

Laser interferometric searches for ultralight dark matter -updates from B01 group-

Yuta Michimura

LIGO Lab, Caltech

yuta@caltech.edu

RESCEU, UTokyo

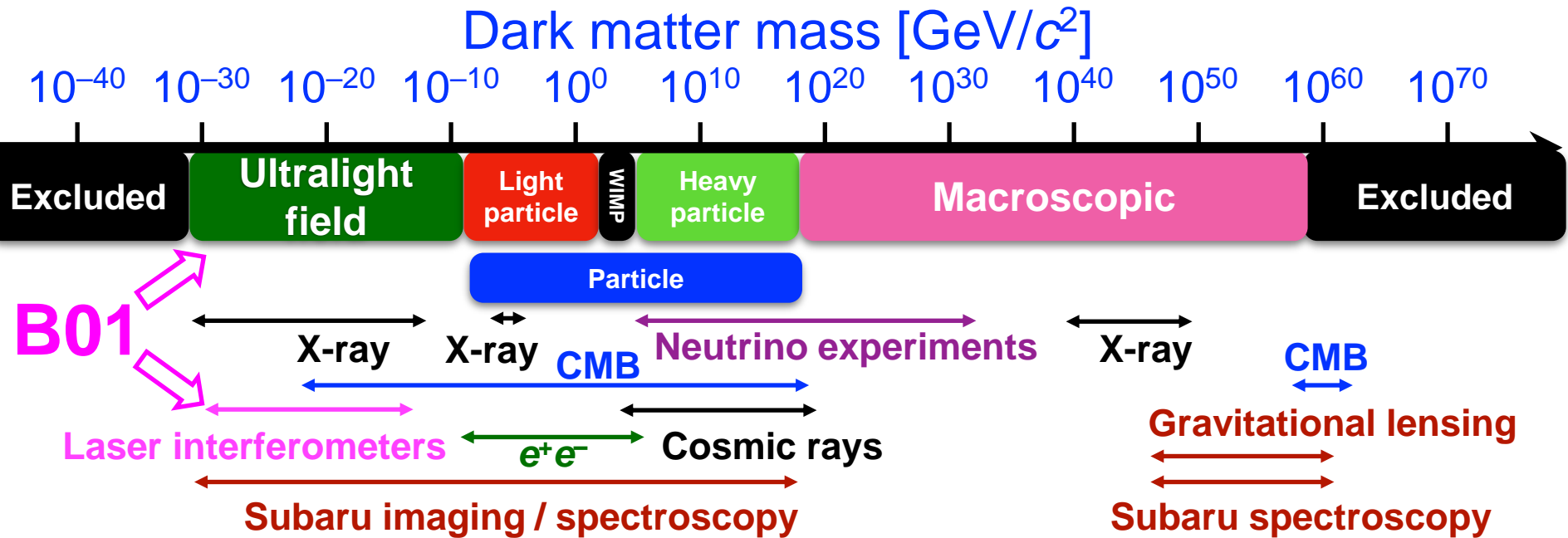
michimura@phys.s.u-tokyo.ac.jp

Caltech



Ultralight Dark Matter

