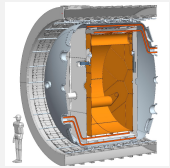


# AXIONS

C GATTI (FOR THE COLD LAB GROUP)



Updates on QUAX - Galactic Axion  
Search at 10 GHz ( $35\text{-}50\ \mu\text{eV}$ )



Next Steps for FLASH - Galactic Axion  
Search at 100 MHz ( $0.4\text{-}1.1\ \mu\text{eV}$ )

## OUTLINE

GALACTIC AXION SEARCH  
AT 10 GHz (35-50  $\mu\text{eV}$ )

QUAX@LNF

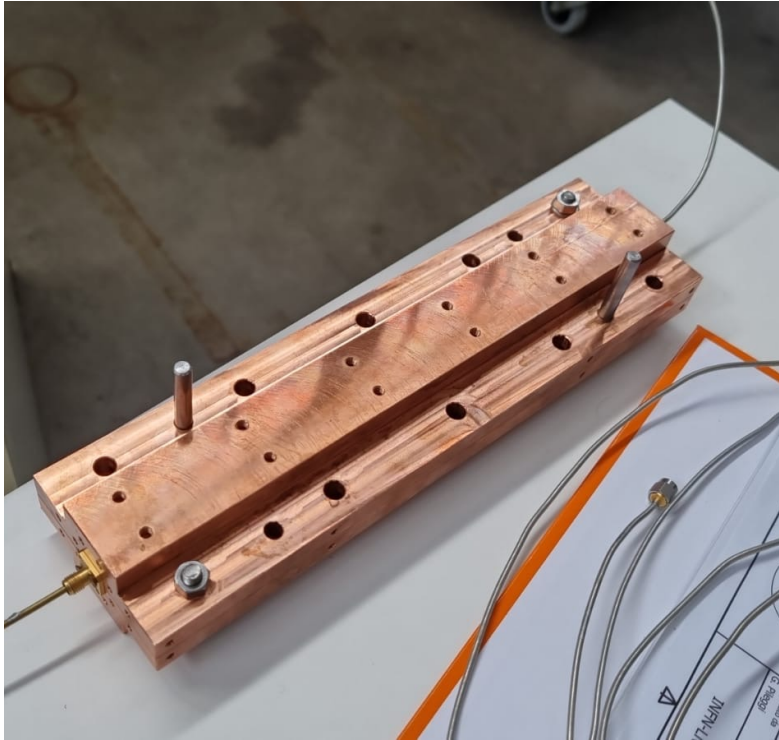


## 9T MAGNET

The new 9T magnet, arrived from AMI at LNF, was installed inside the dilution refrigerator. Tests ongoing.

