

CUPID-1T: A FUTURE NORMAL HIERARCHY BOLOMETRIC EXPERIMENT

CUPID-1T: HALLMARKS

- **1000 kg of ^{100}Mo** in a new cryostat and/or multiple facilities worldwide
- **Sensitivity: $T_{1/2} > 8 \times 10^{27}$ years (3σ), $m_{\beta\beta} > 4-7$ meV (NH)**

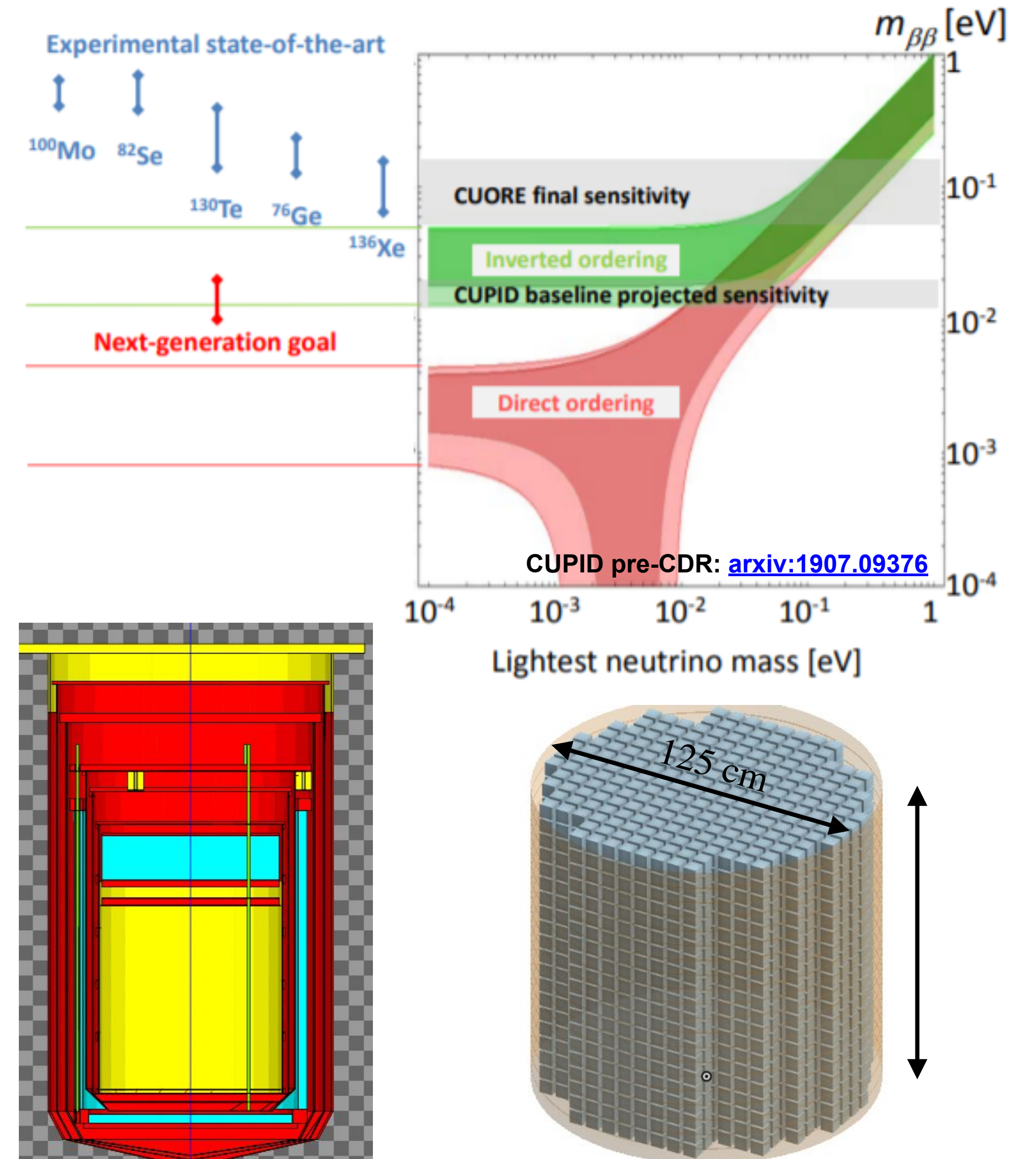
REQUIREMENTS

- **Reduction in the background** compared to CUPID (x20)
- **Readout for O(10k) crystal array**