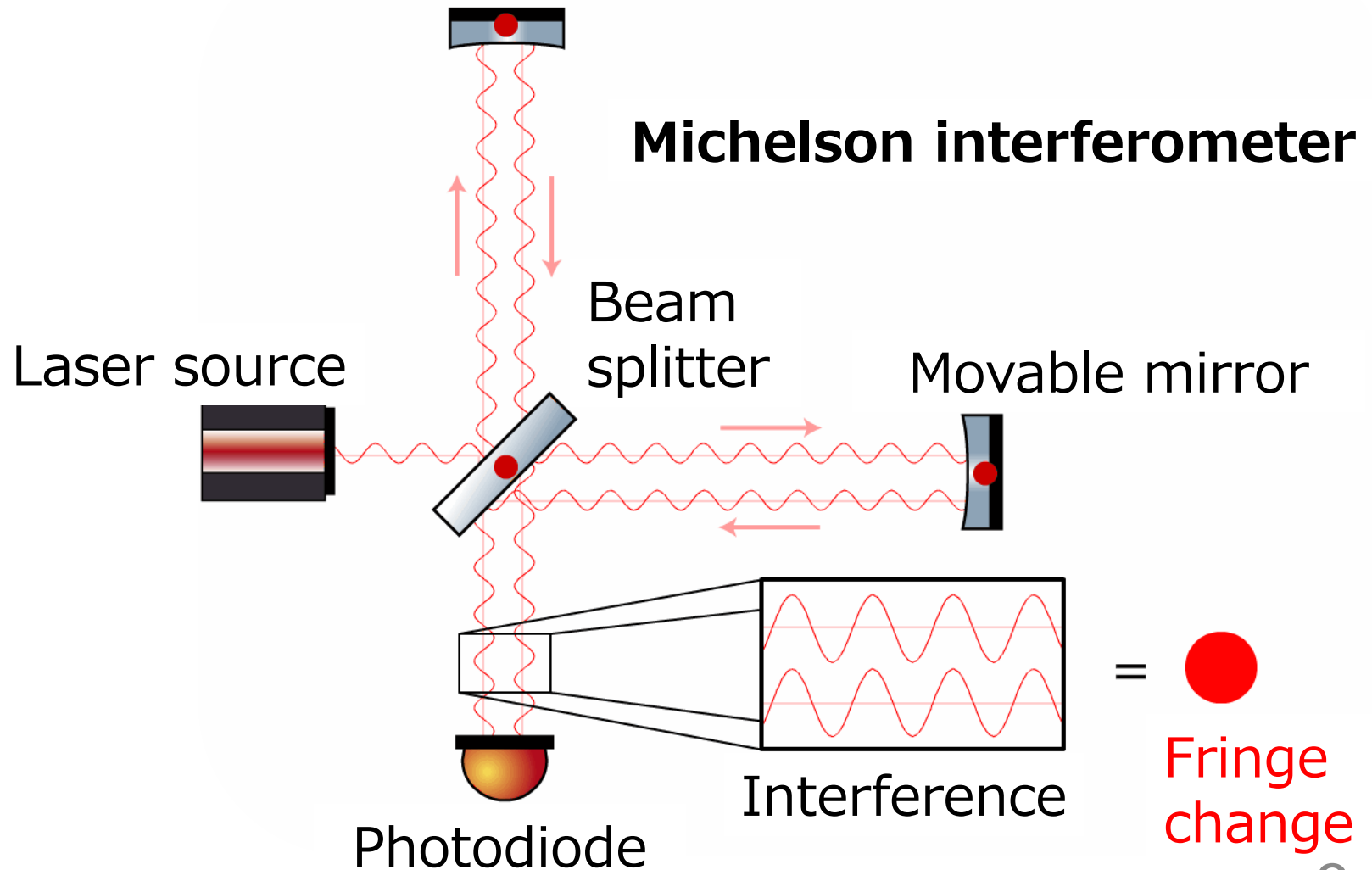
- Ultralight DM ($< \sim 1$ eV) behaves as classical wave fields
- $$f = 240 \text{ Hz} \left(\frac{m_{\text{DM}}}{10^{-12} \text{ eV}} \right)$$
- Laser interferometers are sensitive to tiny length changes from such oscillations