A new turbo pump installed to improve cooling power at 10 mK

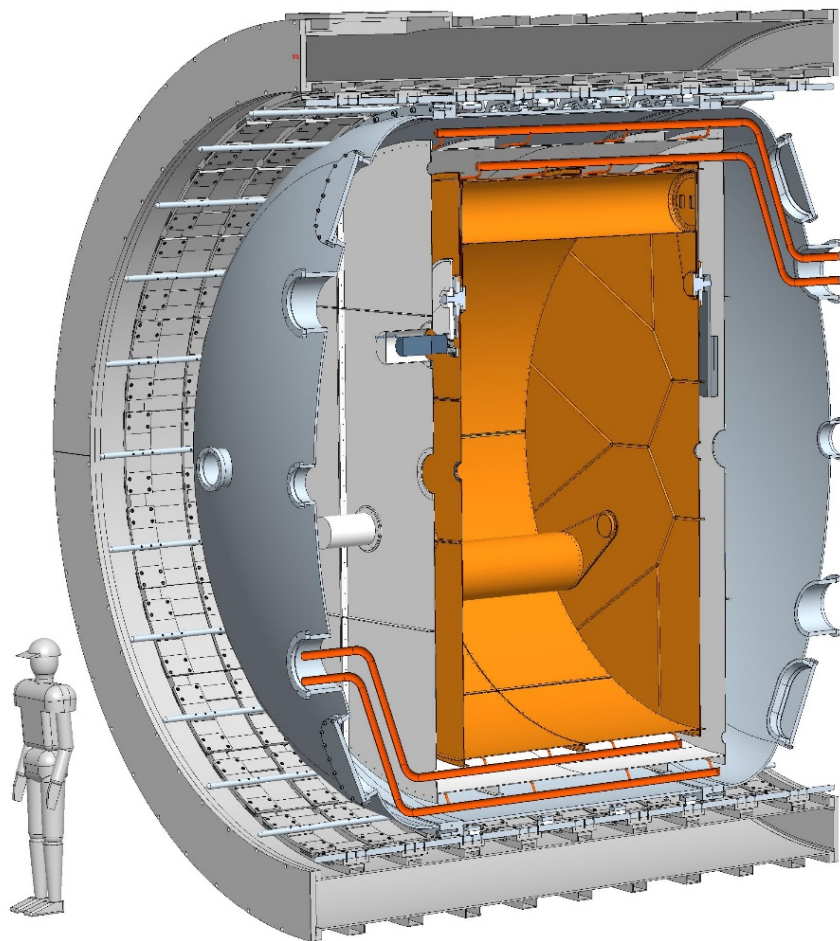




## 8.5 GHz Resonant Cavity

OFHC Cu cavity for Quax-LNF pilot run fabricated at LNF workshop and sent to LNL for surface chemical-polishing.

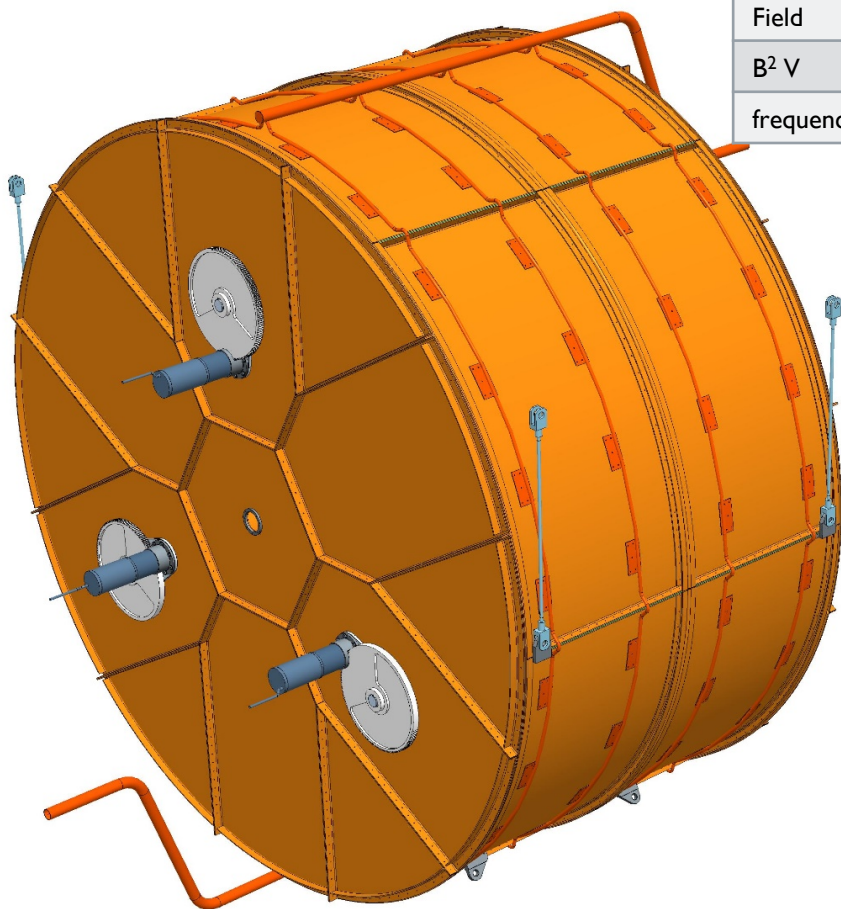
Preliminary characterization done at 300 K ( $Q_0=13000$  and  $O(100\text{ MHz})$  tunability).