POTENTIAL EXPANSIONS

- **Large volume cryogenic facilities** in multiple UG labs worldwide
- Possible detector parameters:
 - **Main detectors:**
 - **~1900 kg of Li_2MoO_4** , few keV thresholds possible
 - **Light detectors:**
 - **~6200 units, 68 kg of Ge** (or 29 kg of Si)
 - O(10 eV) threshold, active γ and surface veto
 - Could also deploy **specialized towers**, e.g. SuperCDMS style DM detectors

**TARGET TIMELINE: ANTICIPATED CONSTRUCTION LATE
2020'S, COMMISSIONING EARLY 2030'S**



PHYSICS BEYOND $0\nu\beta\beta$

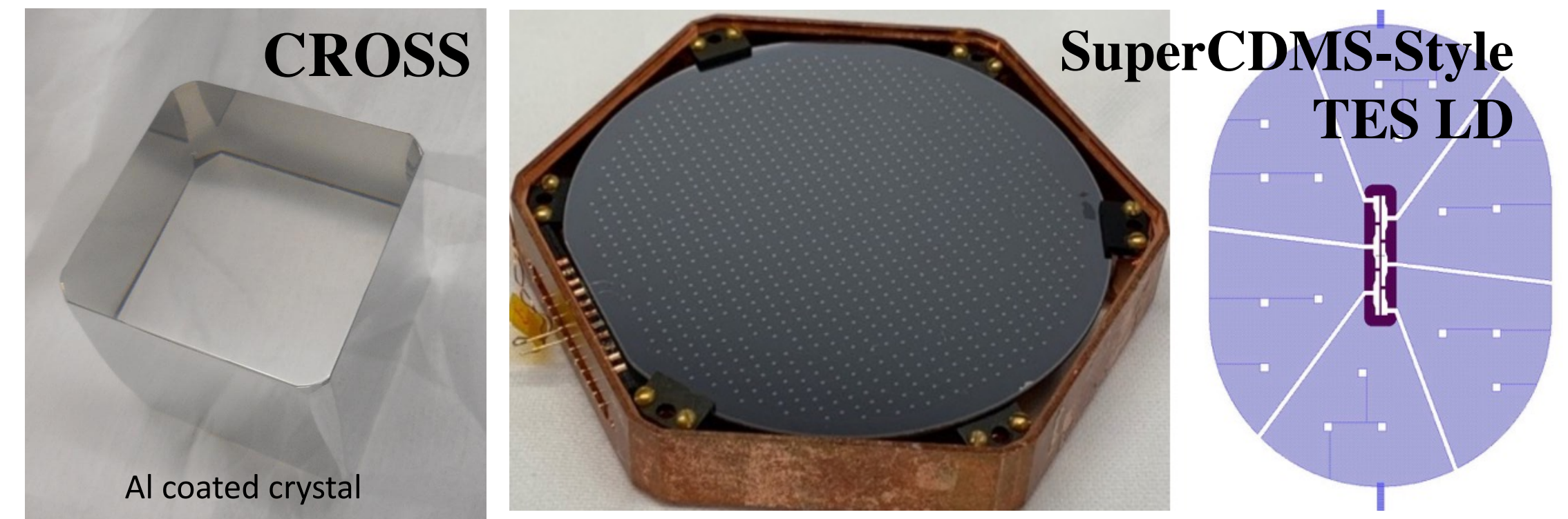
LONGER-TERM R&D ON ADVANCED DETECTOR

TECHNOLOGIES:

