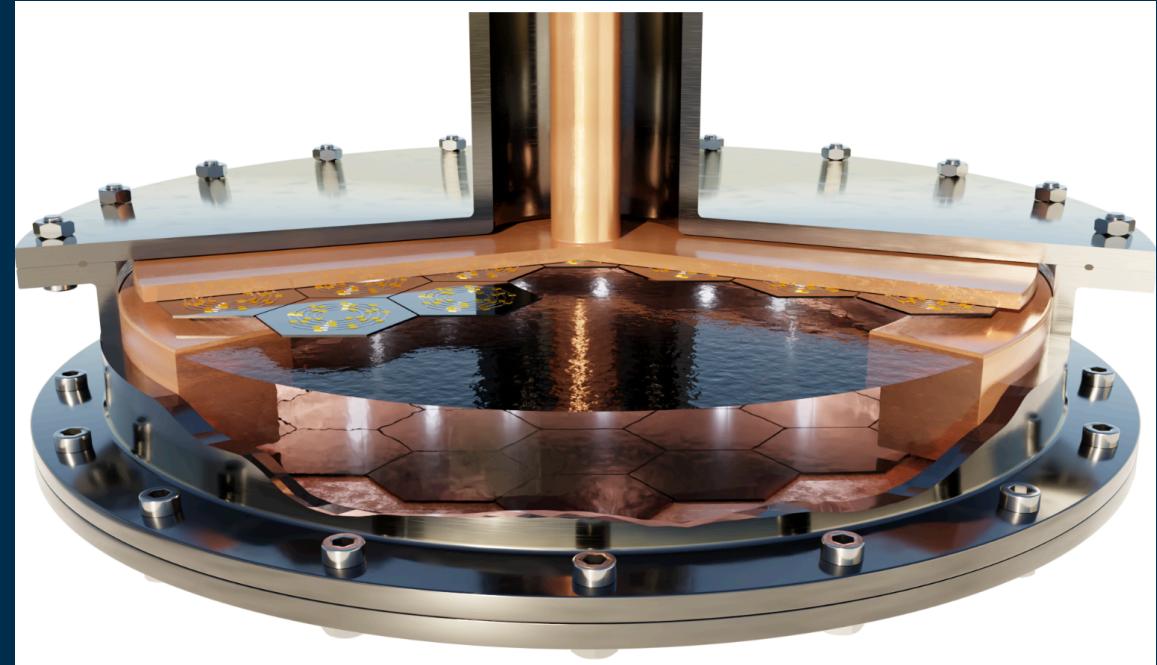
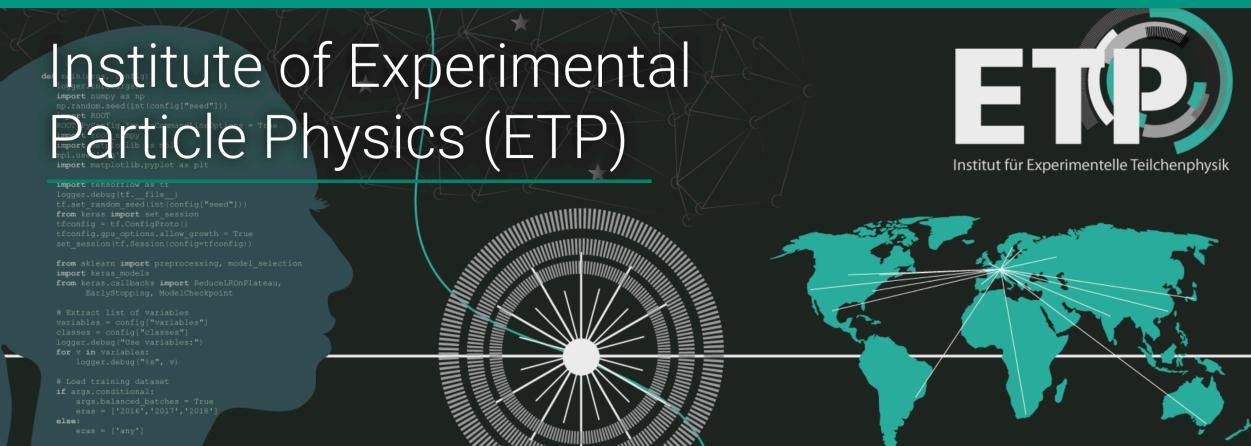


