DOSUE-RR Experiment:

The First Direct Search for Dark Photon Dark Matter at 1 meV Mass

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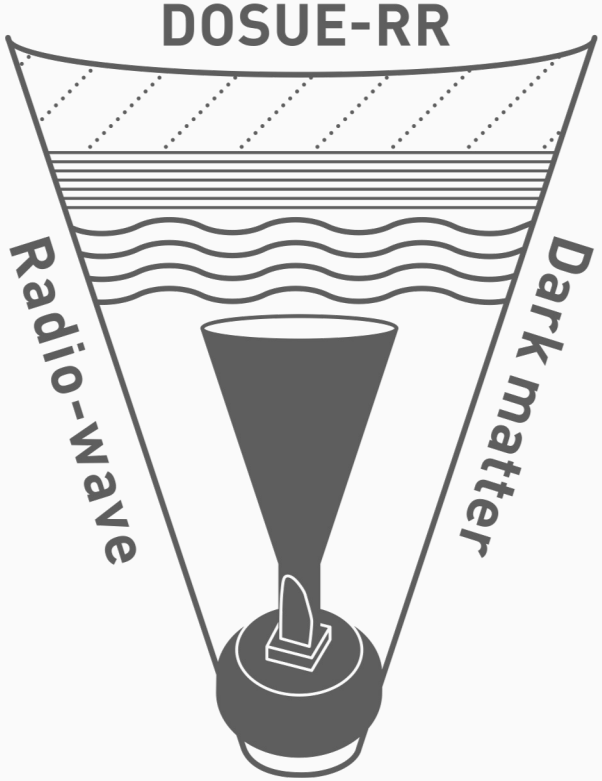
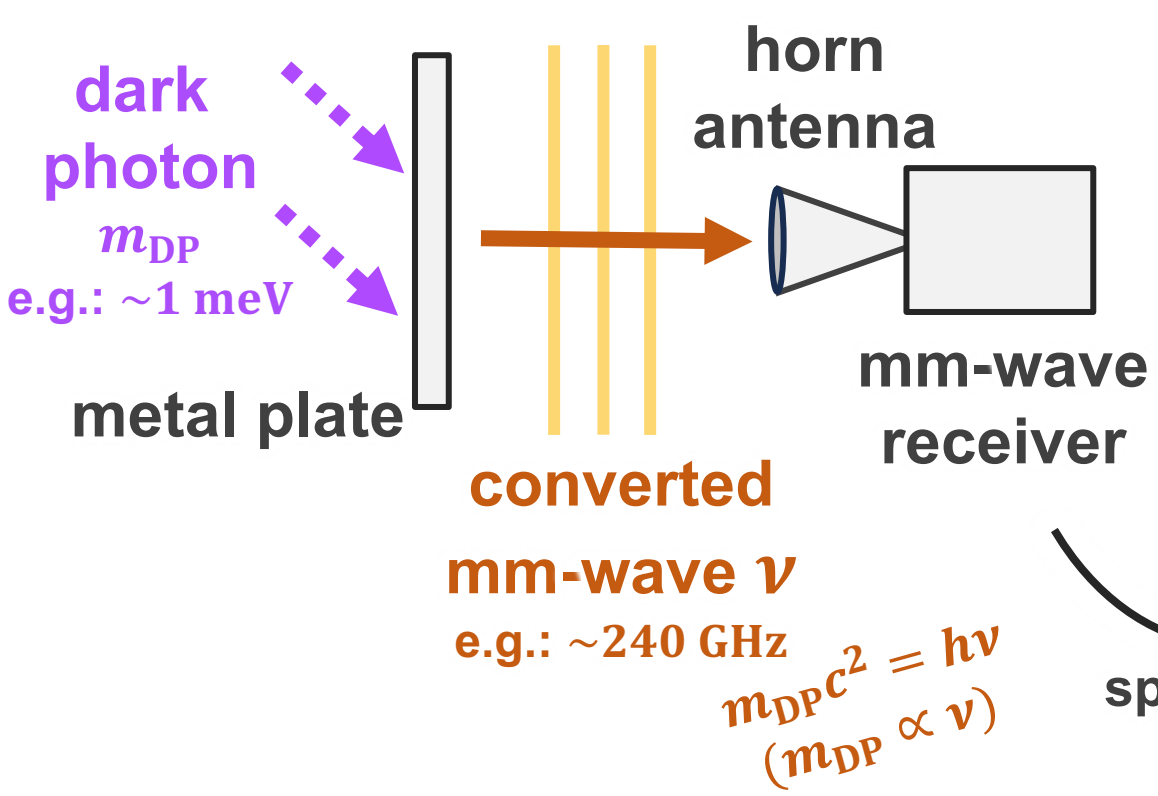
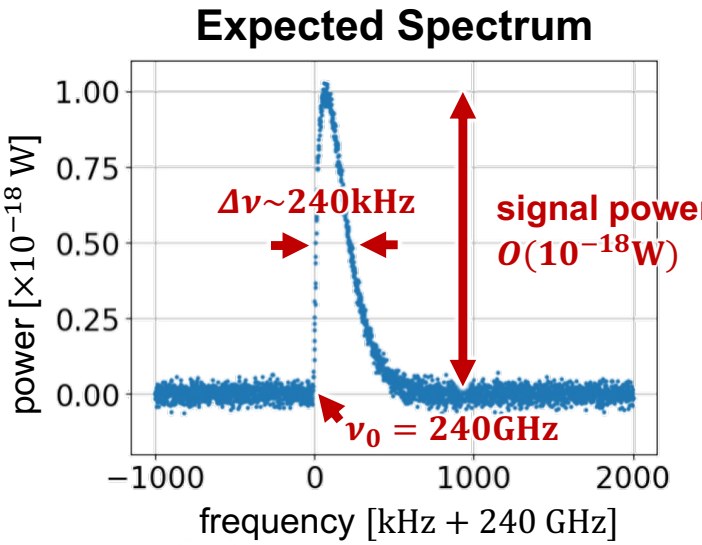