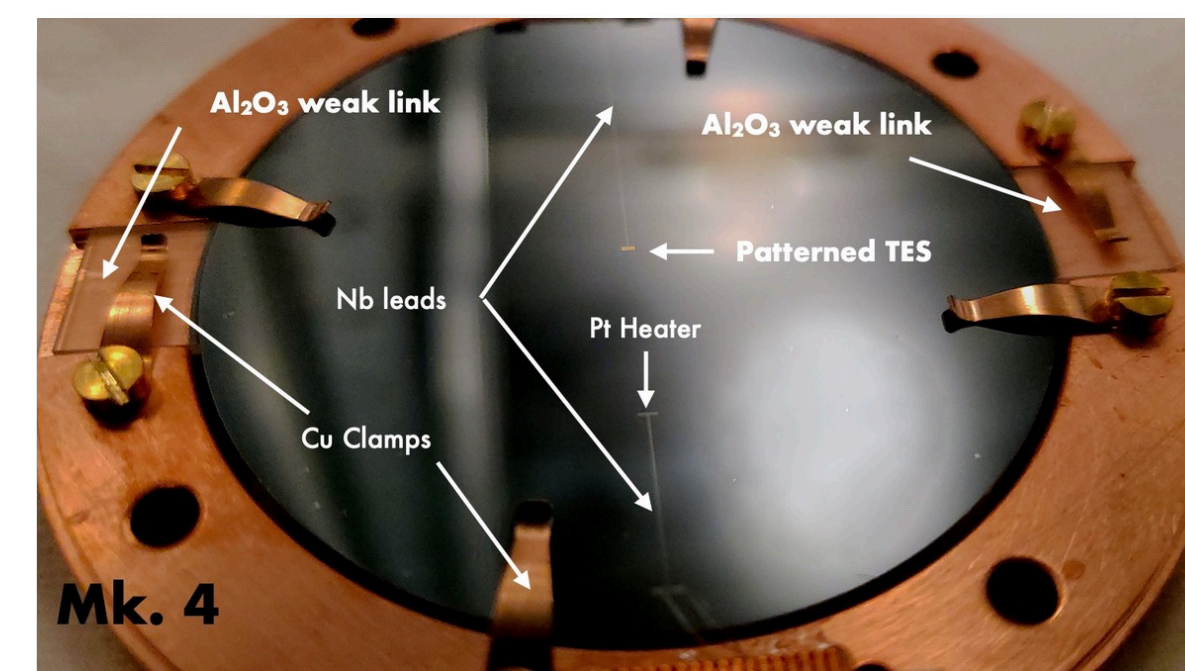
- Superconducting coating of crystals to enhance PSD capabilities (CROSS @ Canfranc)
- Active γ veto (synergy with low-mass DM experiments)
- High-speed superconducting sensors (TES, MKID)
- Multiplexed readout (synergy with CMB)
- Cryogenic CMOS ASIC developments (synergy with QIS)
- Technological overlap with dark matter, CMB experiments and quantum sensor/QIS community

POSSIBLE PHYSICS TOPICS

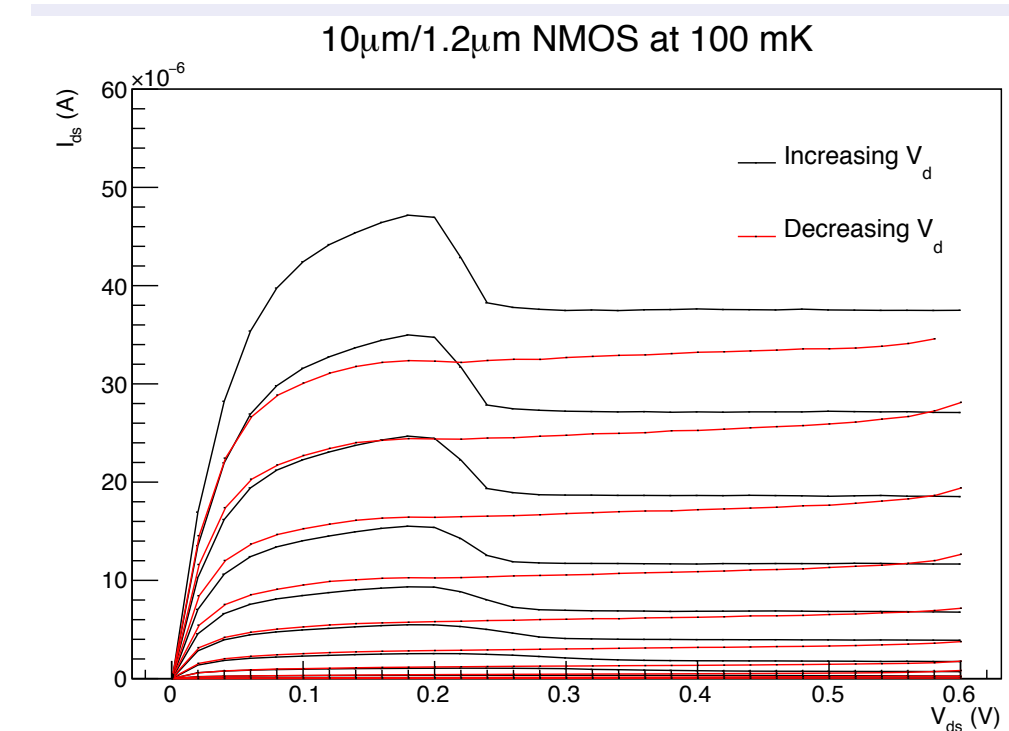
- Low-mass DM
- Neutrino magnetic moment (with external sources or beams)
- Solar axion searches
- Lorentz/CPT violations
- Tracked particle searches



TES-based LD



CMOS @ 100 mK



SEE ALSO: CUPID pre-CDR: [arxiv:1907.09376](https://arxiv.org/abs/1907.09376)