B01

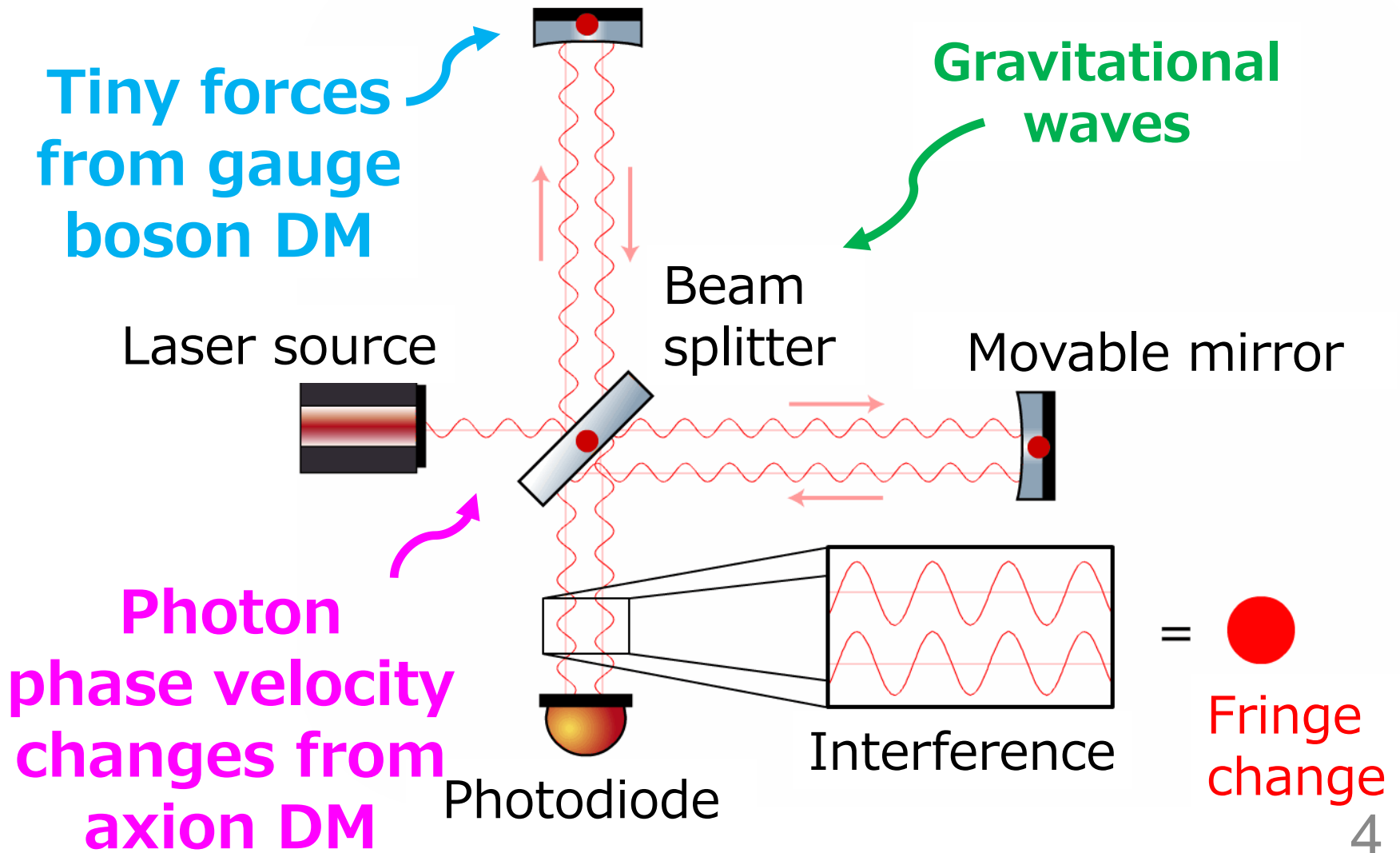
Laser Interferometry

- measures **differential** arm length change



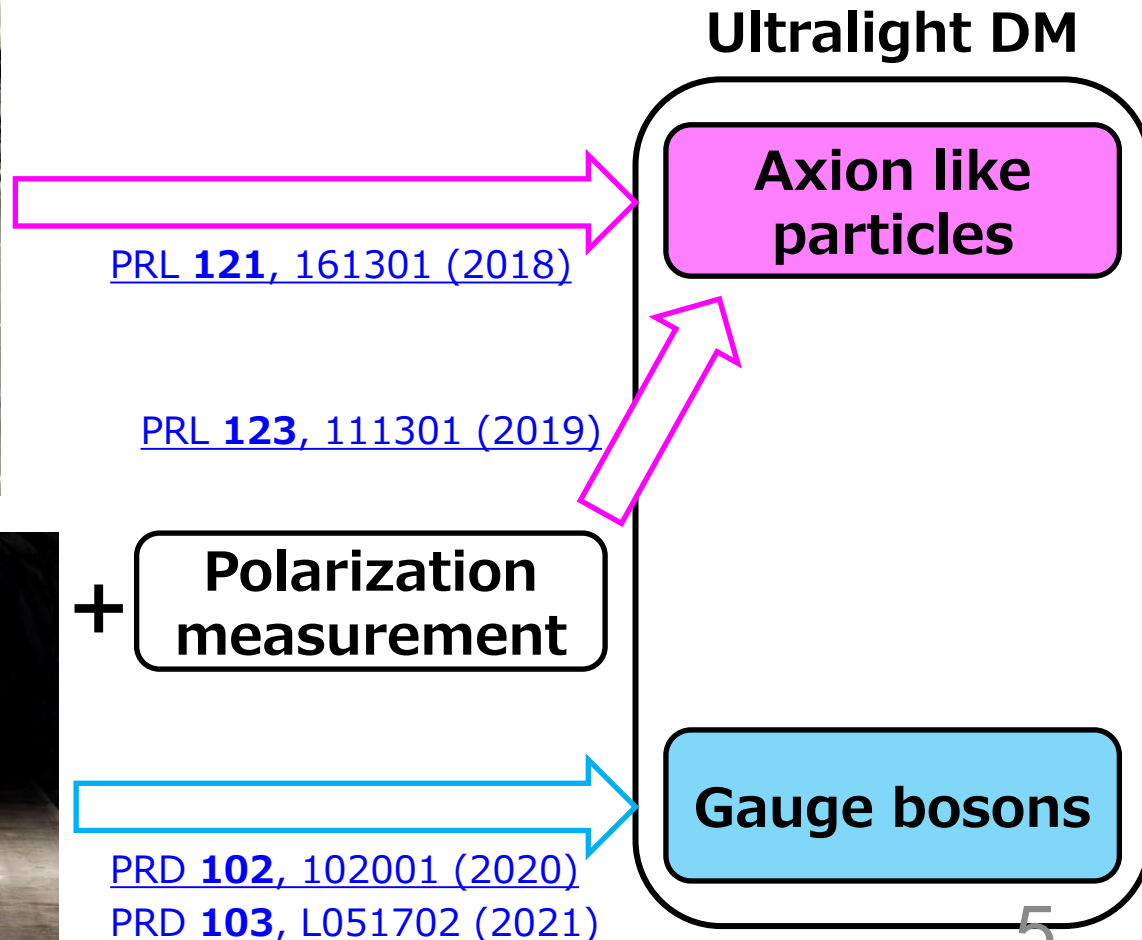
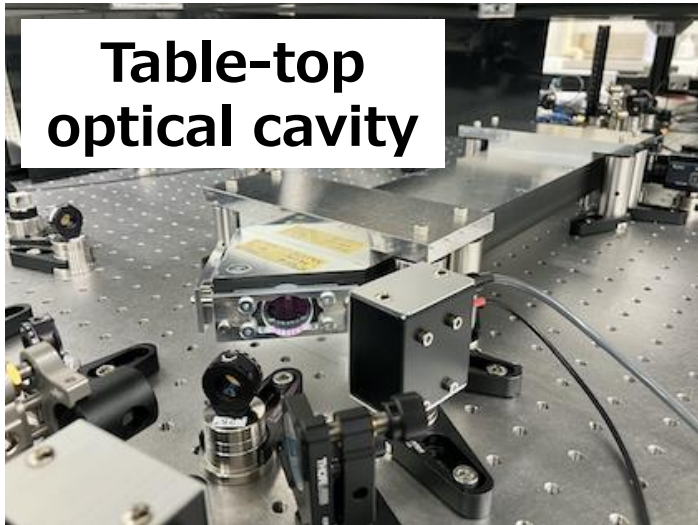
Laser Interferometry

- measures **differential** arm length change



Our Strategy

- Use both **table-top** optical cavities and **large-scale** laser interferometric gravitational wave detectors