20th Patras Workshop 2025/09/24 Morning-5

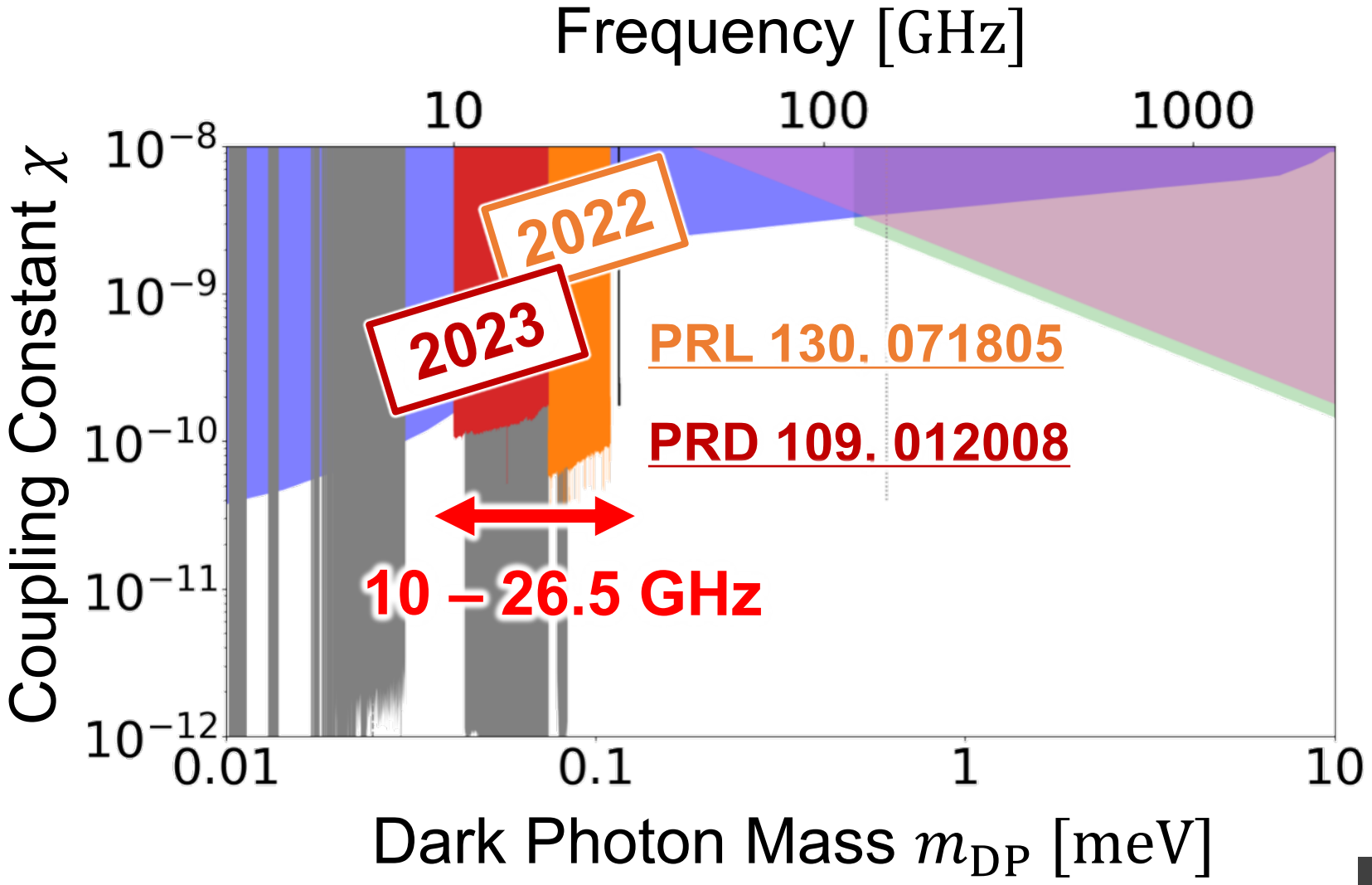
DOSUE-RR Experiment

Dish Antenna Method

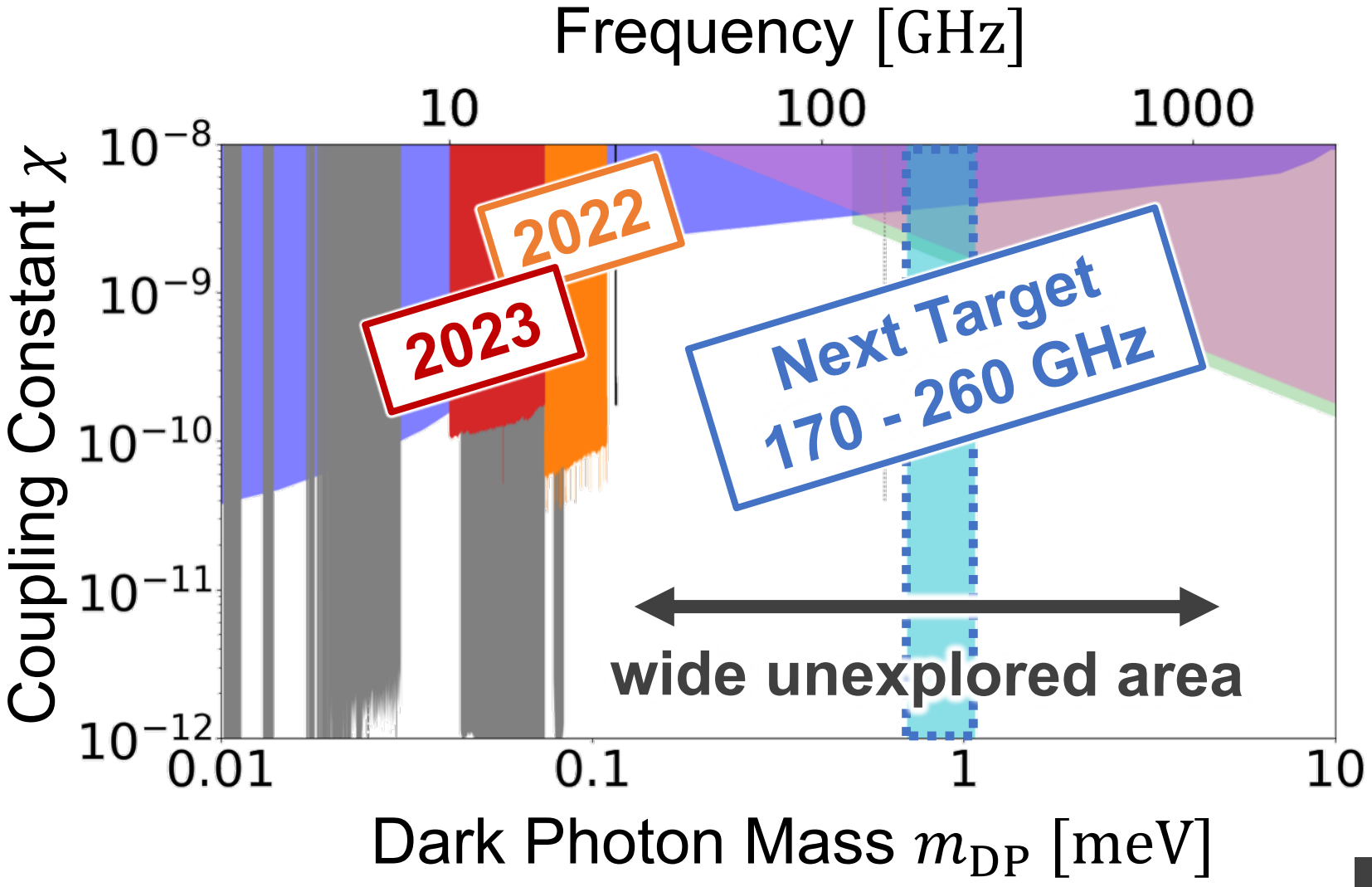