## GridKa Overview Board Meeting

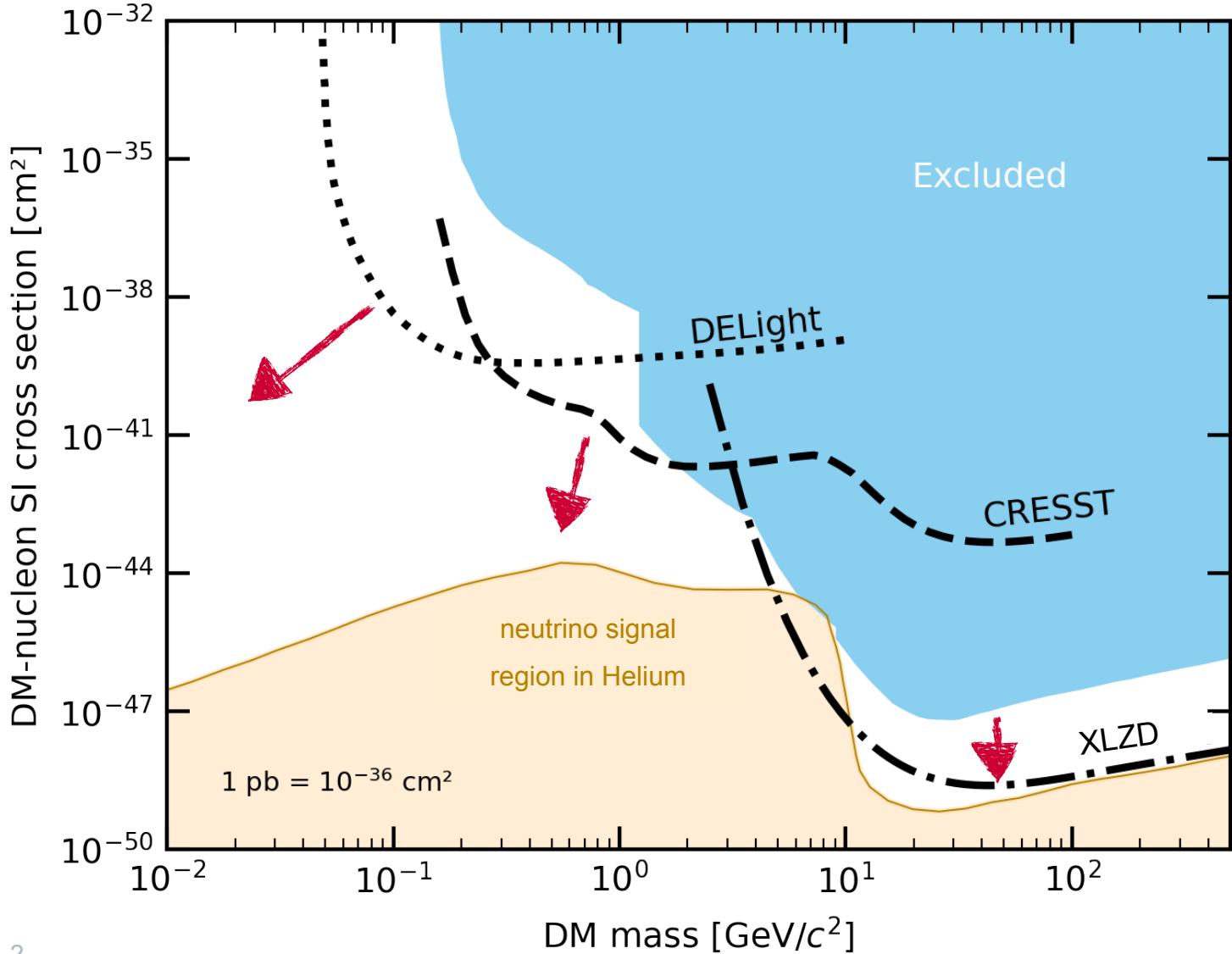


Prof. Dr. Belina von Krosigk (KIP, Heidelberg)

Prof. Dr. Markus KLUTE (ETP, KIT)

