

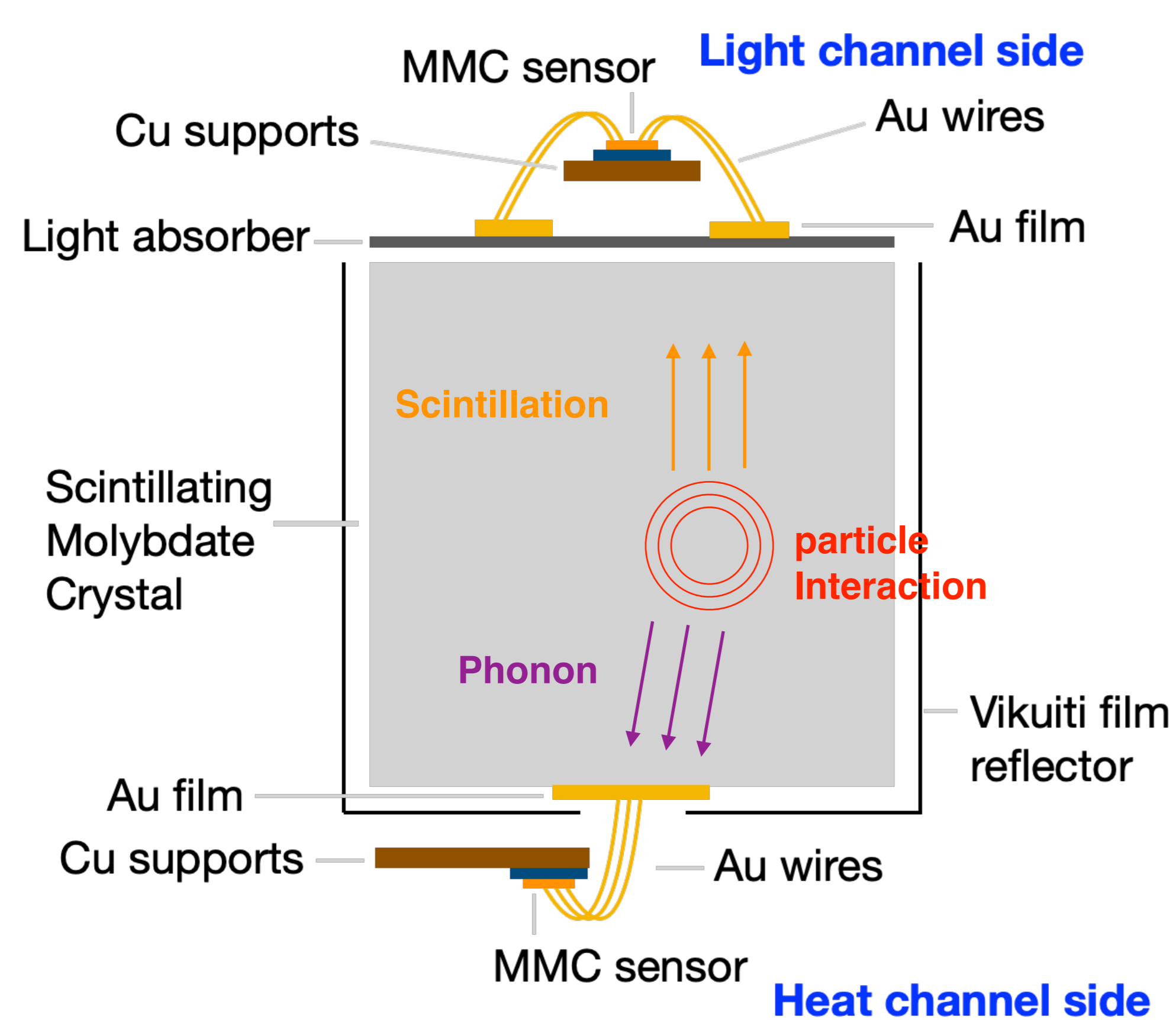
Light Detectors for AMoRE neutrinoless double beta decay searches

SeungCheon Kim on behalf of the AMoRE collaboration

AMoRE

- Neutrinoless double beta decay searches ($0\nu\beta\beta$) in Mo-100
- Cryogenic calorimeters with MMC sensors
- Mo-containing scintillating crystal absorber (~ 300-500g mass)
- Leading sensitivity for $0\nu\beta\beta$ in Mo-100 : $T_{1/2}^{0\nu} > 2.9 \times 10^{24}$ yr
- Preparing AMoRE-II experiment with ~ 90 kg of Mo-100

