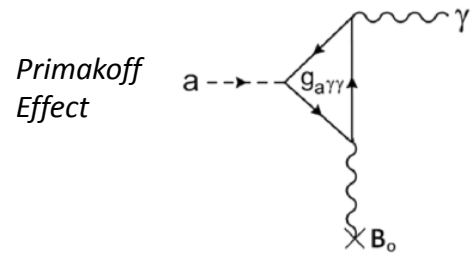


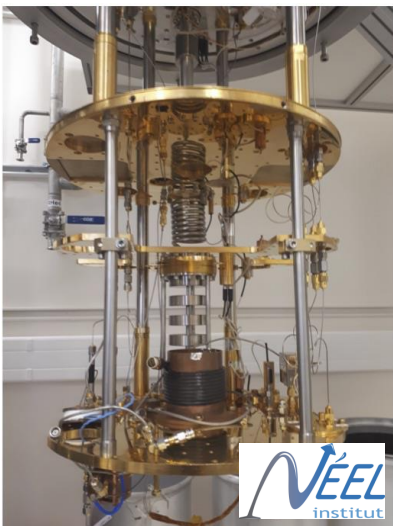
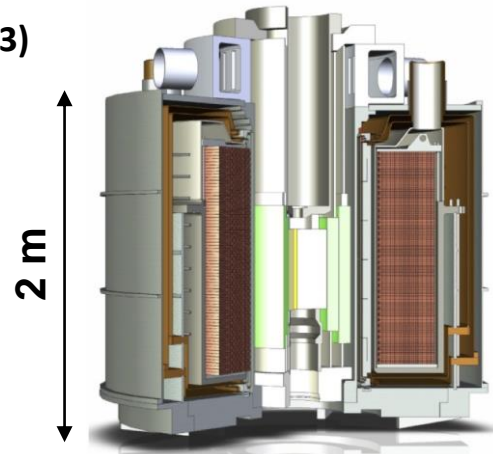
R. Ballou, P. Camus, T. Grenet, S. Kramer, P. Pognat, J. Quevillon, N. Roch, C. Smith, CNRS-Grenoble & Univ. Grenoble-Alpes

Axion & ALPs Haloscope (Sikivie 1983)