May 16, 2025

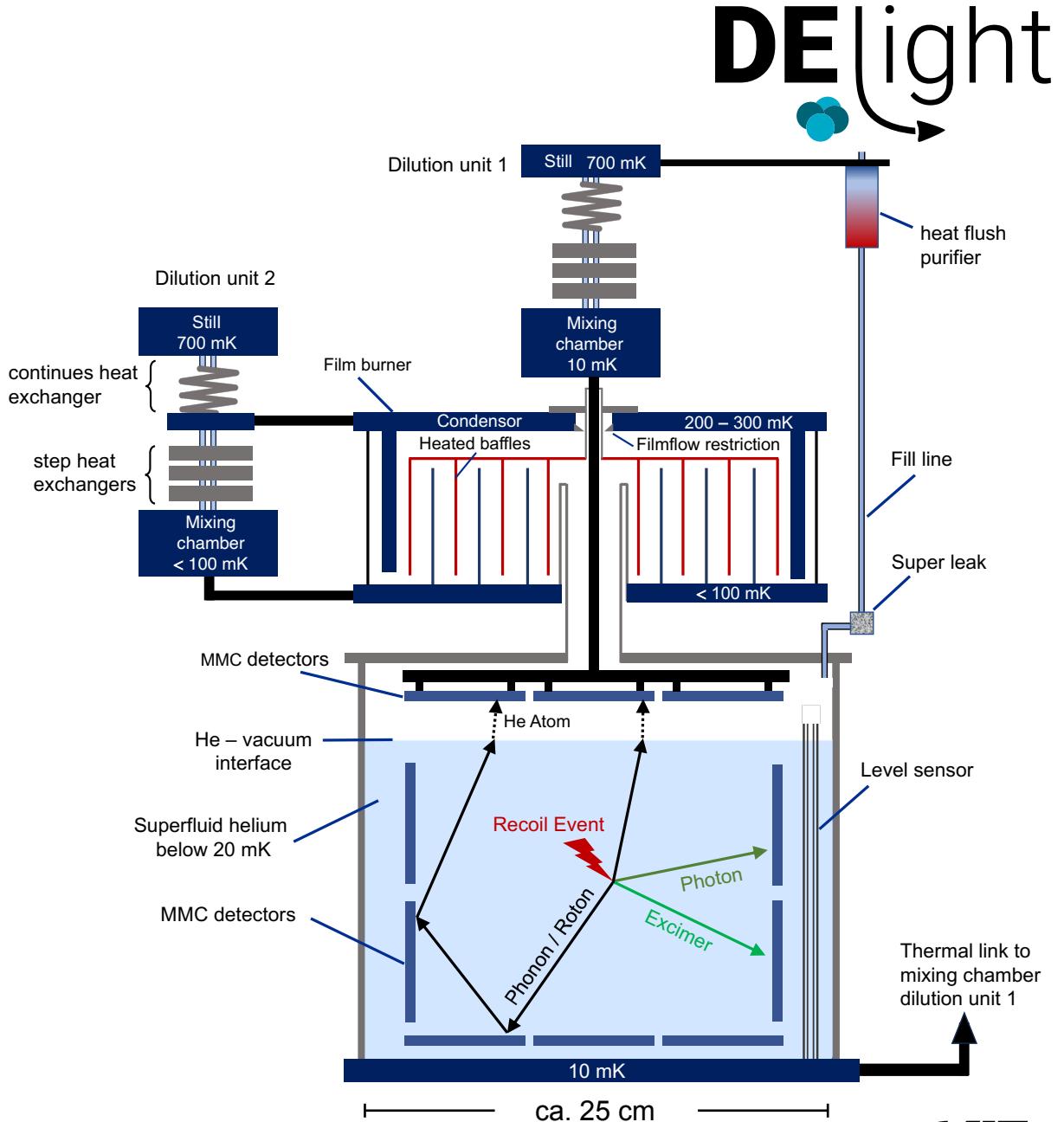
# The physics motivation



- Expanding the dark matter parameter space towards light masses.
- Complementing the other leading experiments (also with major German contribution).
- Together, the European experiments will lead the field over all currently accessible masses.

