reveal the existence of new types of fundamental interactions between elementary particles. Possibly even more intriguing is the search for Dark Matter, an unknown form of matter that, according to astrophysical observations, outweighs the ordinary matter in our Universe by more than 5 times. Dark Matter particles have been searched for since 30 years, and invariably eluded discovery.

Tassello fondamentale

High risk - high gain

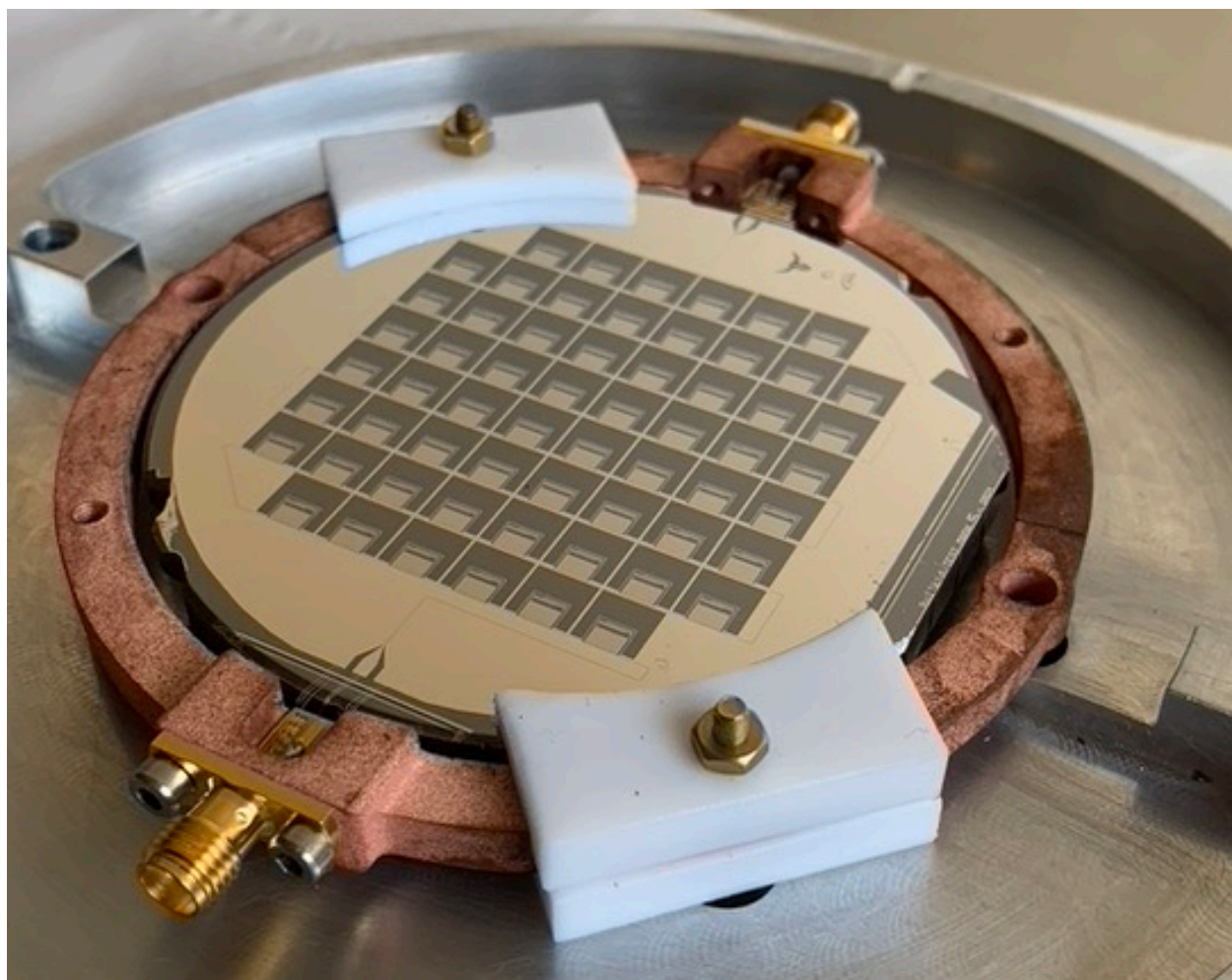


DANAE intends to enable unprecedented sensitivities in the study low energy neutrinos and in the search for Dark Matter, by measuring the tiny nuclear recoils that these particles induce in their passage through matter. The goal is to create a pilot experiment by introducing for the first time monolithic, and at the same time highly segmented, arrays of thousands multiplexed superconducting detectors. If successful, precision measurements of a recently discovered process, the coherent and elastic neutrino scattering off nuclei, could be made. In the Dark Matter field new hypothesized particles could be sensed, lighter than those searched and never found so far.