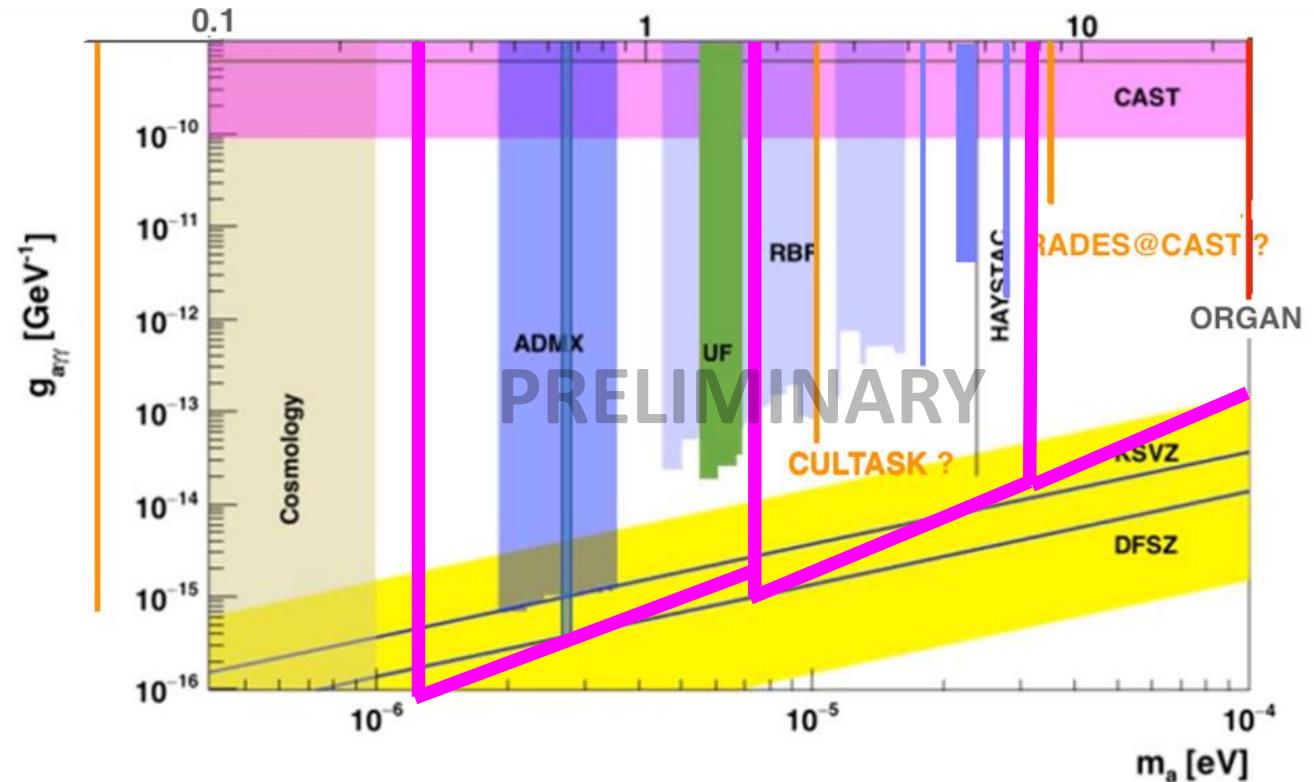


$$P \propto g_{a\gamma\gamma}^2 B_0^2 V < 10^{-21} \text{ W}$$

⇒ RF cavities (0.3-30 GHz) at 20 mK & quantum amplifiers SQUID & JPA (IN) in strong magnetic field (LNCMI)



Large & small scale dilution fridges



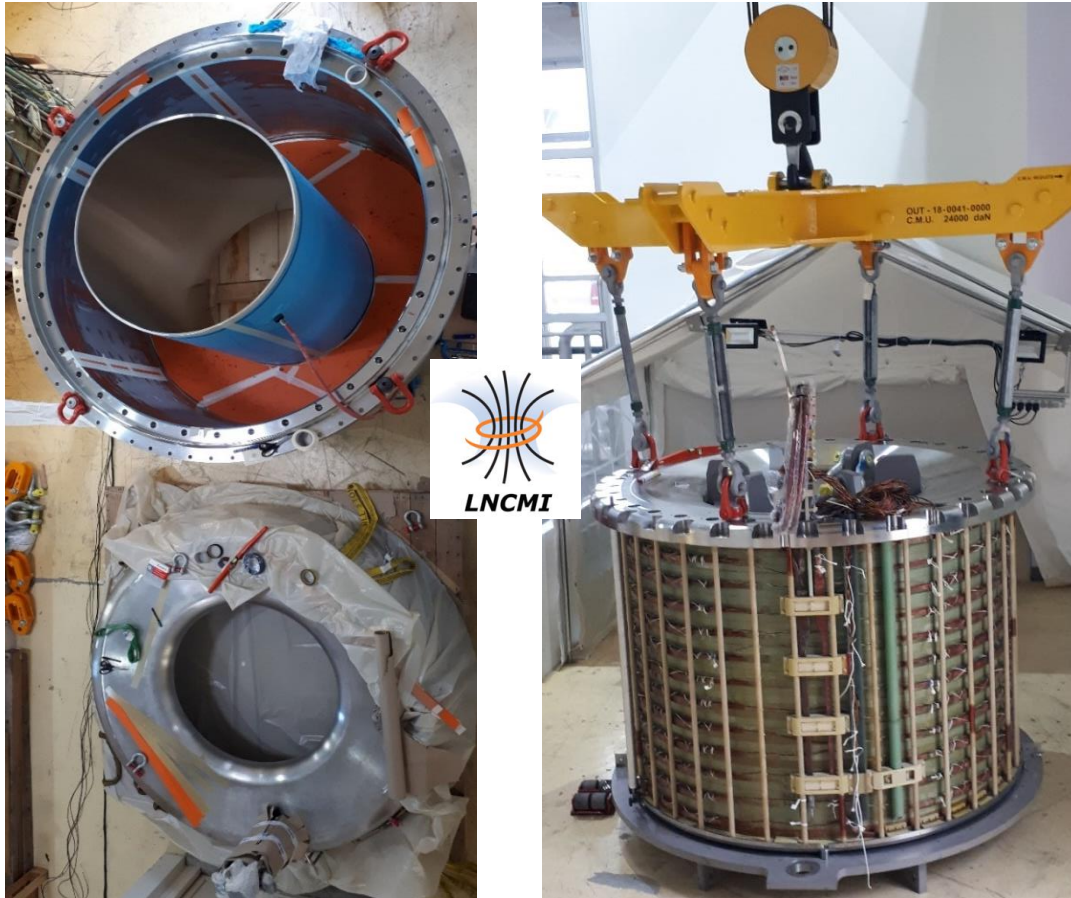
- Grenoble Hybride Magnet (Equipex LaSUP, LNCMI)
43 T/34 mm, 40 T/50 mm, 27 T/170 mm, 9 T/800 mm