DOSUE-RR Experiment



DOSUE-RR Experiment

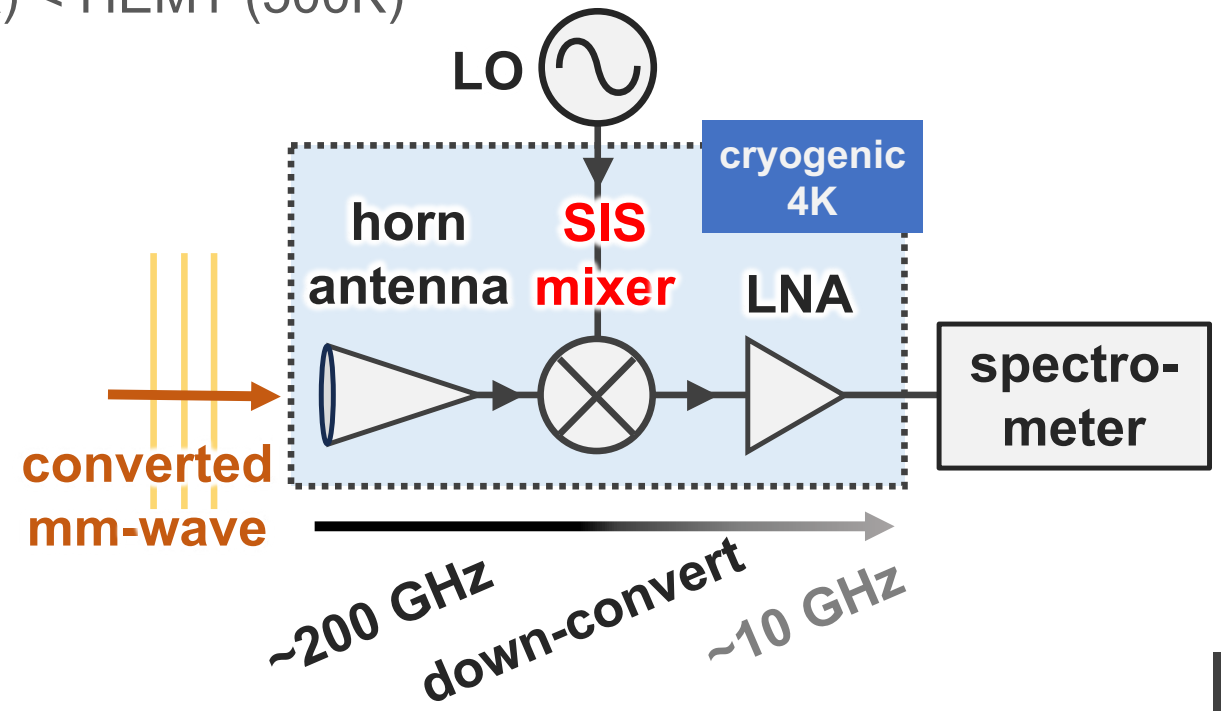


Key technology for ~ 1meV

