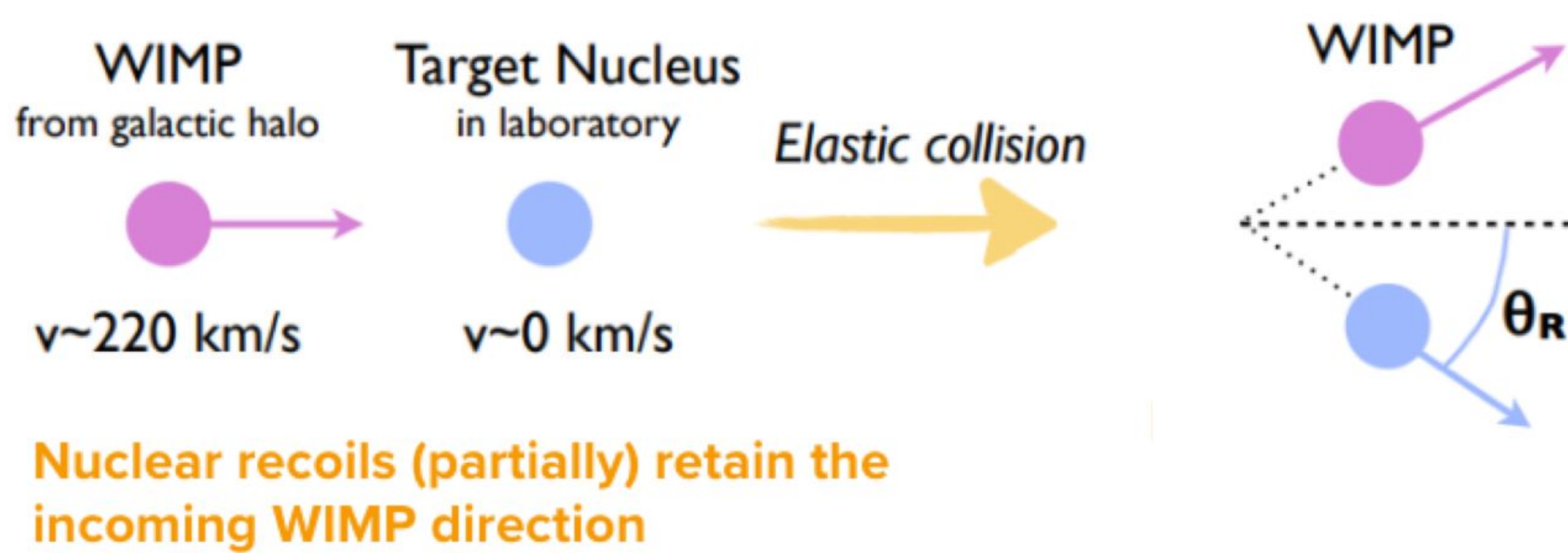




Hunting for light dark matter

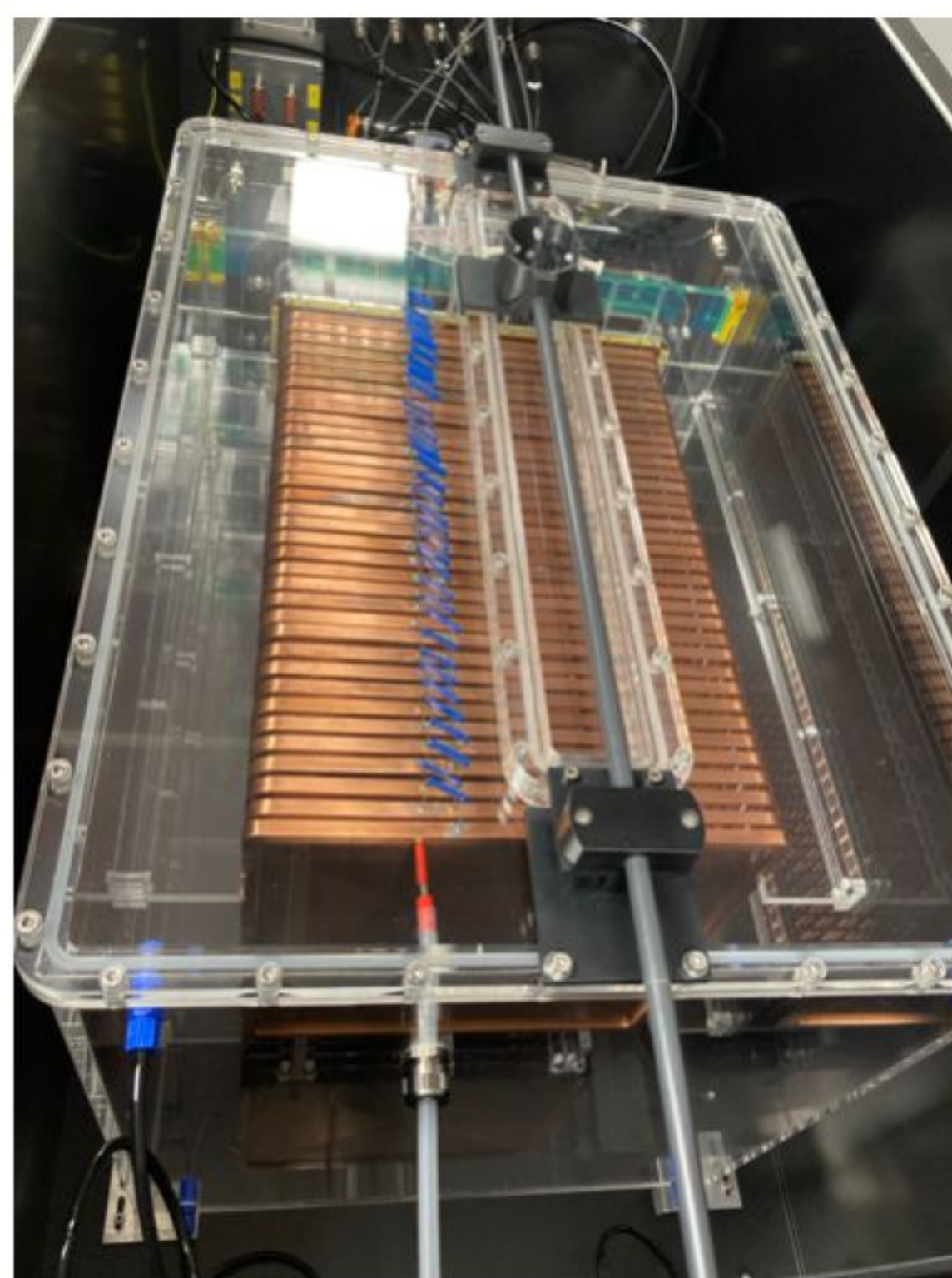
Several **experiments** are currently developing **technologies** to investigate the existence of **WIMP-like** particles with masses in the range of **few MeV to few GeV**.



The fundamental **challenge** of this research lies in the development of detectors sensitive to any **rare signal** produced by **nuclear recoils** or by the even more channeling **electron recoils** well **below the keV** energy to **few eV**