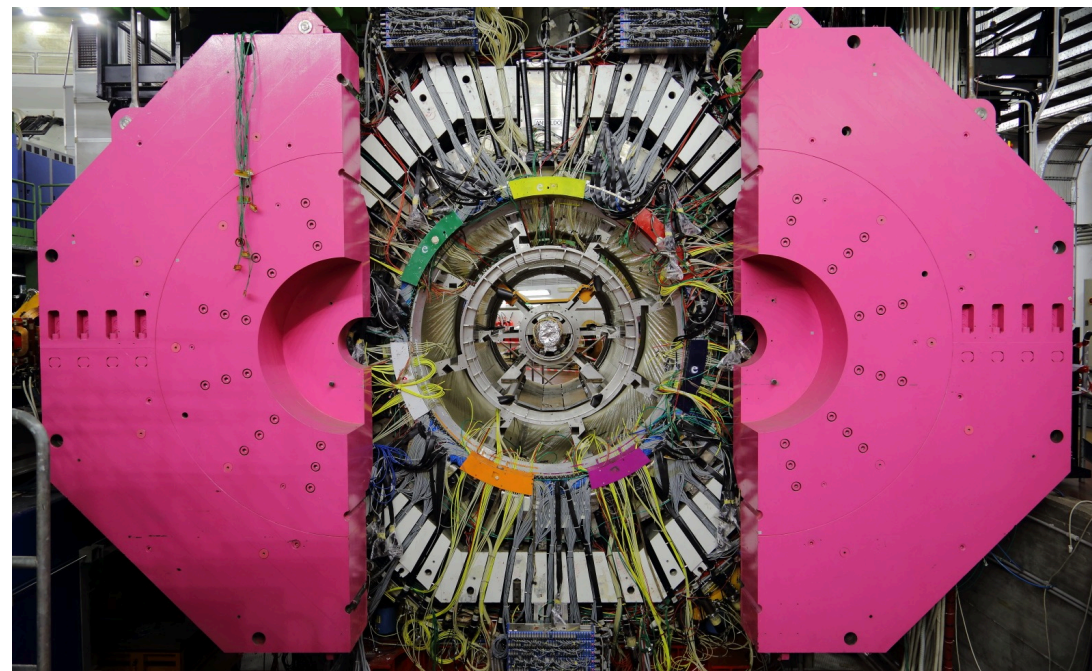
# FROM KLASH TO FLASH

GALACTIC AXION SEARCH AT  
100 MHz (0.4-1.1  $\mu\text{eV}$ )

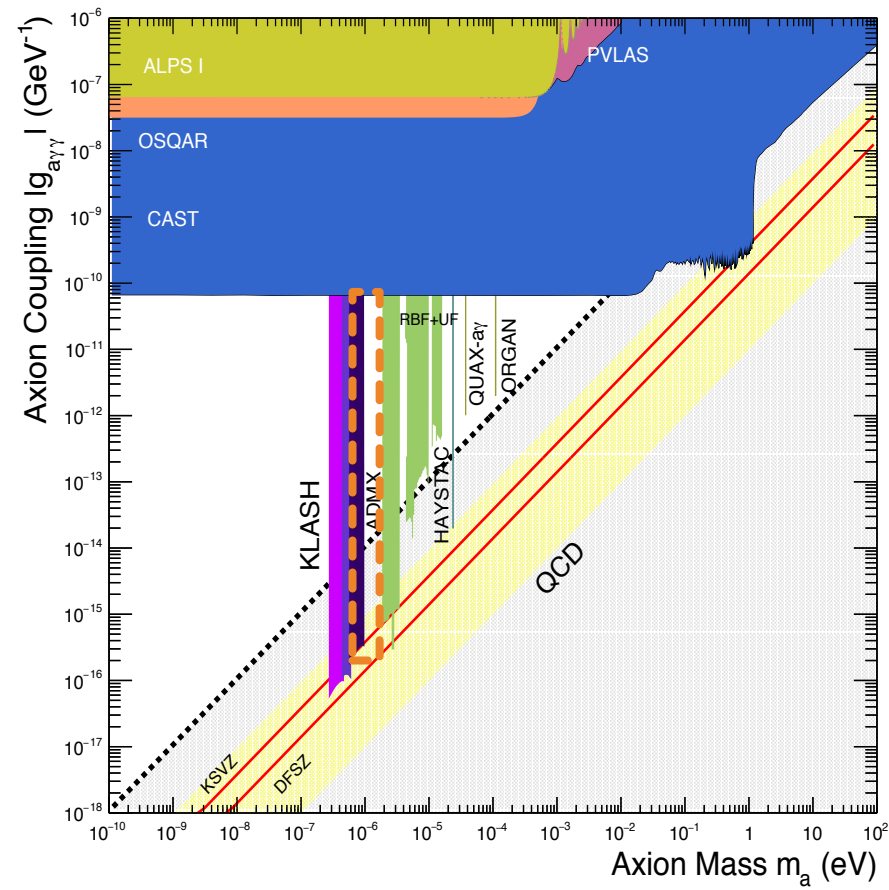




FLASH	
Length	1764 mm
Diameter	2118 mm
V	6.2 m <sup>3</sup>
Field	1.1 T
B <sup>2</sup> V	7.5 T <sup>2</sup> m <sup>3</sup>
frequency	110–270 MHz