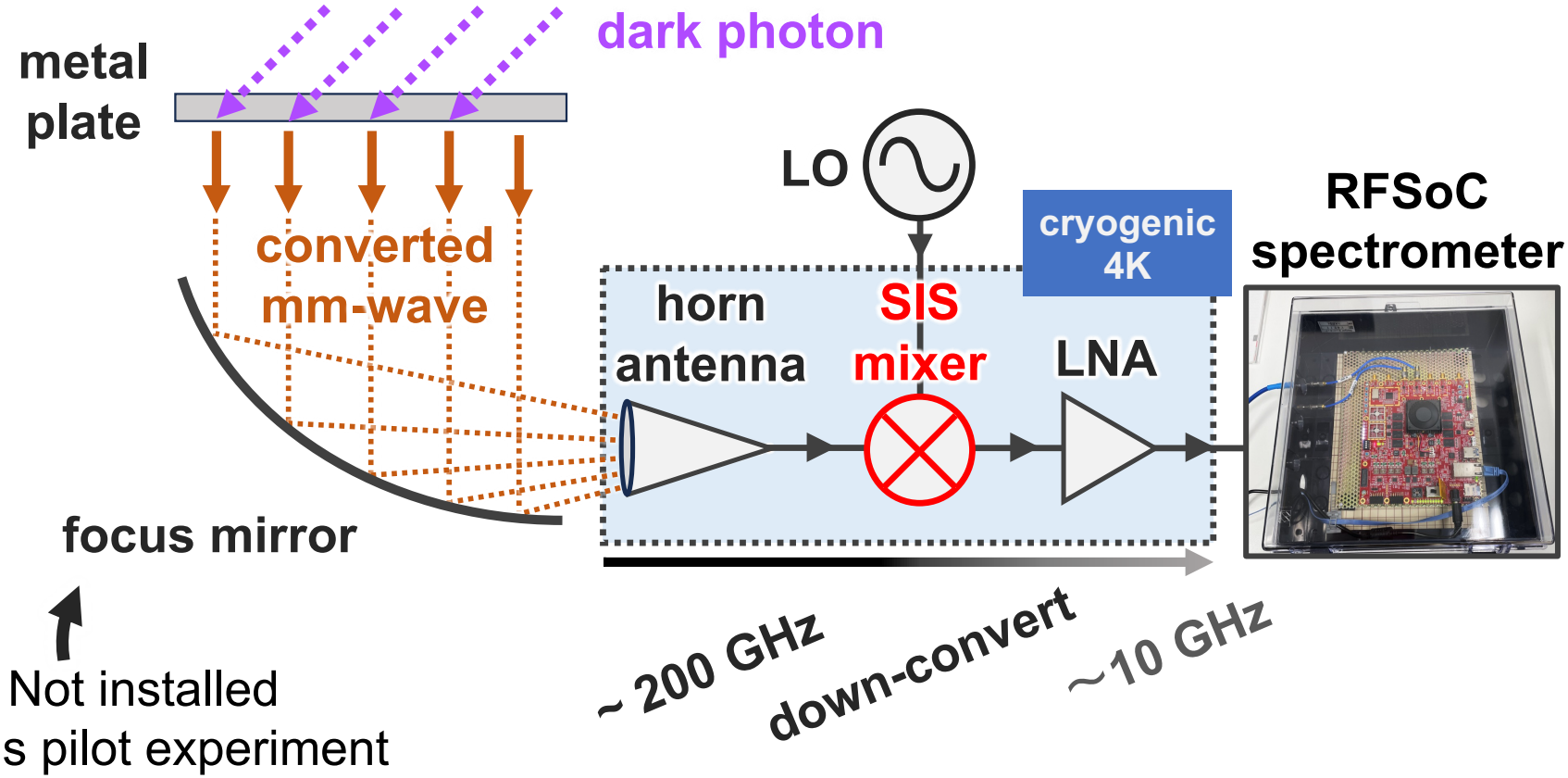
SIS mixer

- Superconducting device
- Down-converting high frequency (~200 GHz) to low (~10 GHz)
- Low noise (100K) < HEMT (500K)