Progetto

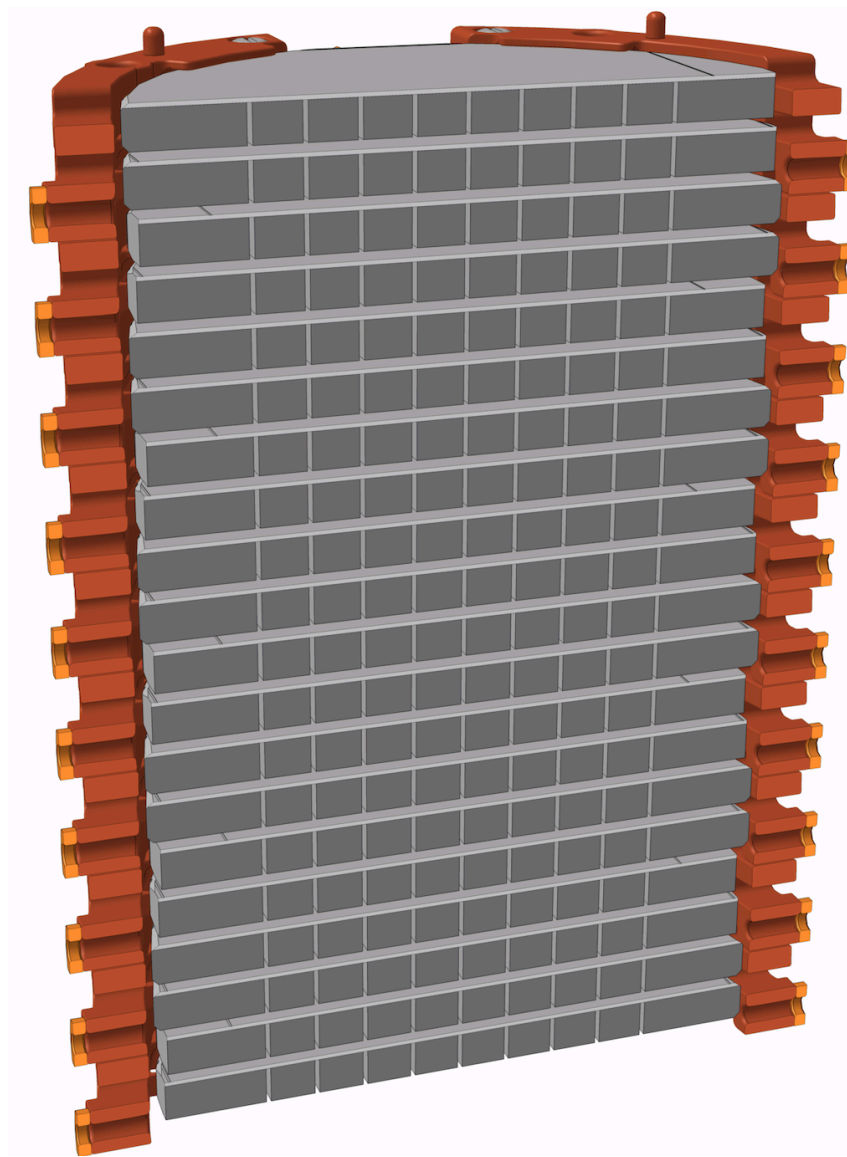
Finanziamento esplorativo

Matrice di 60 rivelatori di silicio/
alluminio per Dark Matter e Neutrini



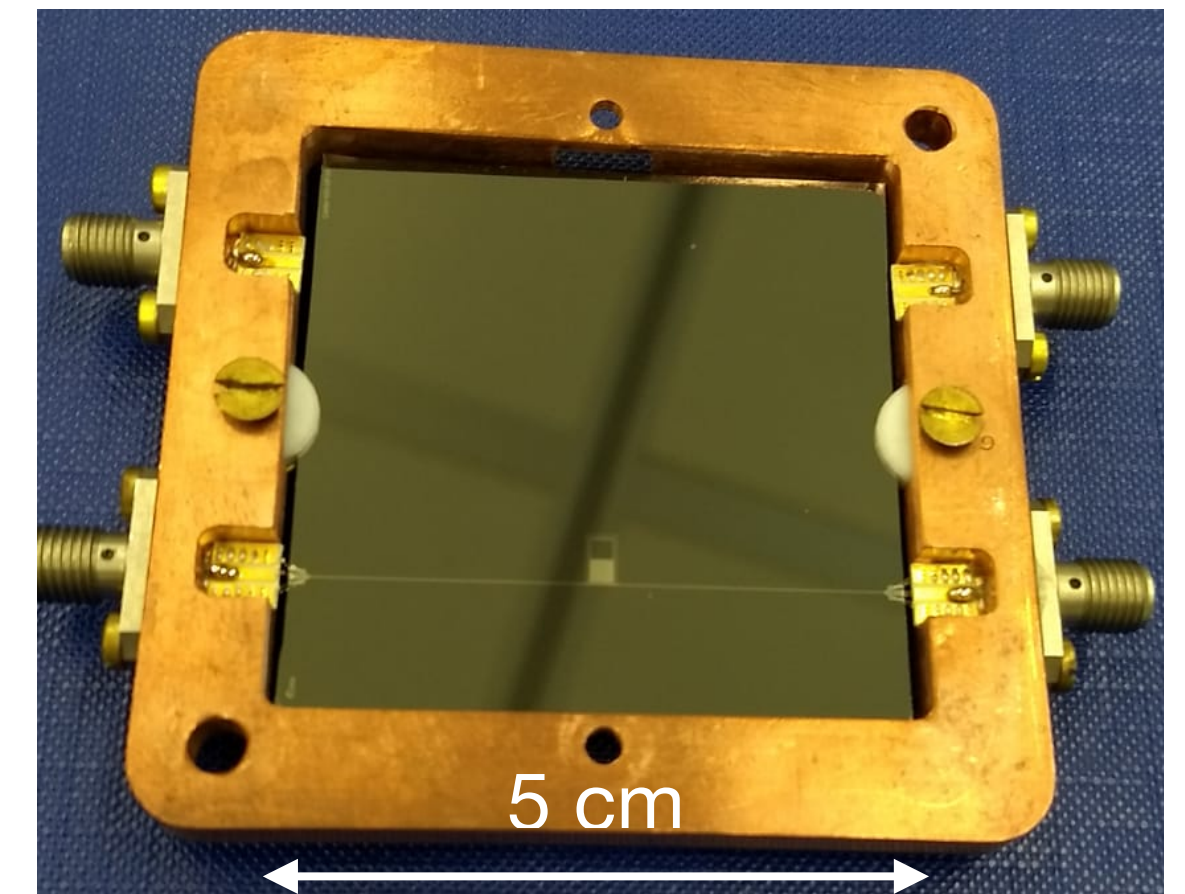
Obiettivo ERC

Pila di 2000 rivelatori e con
sensibilità maggiore



ERC precedente

1 rivelatore grande per fotoni
(da usare in esperimenti per neutrini)



È fondamentale spiegare le specificità dei progetti e l'unicità dell'ERC proposto

Tentativo 1 (Call 2020): fallito

Prototipo non esistente, nessun articolo pubblicato

Giudizio: troppo high risk

MAHLER is a very innovative proposal that highly benefits from developments from previous important funding and INFN Seed Funding. The committee appreciated the novel ideas that will allow an increase in sensitivity and the readout. However, the panel members were not convinced that the proposed schedule including R&D and construction is realistic and that a full detector can be ready within 5 years. The panel members think that this project would benefit from much more R&D, and that a collaboration will need to be built for the construction and operation of the full detector.

The PI is an expert in cryogenic detectors with a proven track record. There is no doubt that he has the expertise required for this project.

Rating A, 65% (Soglia < 35%)

Tentativo 2 (Call 2021): fallito

Prototipo quasi esistente, nessun articolo pubblicato

Giudizio: troppo high risk

The PI proposes to use his innovative Kinetic Inductance Detector technology to develop a cryogenic detector that can detect light dark matter particles as well as neutrinos via coherent neutrino-nucleus scattering. It would be ground-breaking if successful. The PI has the capacity and experience required for the project.