# Detection concept

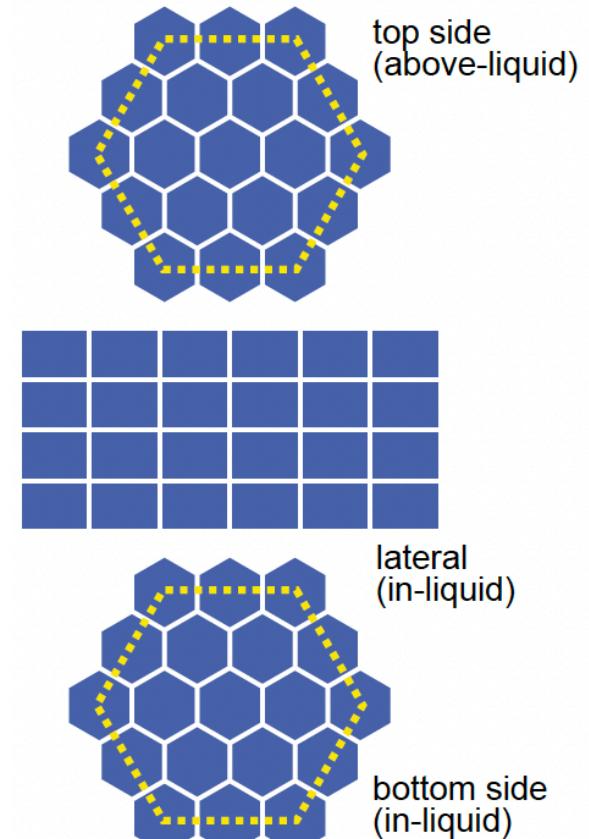
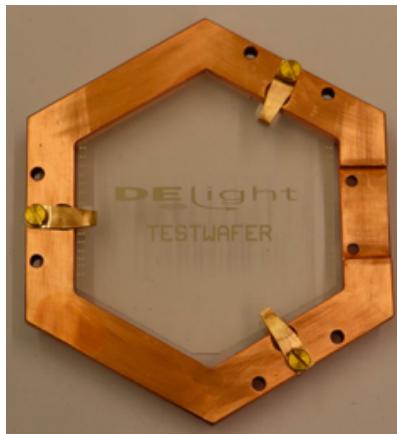
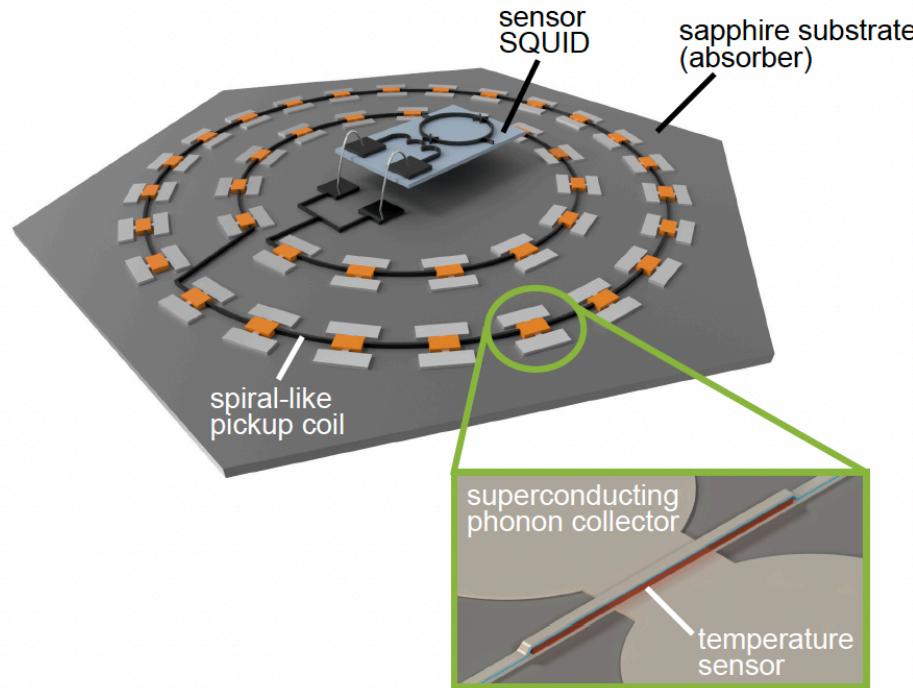
- Superfluid  $^4\text{He}$  as ultra-pure, compact target with light nuclei
  - ~10 liters in phase-I of the experiment
- Ultra-sensitive large-area calorimeters (LAMCALs) based on successful magnetic microcalorimeter (MMC) technology for energy measurement
  - 62 LAMCALs in phase-I for full coverage
  - 20 eV threshold (full detector) in phase-I
- Design goals for later phases: increasing He volume, decreasing threshold, decreasing backgrounds