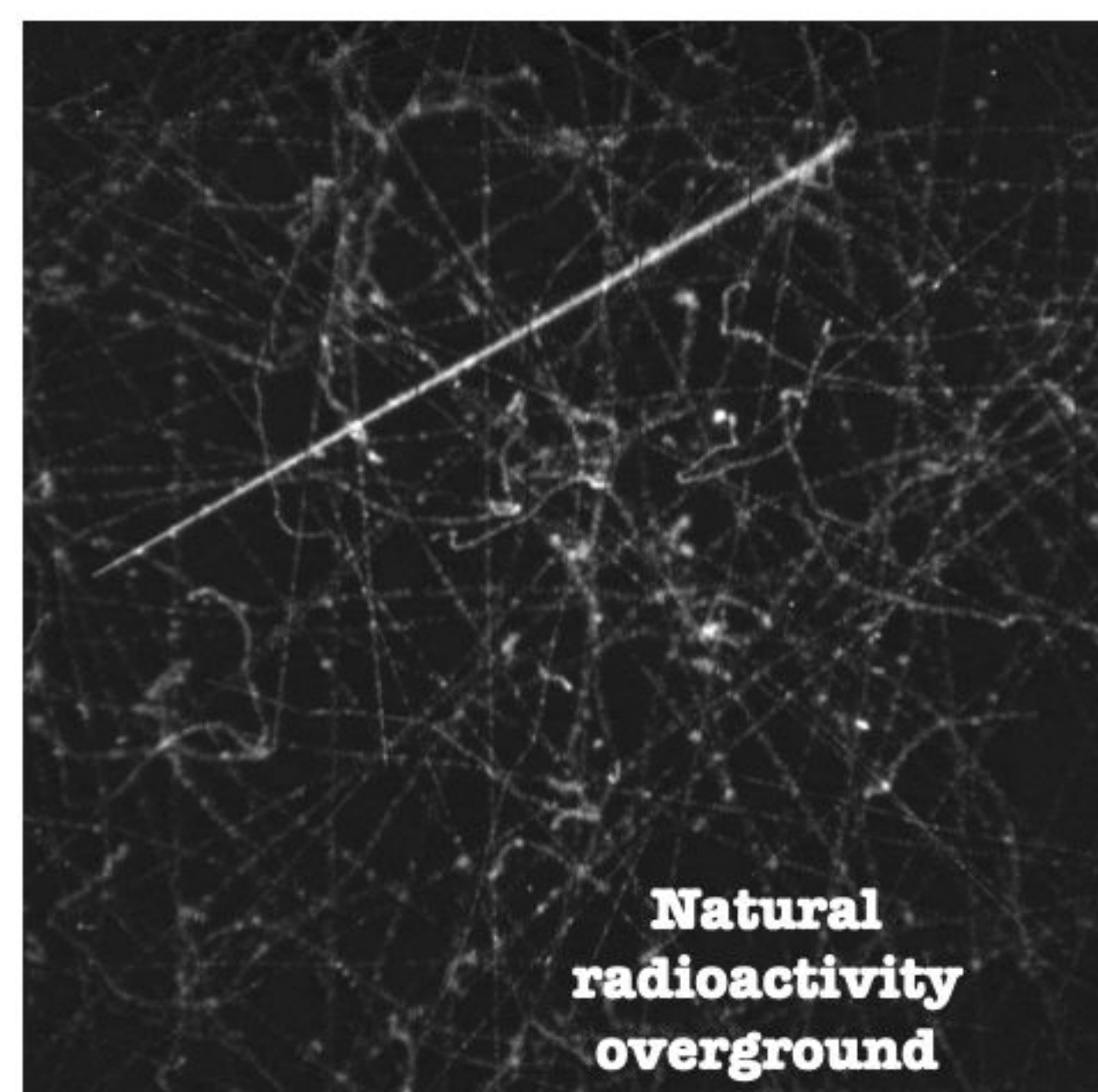
The CYGNO experiment

The optical readout



Take pictures of particles moving in the gas volume

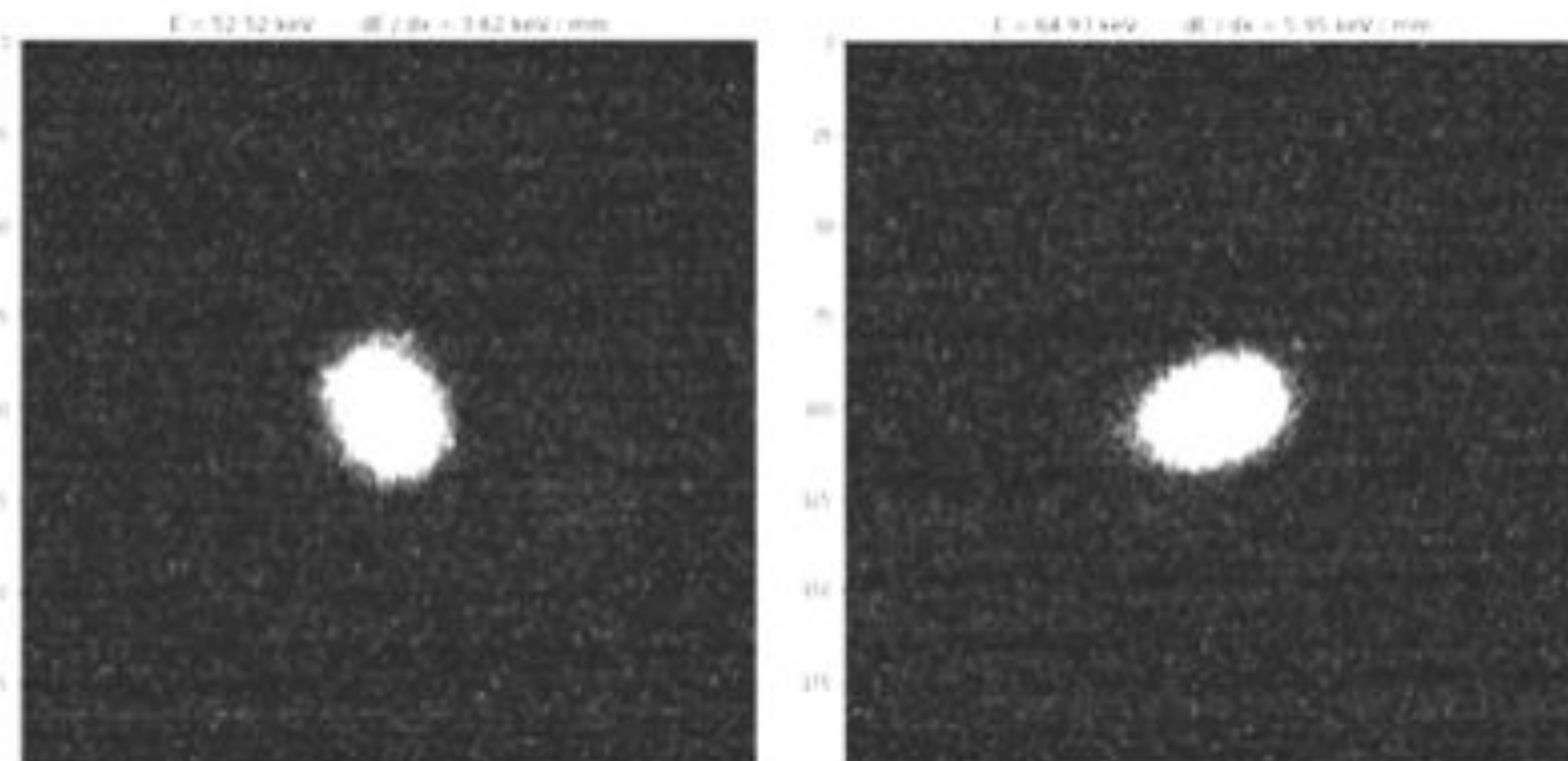
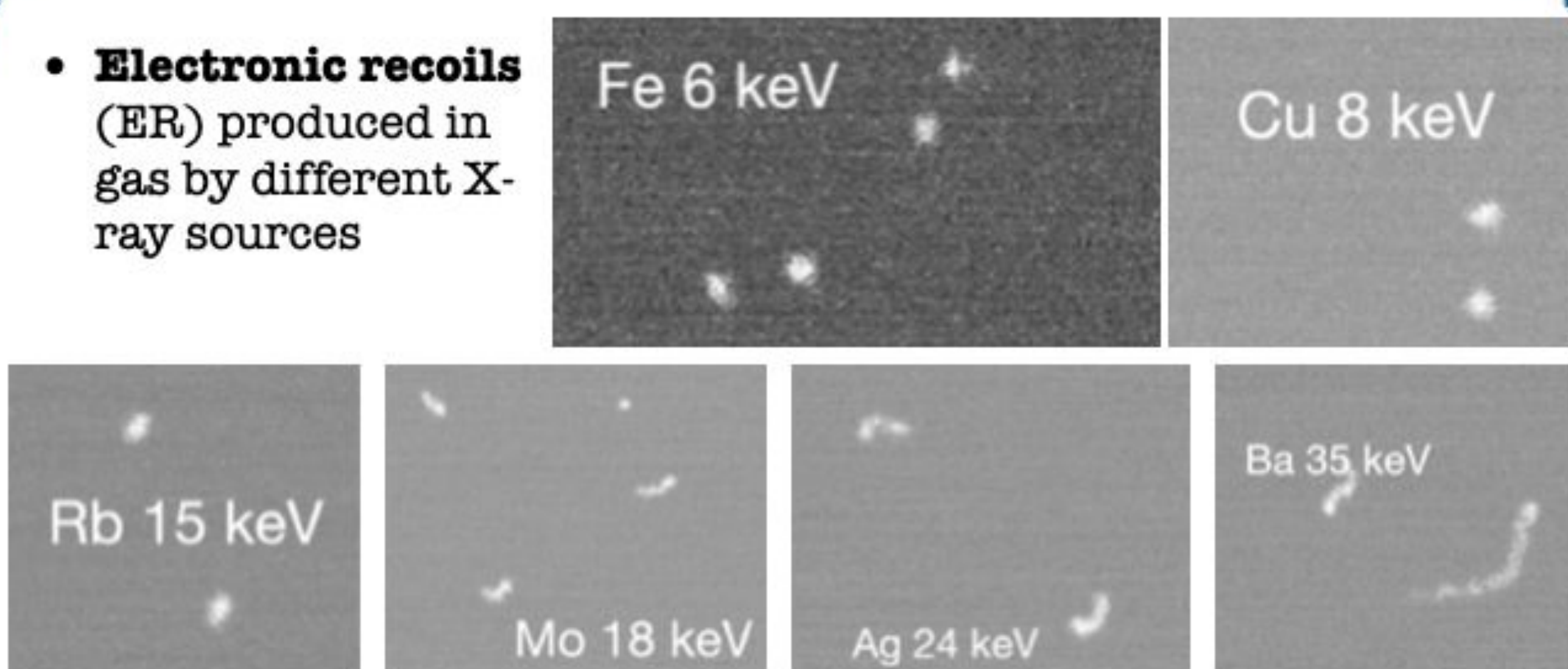
Ionization produced in a TPC drifts towards the amplification stage (**triple GEM**) where **light** is also produced



Natural radioactivity overground

Nuclear and electronic recoils

- Electronic recoils (ER)** produced in gas by different X-ray sources



- Nuclear recoils (NR)** induced by neutrons
- Energy release and light density changes producing different tracks