<https://indico.desy.de/indico/event/13889/contribution/11/material/slides/0.pdf>
<http://cds.cern.ch/record/2315130/files/fulltext.pdf>

- 2021-2024: 1st experimental runs down to 20 mK in smaller bore superconducting magnets (LANEF, Néel Institut) in 16-20 T/50 mm & 14 T/70 mm

Grenoble Hybrid magnet

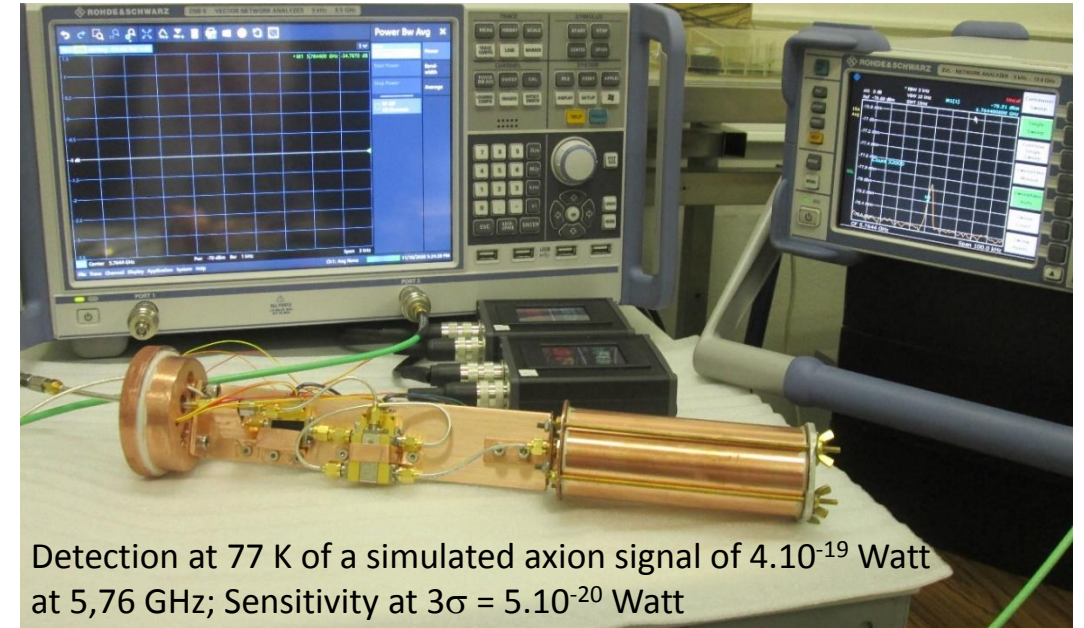
- Integration & final assembly on-going at LNCMI/Grenoble