# MMC-based Large-Area Microcalorimeters

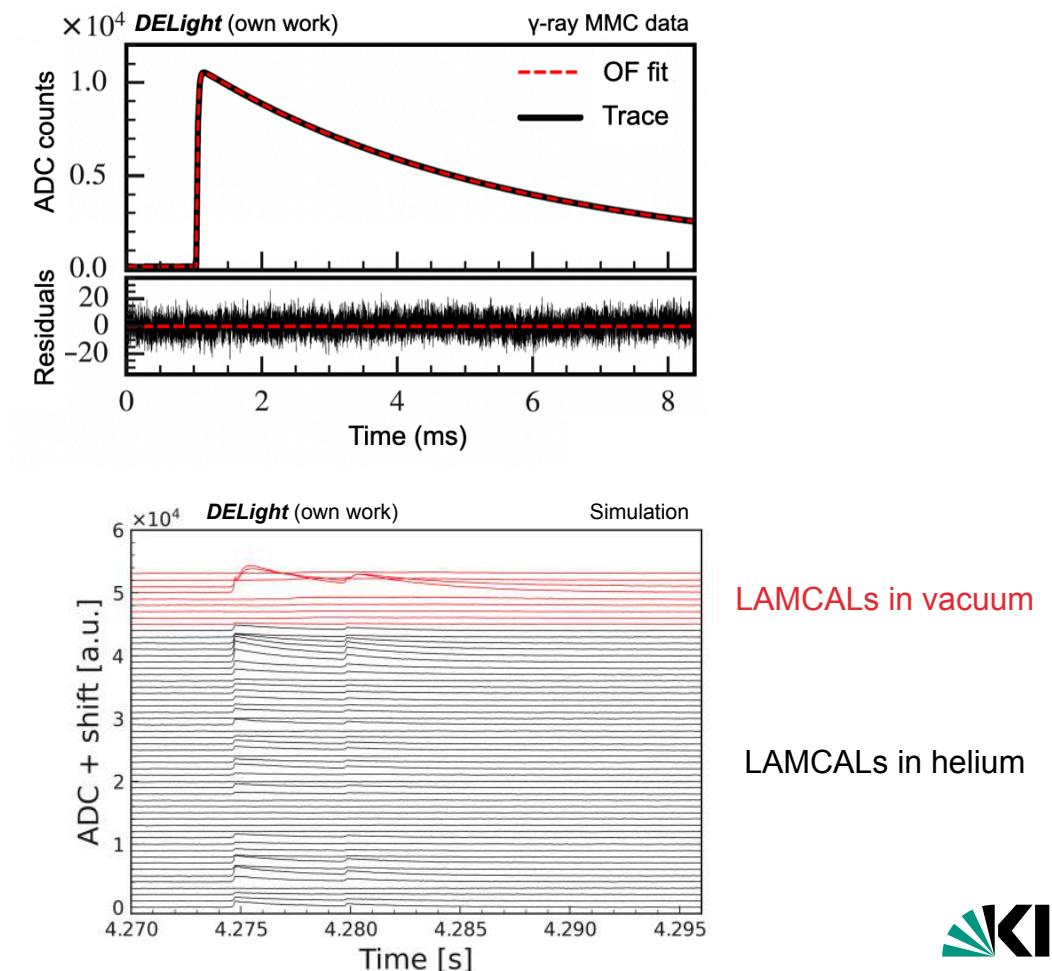
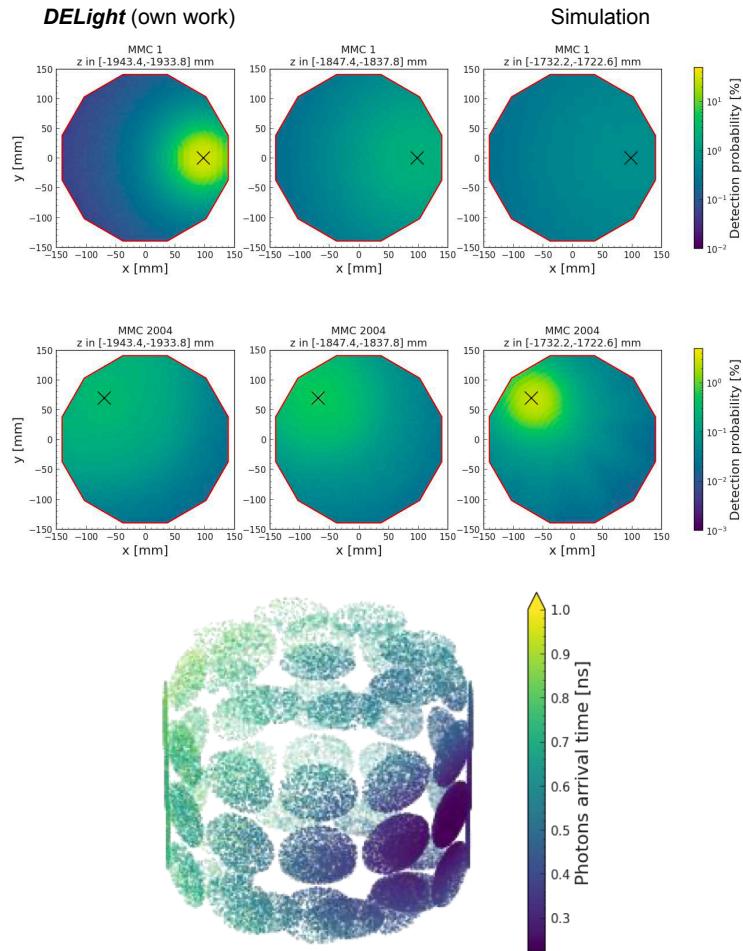