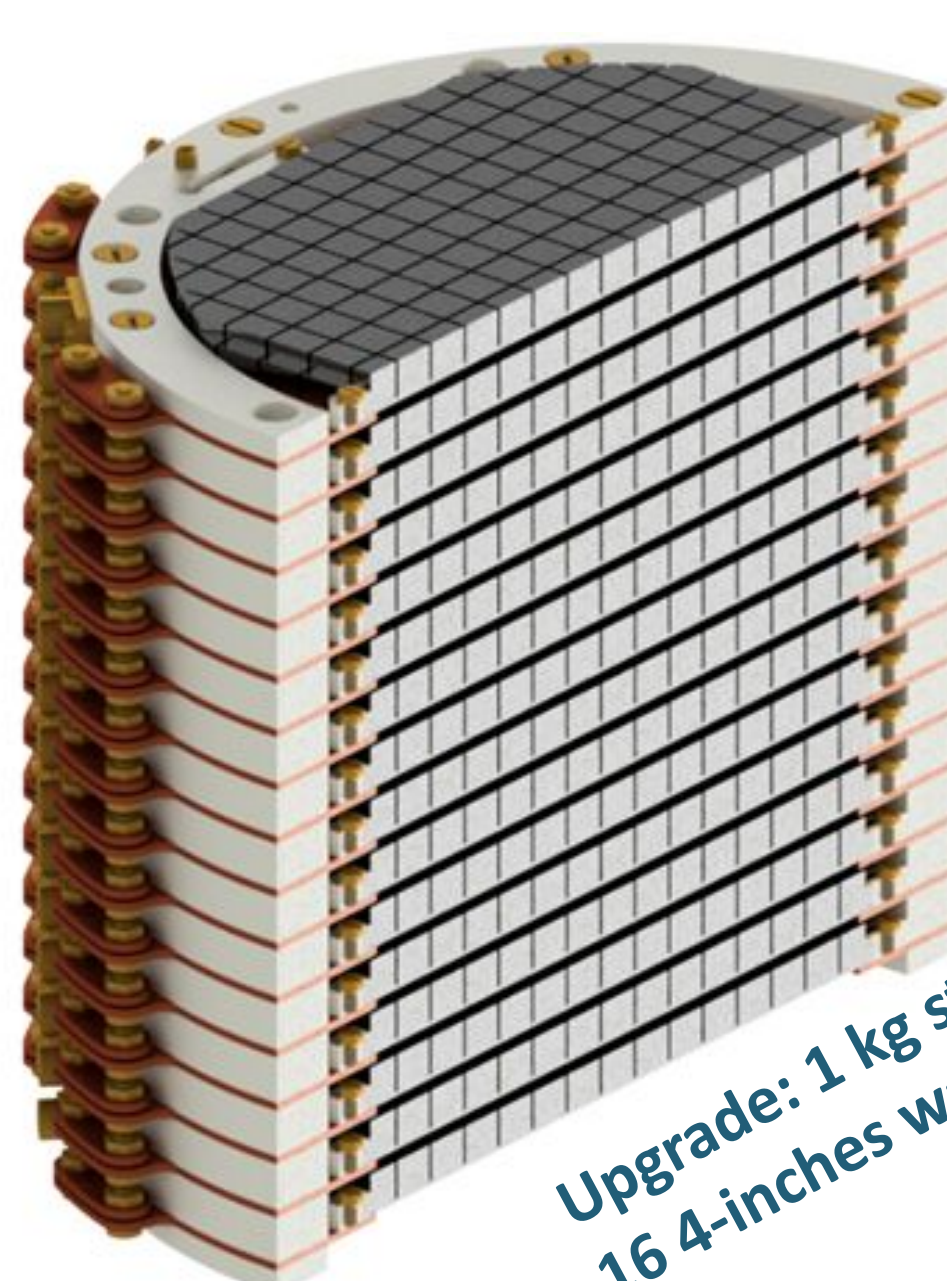
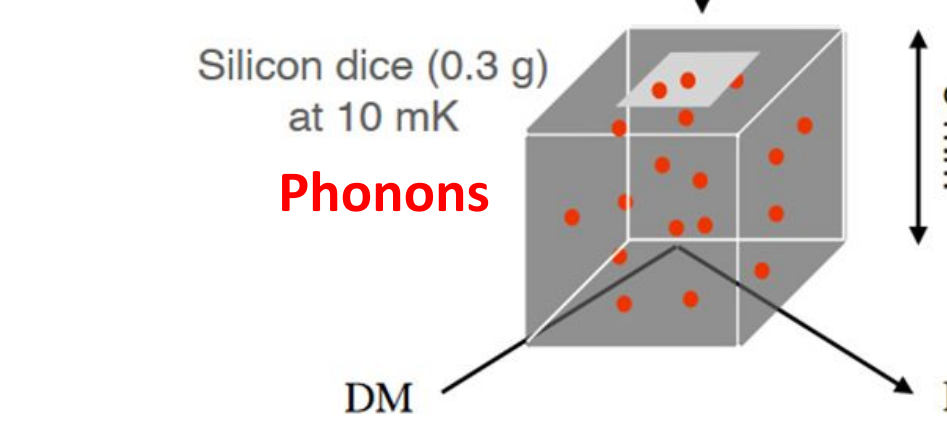
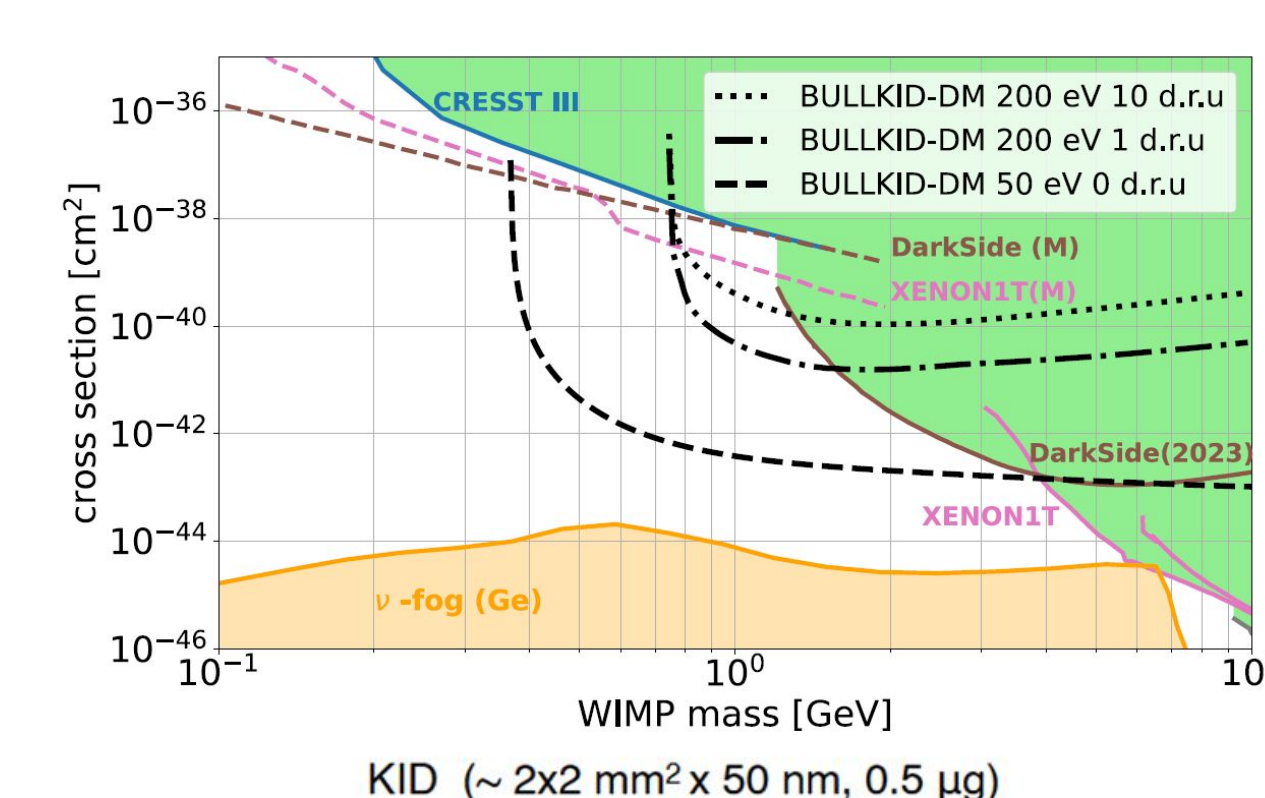
A **0.4 m³** demonstrator is under construction and is expected to be operative at LNGS in **2025**