- Expected sensitivity of FLASH





# Mini Workshop on Physics Opportunities at 100-300 Mhz Haloscopes

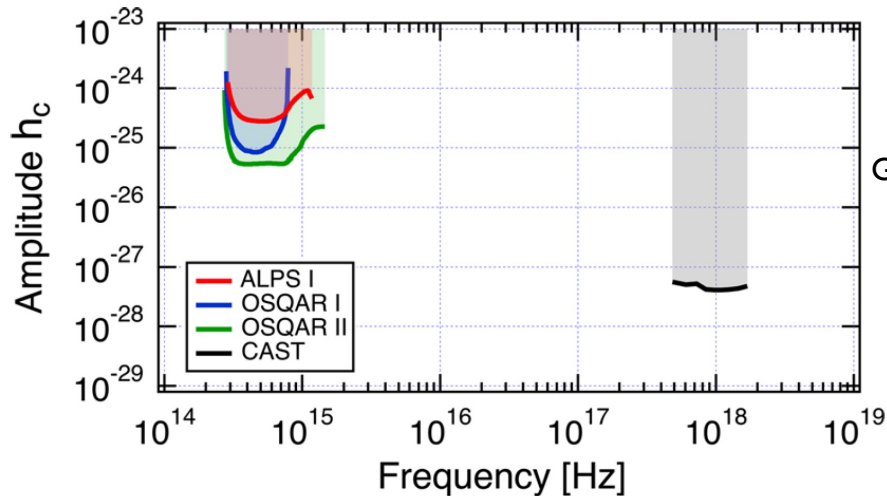
In collaboration with Rades/Baby Yaxo group we are organizing a Mini Workshop on physics opportunities at 100-300 MHz Haloscopes. To be held between February and March at CERN or LNF (or online ...).

## Topics:

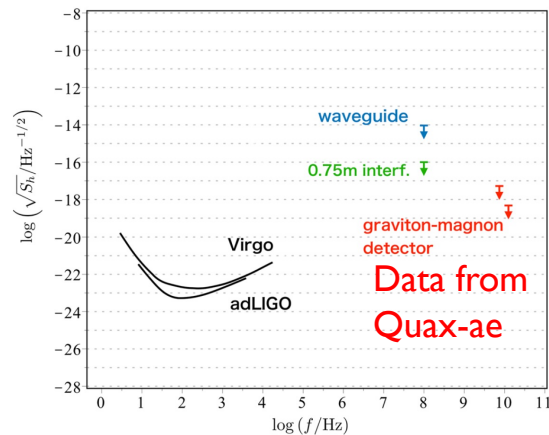
1. Theoretical aspects of Axions at 100-300 MHz
2. The Flash Haloscope
3. The Baby Yaxo Haloscope (Rades group)
4. Other axion searches at low mass (DMRadio, Abracadabra, Casper)
5. HF-GW detection with Axion detectors
6. Cryogenics and Detector

Invitation will be addressed to experimental and theoretical physicists working in the field of axion/alps and GWs, as well as to the community involved in the Physics Beyond Collider studies, with the aim of investigating physics opportunities at  $O(100 \text{ MHz})$  Haloscopes.

# High Frequency Gravitational Waves



Graviton-photon conversion EPJC (2019) 79



Graviton-magnon conversion EPJC (2020) 80

PHYSICAL REVIEW D **104**, 023524 (2021)

## Detecting planetary-mass primordial black holes with resonant electromagnetic gravitational-wave detectors

Nicolas Herman<sup>1,\*</sup>, André Füzfa<sup>1,2,†</sup>, Léonard Lehoucq<sup>1,3,‡</sup> and Sébastien Clesse<sup>4,2,§</sup>

Eur. Phys. J. C (2019) 79:1032  
<https://doi.org/10.1140/epjc/s10052-019-7542-5>