- Novel large-area design achieving full coverage
  - 3 inch sapphire wafer (in hex design)
- Based on successful MMC-technology (magnetic microcalorimeter)
- Anticipated LAMCAL energy resolution of 1-2 eV (FWHM)
- Anticipated energy threshold of  $\leq 10$  eV per LAMCAL
- Developed for DELight at KIT by S. Kempf and his group



# Analysis and Simulation

Ray tracing and hit-pattern (left) and time-series (right) analysis and simulation requires a powerful, easily accessible and robust analysis facility.

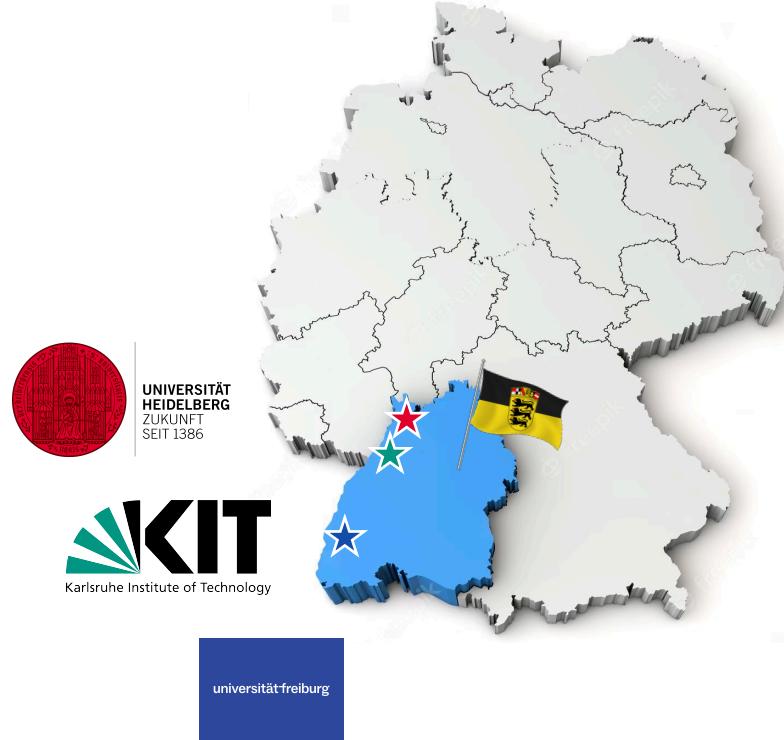


# The DELight Collaboration



Collaboration Meeting Sep. 2024

- Collaboration founded in May 2023 with members from KIT, U. Freiburg, and U. Heidelberg; growing since
- Funding received by the HEiKA-STAR program
- Commissioning of DELight Demonstrator planned end of 2025