Join US!

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francesco.renga@roma1.infn.it

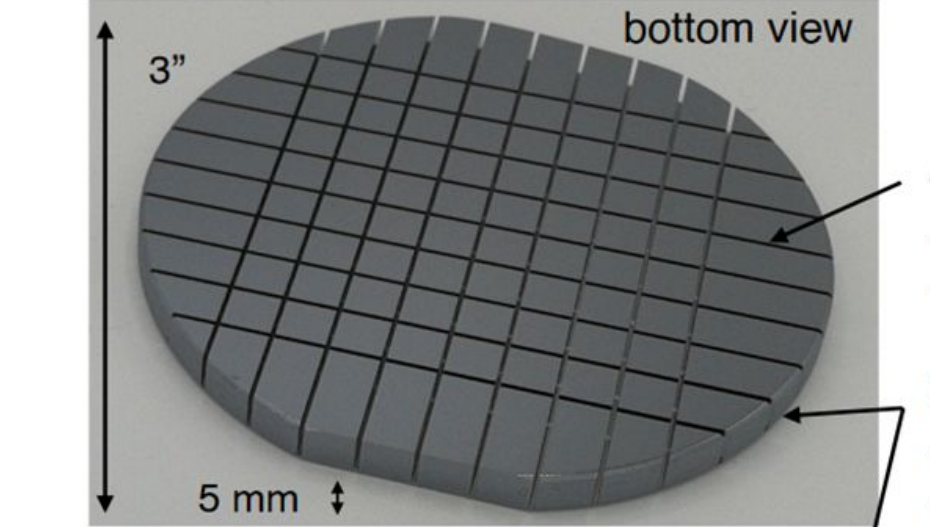
BULKID-DM: Kinetic Inductance Detectors coupled to silicon absorbers

Dark Matter - direct search



Upgrade: 1 kg stack of 16 4-inches wafers

carving of dices in a thick silicon wafer



KID array

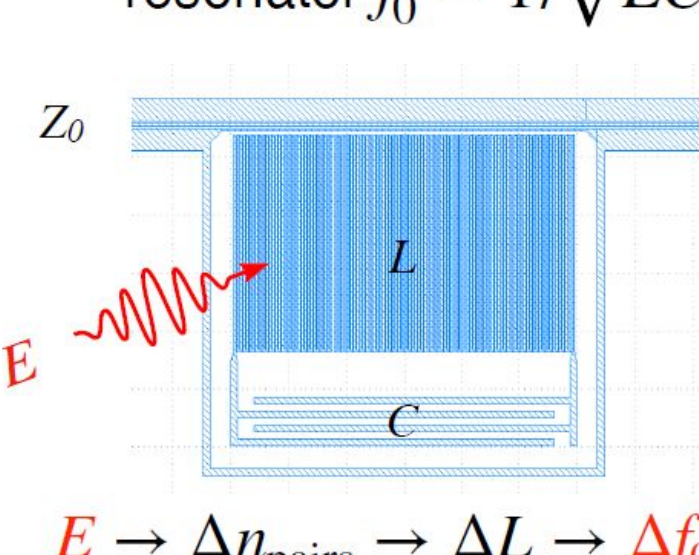
- 60 nm aluminum film
- 60 KIDs lithography

✓ 60 detectors in 1

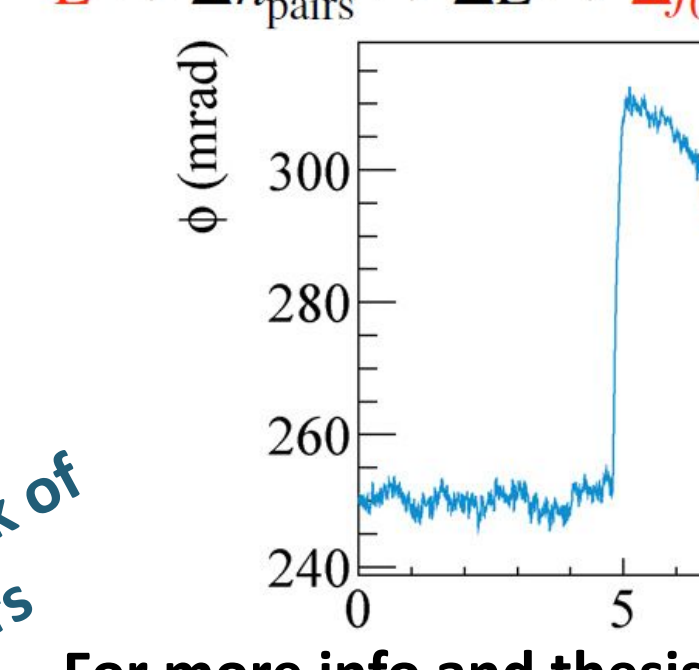
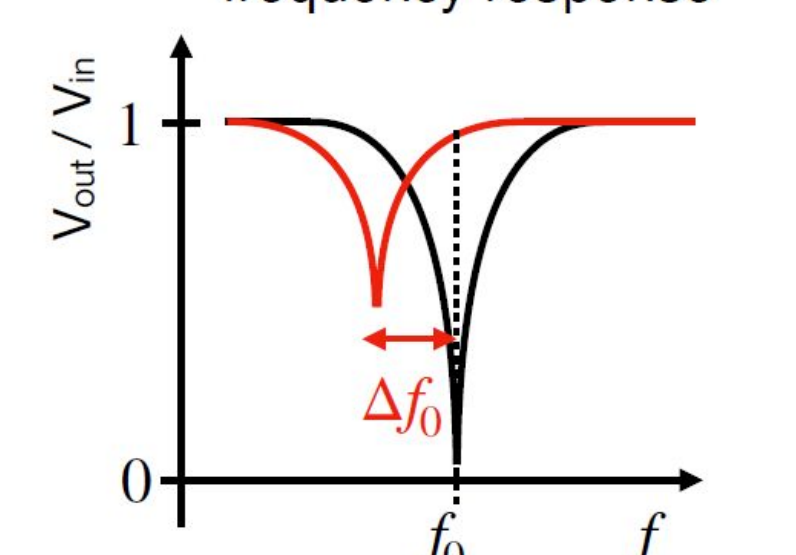
Fully multiplexed (single readout line)