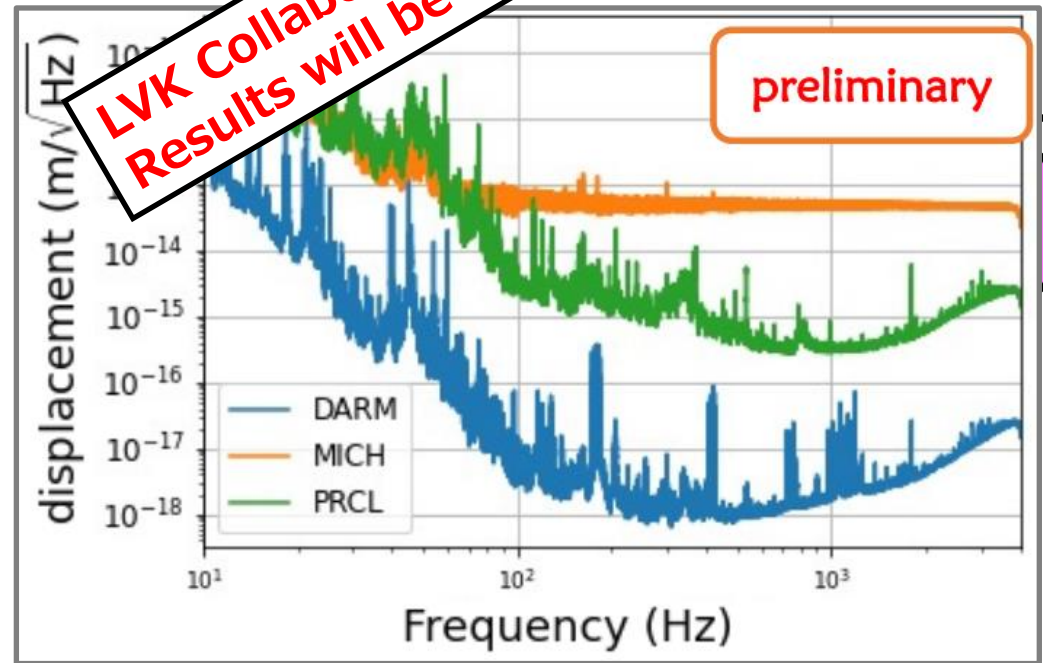


First results from KAGRA Run in 2020

Talk by Jun'ya Kume



**LVK Collaboration review to be done
Results will be available this summer**

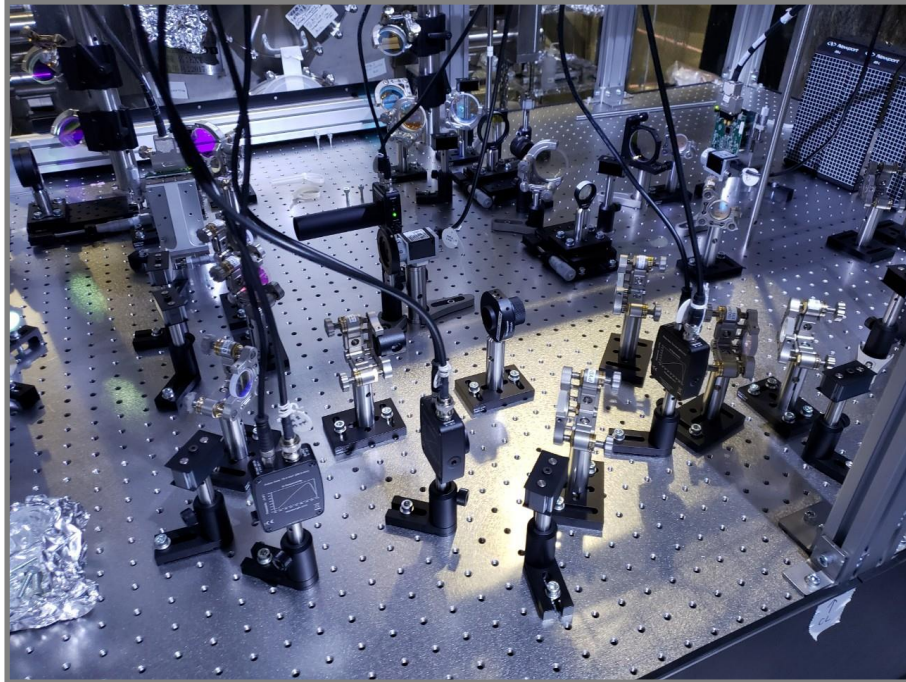


[PRD 102, 102001 \(2020\)](#)
[PRD 103, L051702 \(2021\)](#)

Gauge bosons

Polarizers installed for KAGRA

Ready for first data
taking in O4 run
(planned to start in May 2023)



[123, 111301 \(2019\)](#)