SIS mixer

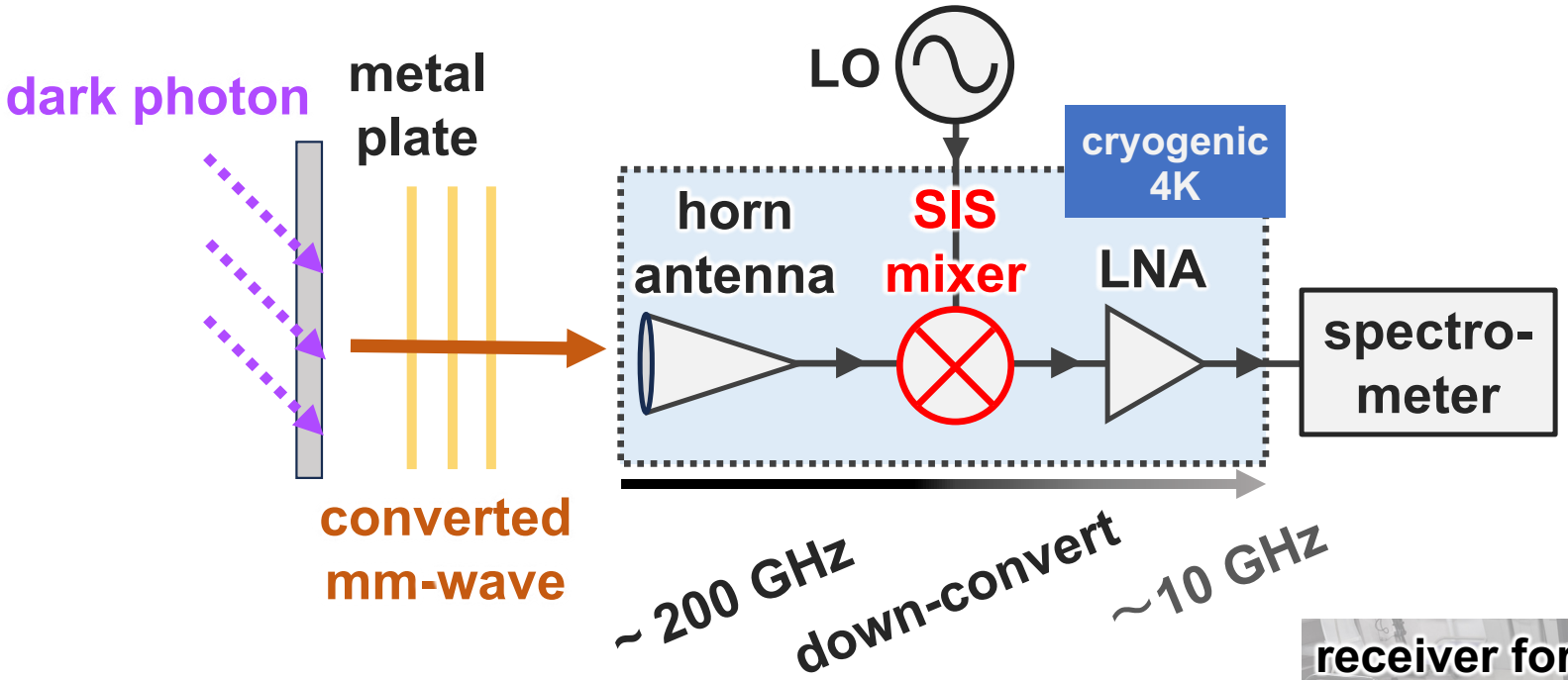


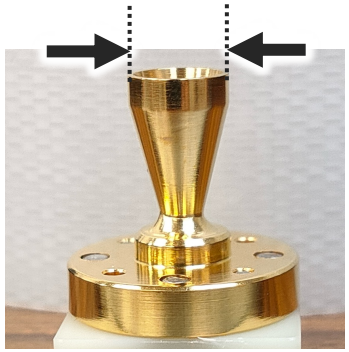
Setup plan for ~ 1meV



RFSoC Spectrometer:
H.Takeuchi et al., PTEP, 053H02 (2025).