THE EUROPEAN  
PHYSICAL JOURNAL C



Regular Article - Theoretical Physics

## Upper limits on the amplitude of ultra-high-frequency gravitational waves from graviton to photon conversion

A. Elli<sup>1,a</sup>, D. Elli<sup>3</sup>, A. M. Cruise<sup>2</sup>, G. Pisano<sup>1</sup>, H. Grote<sup>1</sup>

Eur. Phys. J. C (2020) 80:179  
<https://doi.org/10.1140/epjc/s10052-020-7735-y>

THE EUROPEAN  
PHYSICAL JOURNAL C



Letter

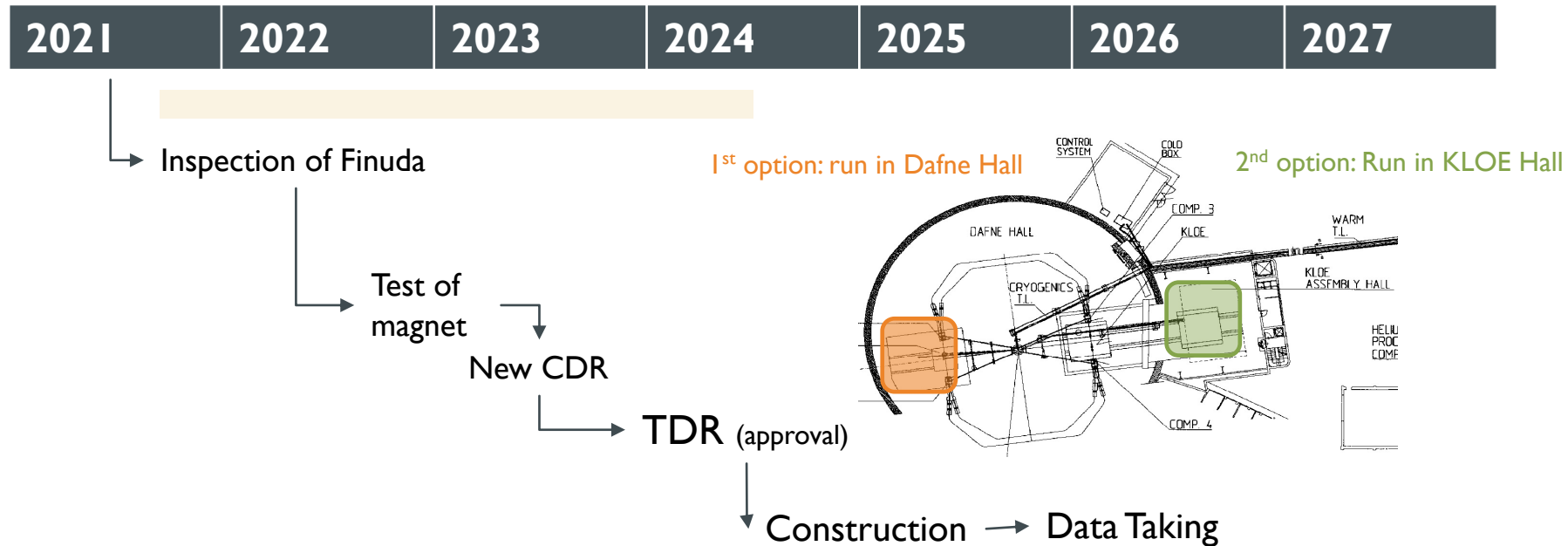
## Probing GHz gravitational waves with graviton-magnon resonance

Asuka Ito<sup>a</sup>, Tomonori Ikeda<sup>b</sup>, Kentaro Miuchi<sup>c</sup>, Jiro Soda<sup>d</sup>

Department of Physics, Kobe University, Kobe 657-8501, Japan

See also Workshop on “Ultra-High-Frequency GWs: A Theory and Technology Roadmap” <https://indico.cern.ch/event/1074510/>

# FLASH Timeline and Next Steps



A discussion about FLASH and next steps to take organized by the local CSN2 Coordinator (G. Mazzitelli) will be held on November the 29th:

1. Preparation of test of the Finuda magnet (contact companies, site inspection, cost evaluation).
2. Contact ASG Superconductors (<https://www.asgsuperconductors.com/progetto/finuda>) about mode to move the magnet.
3. Refurbishing of the control panel and other hardware parts.
4. Discussion about people and Services involvement.



# Operating FLASH in Dafne Hall

We received the following comments from the Radiation Protection Expert of LNF on two main scenarios :

1. Access to the Dafne Hall only when no beams are circulating in Dafne  
Easier solution in terms of radiation protection. No particular changes needed for shieldings, control system and authorizations. Limited access to the detector. Impact on noise induced inside the detector or on the electronics must be evaluated.
2. Access to the Dafne Hall with beam accumulated in Dafne  
Full access to the detector and no concern about induced noise. It requires new shieldings, new access control system and new authorizations (estimated time 2 years).

# Conclusion

2022 will be an important year for Axions at LNF:

- Complete assembly of Quax@LNF haloscope
- Test run at 8.5 GHz
- New extended collaboration for FLASH
- Test of the FINUDA magnet

*Thank You!*