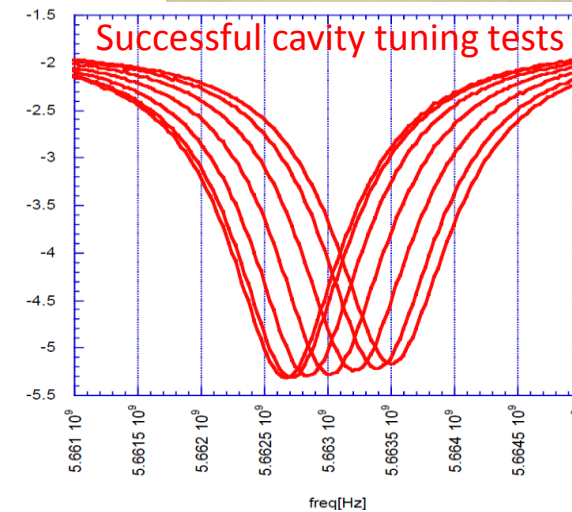
Ref. (p.9) : https://emfl.eu/emflwebsite/wp-content/uploads/2020/11/emfl_newsletter_n3_20_web.pdf

- Final assembly & pumping expected end of 2021

RF Cavity developments at



Detection at 77 K of a simulated axion signal of 4.10^{-19} Watt at 5,76 GHz; Sensitivity at $3\sigma = 5.10^{-20}$ Watt

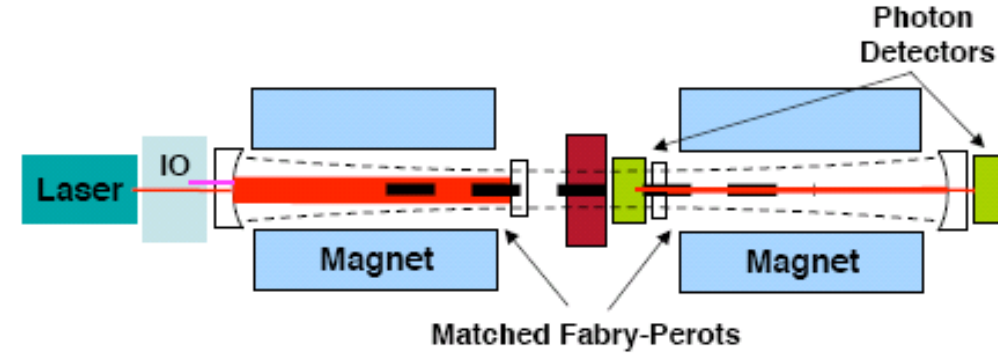


First data taking in 2021 at 2 K & 16 T in 55 mm dia. sc coil

Ref. (p.77) : http://lncmi.cnrs.fr/wp-content/uploads/2021/02/LNCMI_AR2020vwB_D.pdf