KIDs working principle

$$\text{resonator } f_0 = 1/\sqrt{LC}$$



frequency response



Phase pulse after a 1 keV deposition in KID-40

For more info and thesis contact:

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Angelo Cruciani <angelo.cruciani@roma1.infn.it>

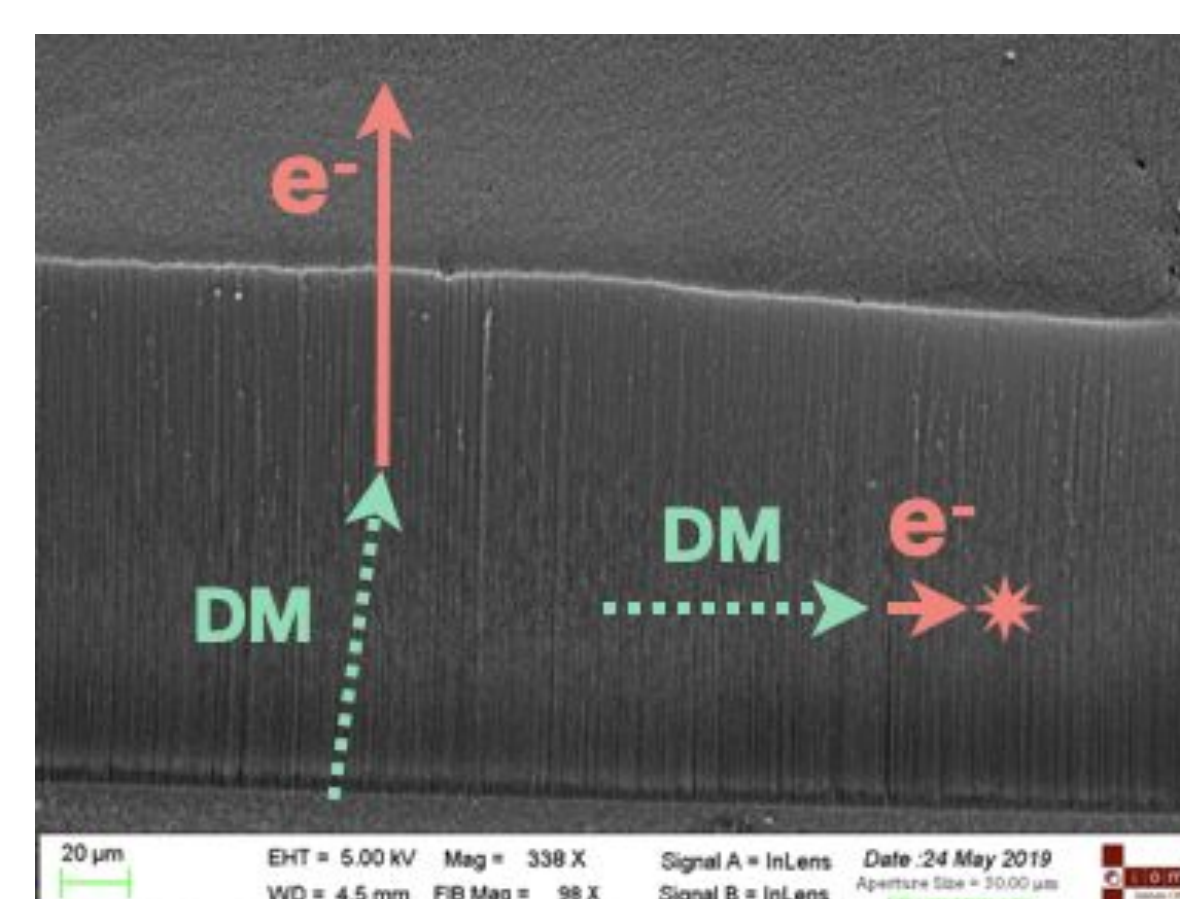
ANDROMeDa

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Aligned Nanotube Detector for Research On MeV Dark Matter

New directional detector concept: the **Dark-PMT**

Dark matter - electron scattering inside aligned **carbon nanotubes**



Low density in direction of tubes