+ Polarization
measurement

Ultralight DM

Axion like
particles

Gauge bosons

First results from DANCE

Talks by Yuka Oshima
& Hiroki Fujiimoto

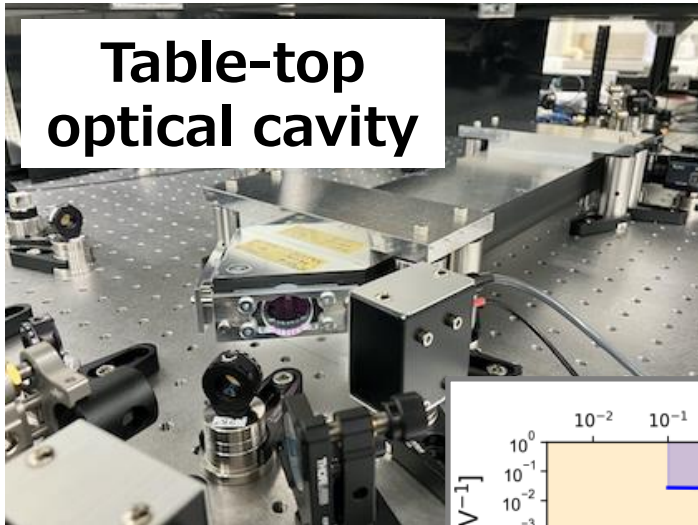


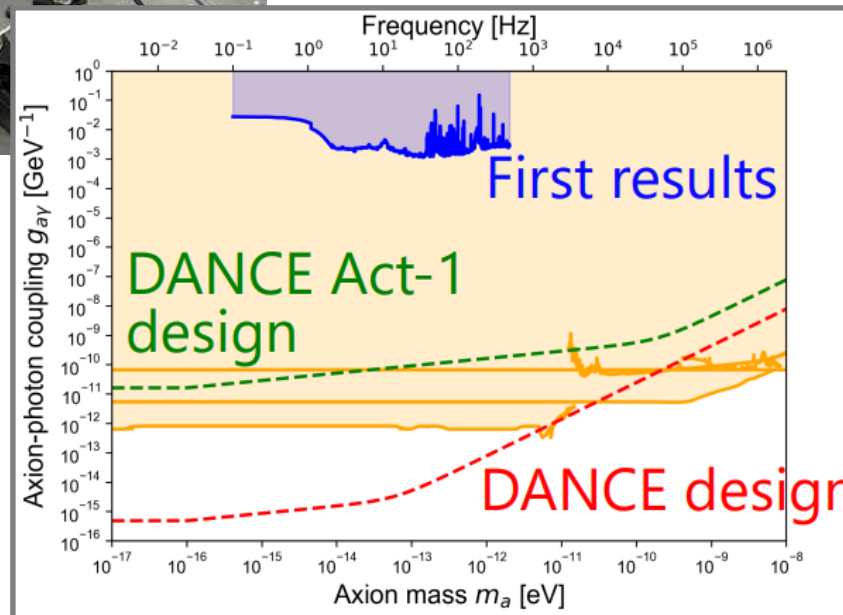
Table-top
optical cavity

[PRL 121, 161301 \(2018\)](#)

Ultralight DM

Axion like
particles

Gauge bosons



[arXiv:2303.03594](#)

B01 Team

Tomohiro Fujita

Hiroki Fujimoto

Jun'ya Kume

Matteo Leonardi

Yuta Michimura

Shinji Miyoki

Soichiro Morisaki

Koji Nagano

Atsushi Nishizawa

Ippei Obata

Yuka Oshima

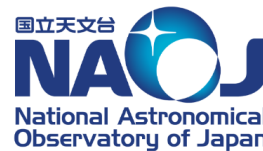
Haoyu Wang



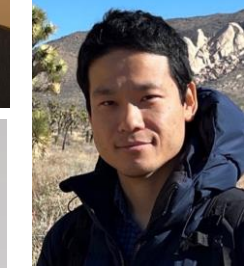
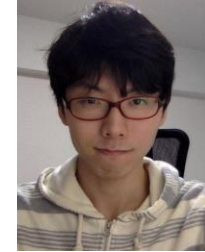
東京大学
THE UNIVERSITY OF TOKYO



Caltech



UNITRENTO



Workshops

- **Workshop on Very Light Dark Matter 2021**
A01-B01
Online / September 27-29, 2021
- **Workshop on Very Light Dark Matter 2023**
A01-A02-B01-B06
Chino, Nagano + Online / **March 28-30, 2023**
<https://indico.ipmu.jp/event/416/>

**Online registration
still open!**