The scientific approach of first prototyping the detector and executing a pilot experiment is reasonable. However it would require many technological developments such as achieving the low energy threshold of 50eV and porting the technology to germanium, excessively raising the risk. The panel considered that It was not clearly demonstrated how the proposed technology could evolve and have an impact on future large-scale neutrino or dark matter experiments. It remained unclear to the panel how likely and depending on what performance figures the proposal would find entrance into a bigger neutrino experiment collaboration. Nevertheless, overall the project is a valuable effort that would be well worth pursuing.

Problema con le collaborazioni, ma all'intervista non ho ricevuto domande su questo!

Rating A, 70% (Soglia < 40%)

Tentativo 3 (Call 2022): successo

Il prototipo funzionicchia, nessun articolo pubblicato alla sottomissione.

Motivazione bassa ma c'è anche il Seed of ERC Sapienza:
se va male questo finanziamento è adeguato a portare avanti il prototipo.

Cosa è cambiato?

- Il nome: MAHLER -> DANAE
- Avanzamento scientifico del prototipo
- Ridotta la prospettiva di collaborazioni future
- Interview con domande precise sul progetto

Avrei potuto risottometterlo? Probabilmente no

- Prima dell'interview il prototipo ha funzionato al di sopra delle aspettative
- Aspetto high-risk ridotto significativamente.
- Era l'ultimo anno di anzianità per un CoG.

I miei criteri, ma non c'è una ricetta

Progetto:

- Avere le idee e gli obiettivi chiari.
- Non sparare troppo alto, se lo vinci poi devi farlo.
- Scrivere molto bene il B1, viene letto da persone non necessariamente della vostra area
- Dedicare almeno 1 mese a tempo pieno alla scrittura di B1 e B2 (con l'idea definita in precedenza).

Prima dell' interview:

- Preparare le slide almeno 1 mese prima
- Fare prove dell'intervista con colleghi dalla propria area ma soprattutto non della propria area
- Simulare domande scomode e scriversi le risposte.
- Non assumere che tutti i panelists conoscano ogni dettaglio del progetto.

All'interview:

- Rispondere in modo preciso e conciso
- Cercare di farsi fare più domande possibile
- Una domanda che mi hanno sempre fatto (4 interviste...): "Come questo progetto si distingue dai tuoi precedenti"