Pilot Search for 1 meV





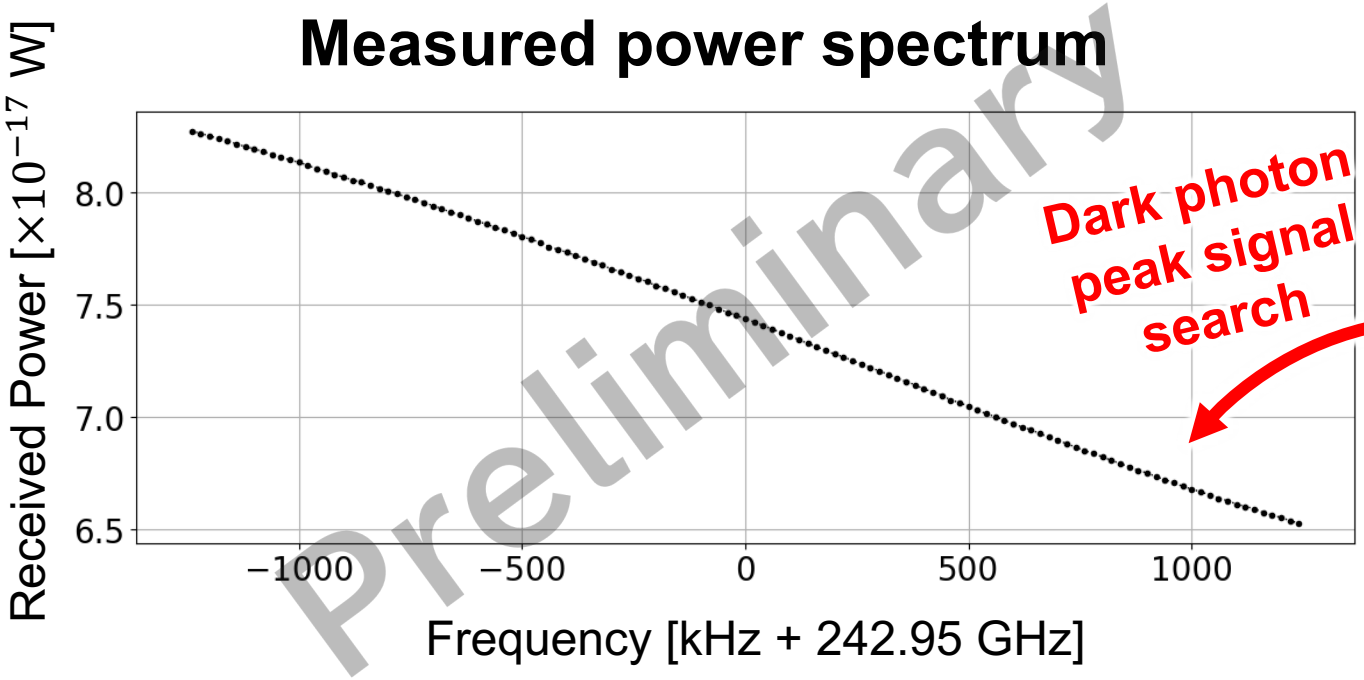
horn antenna
ϕ 0.7 cm

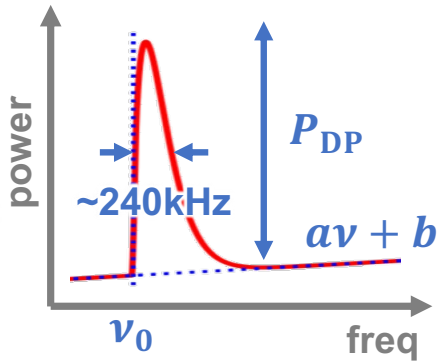
Pilot Search for 1 meV

We searched for 1 meV

- 1.004757–1.004761 meV / 242.9493–242.9503 GHz
- 1 hour (1 MHz width)