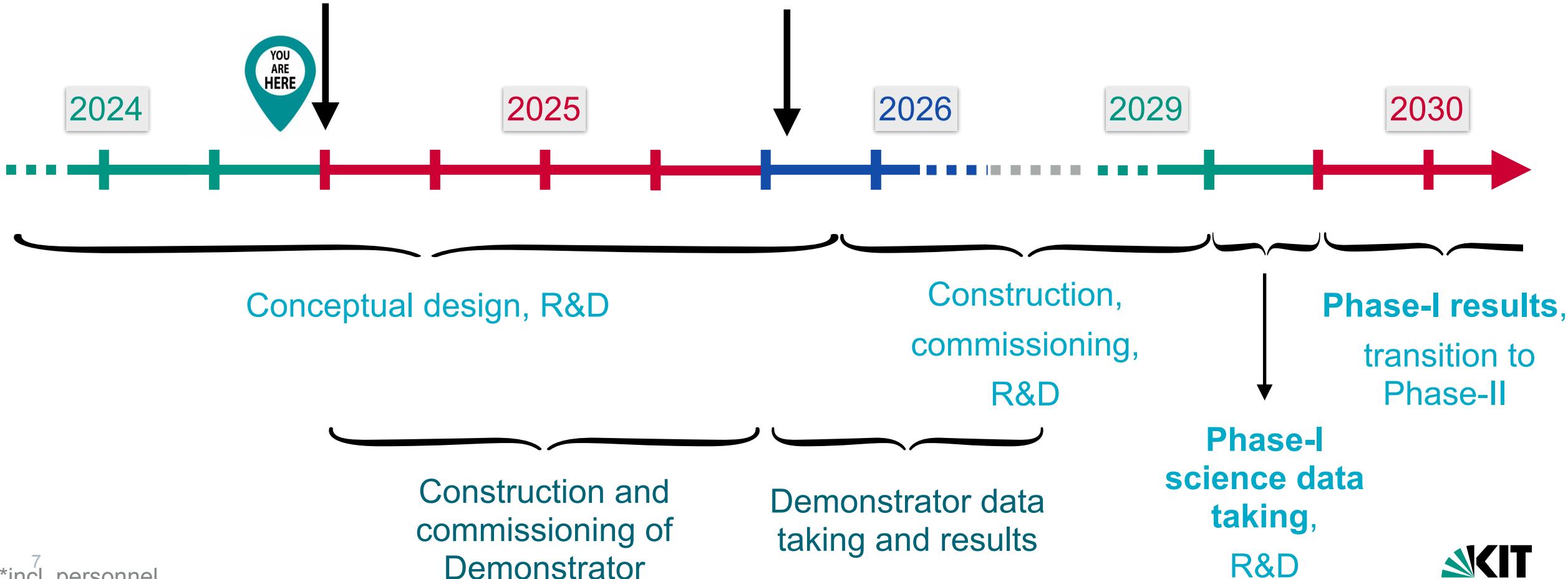


# Tentative timeline and funding



Start of HEiKA STAR funding  
for **DELight Demonstrator**  
(2 years, ~400 k€)\*

Expected decision on DFG  
Research Unit proposal for  
**full experiment**  
(4 years, ~4.5 M€)\*



# DELight Computing

- Overall, moderate amount of compute required to support the experiment
- Strategy: follow path of XLZD (formally DARWIN) computing setup with small scale, scalable analysis farm
- GridKa (grid resources) needed to scale compute rapidly and for storage
- Initial (R&D phase) GridKa needs
  - $\langle \text{CPU} \rangle = 3$  with 500 peak
  - 25 TB storage
- GridKa needs during exp. operation
  - $\langle \text{CPU} \rangle = 6$  with 1000 peak
  - 250 TB storage