From OSQAR & ALPS toward Baby-JURA & JURA

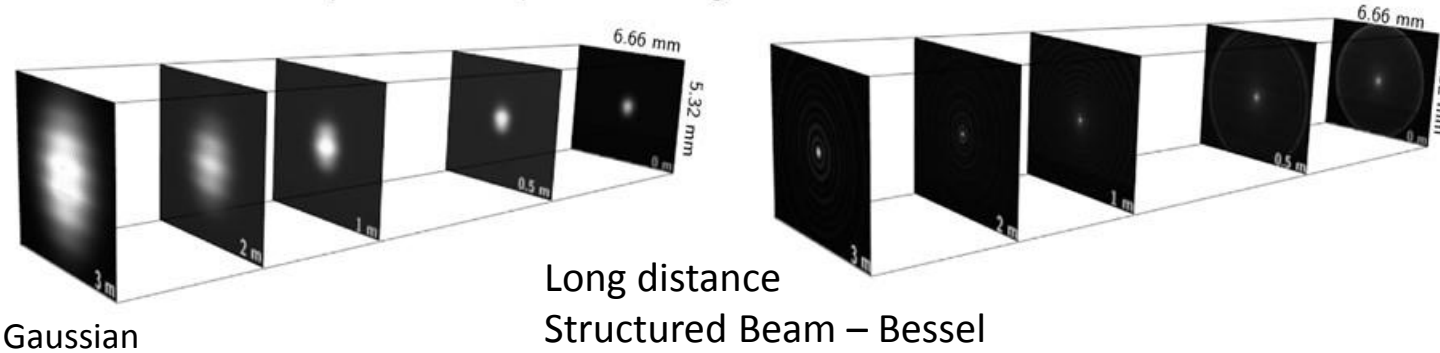
- Exploiting the unique opportunity offered by LHC/FCC sc. dipole magnets
 - Use up to 15+15 LHC dipoles, 9 T, 14.3 m, 50 mm dia. , or/and
 - Use 16 T FCC sc. dipoles to built
- Synergy with VMB@CERN & ALPS-II for the development of long Fabry-Perot cavities & known optical scheme*
- Synergy with OSQAR for the development of low divergent optical beam & development of new optical schemes**



*P. Sikivie et al, Phys. Rev. Lett. **98**, 172002 (2007)

**Such as the use of atomic physics based detection;
New OSQAR proposal under study...

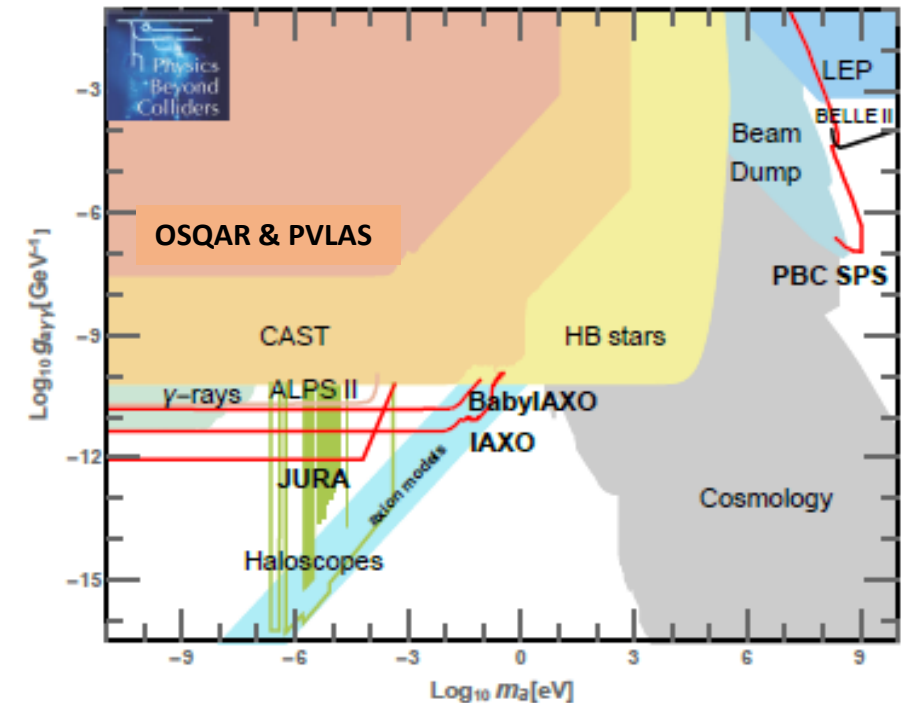
Experimental comparison of divergence of the Gaussian and the Bessel beam



Gaussian

Long distance
 Structured Beam – Bessel

Beam diameter	3 m distance	100 m distance
Gaussian	0.8 mm	240 mm
SB	0.01 mm	1.4 mm



<https://arxiv.org/pdf/1902.00260.pdf>