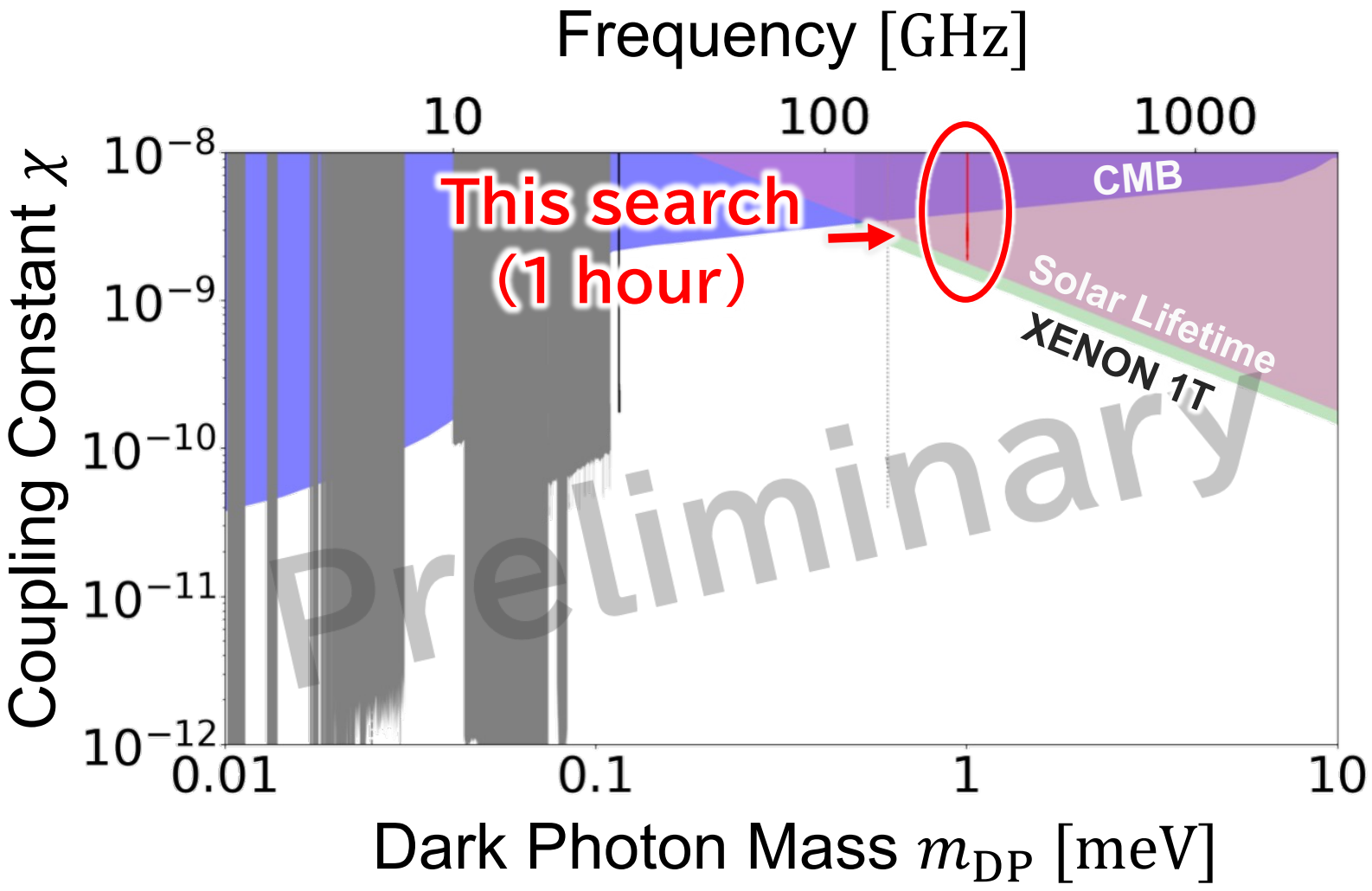
Measured power spectrum



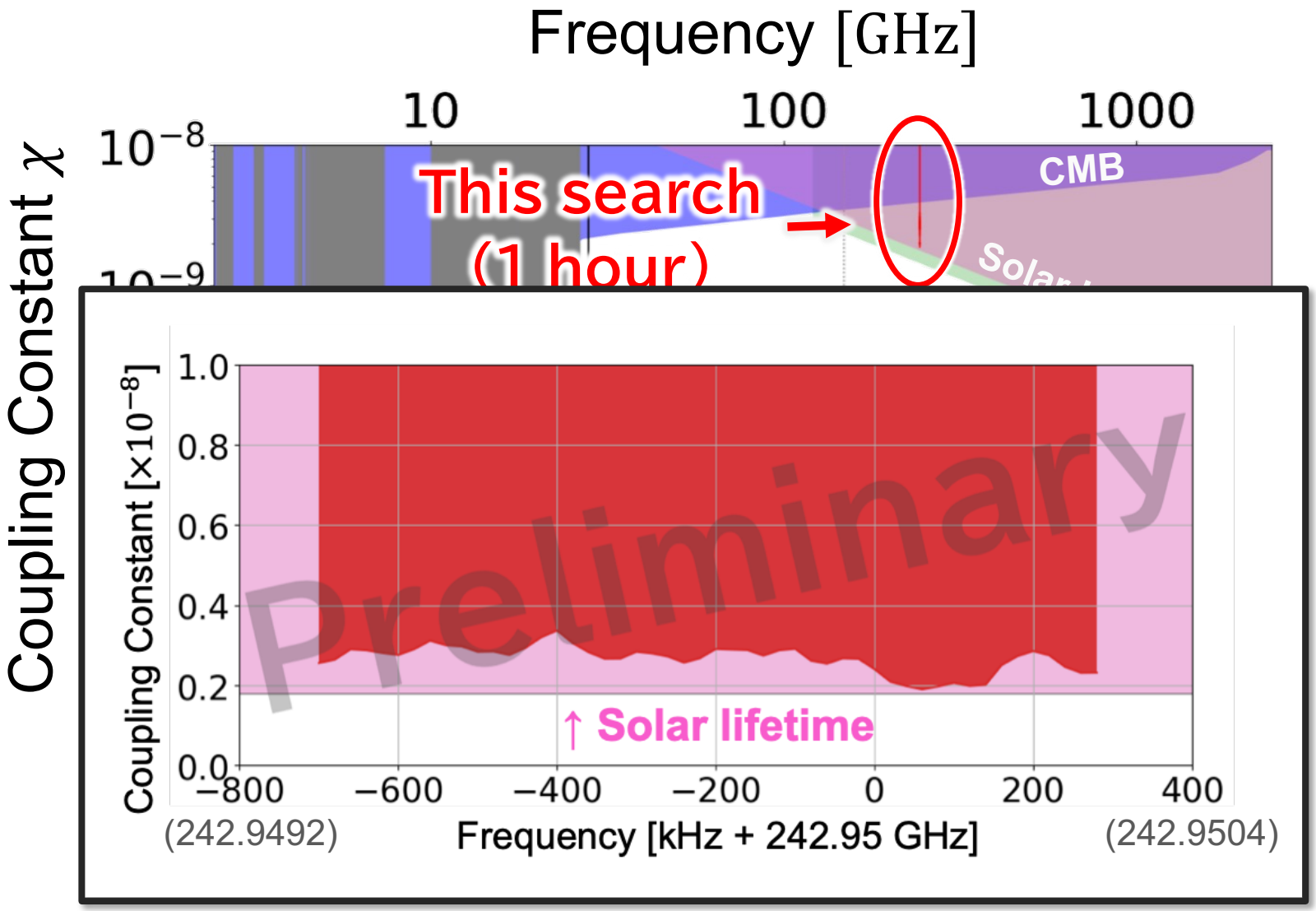


No significant excess

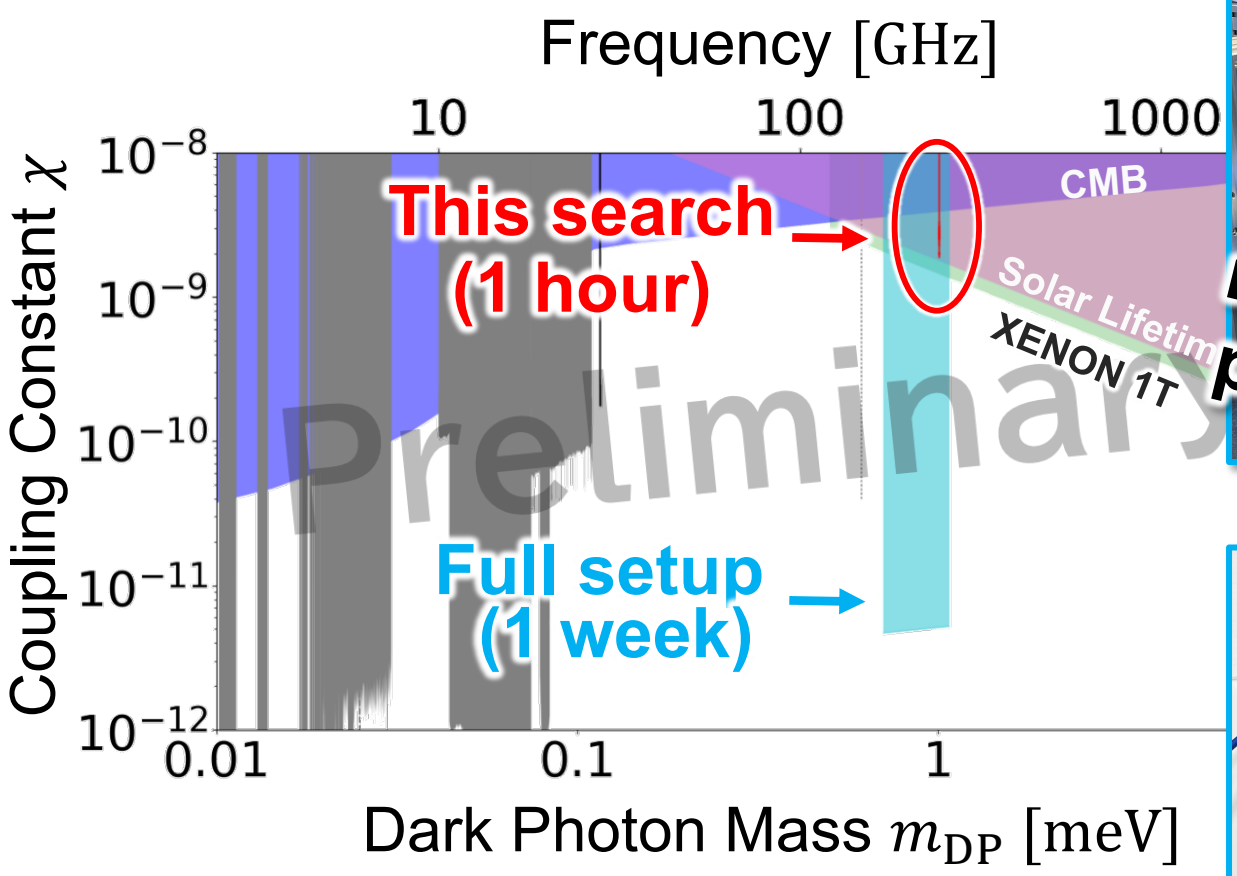
Pilot Search for 1 meV



Pilot Search for 1 meV

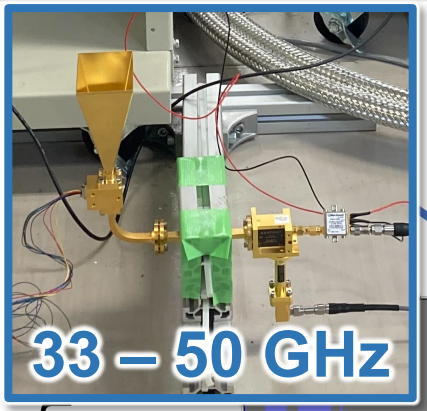


Prospects for Full Setup



H.Takeuchi et al., PTEP, 053H02 (2025).

Prospects of DOSUE-RR



Frequency [GHz]

100

10^{-9}

10^{-10}

10^{-11}

10^{-12}

0.01

0.1

1

Dark Photon Mass m_{DP} [meV

Work in Progress !!