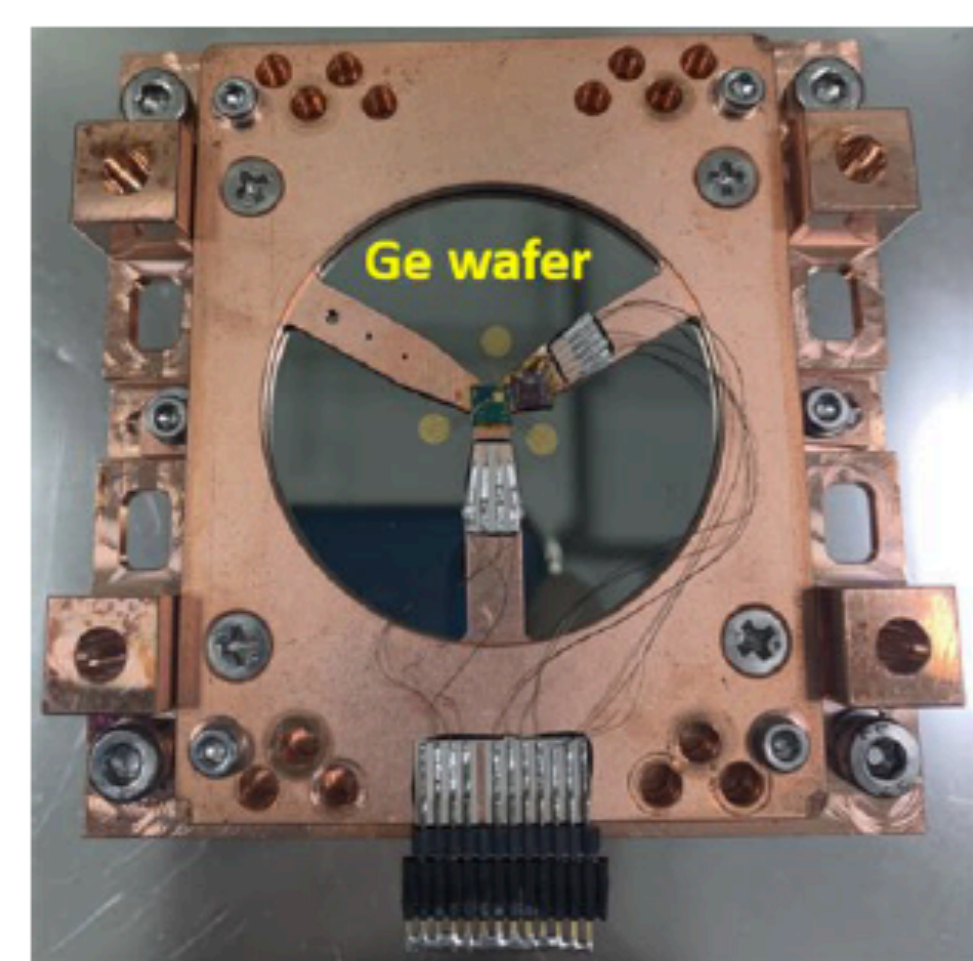
Detector Module



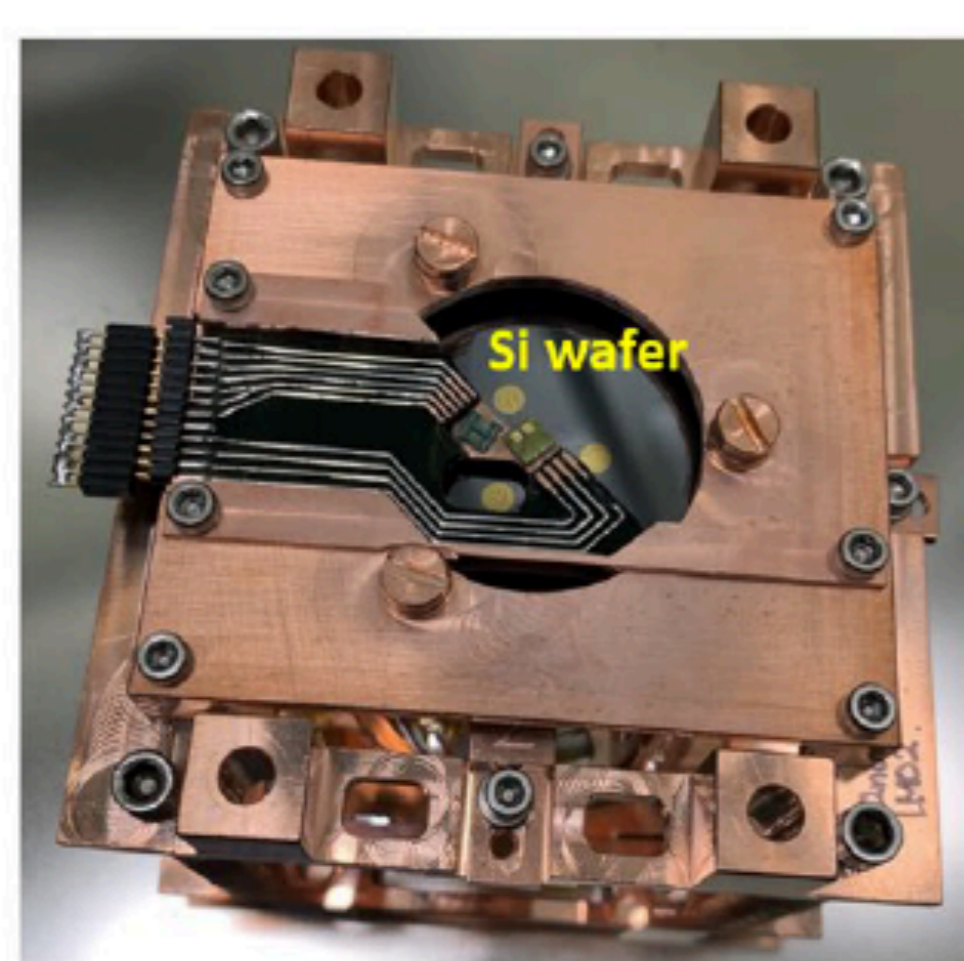
Light Detector (LD)

- Simultaneous scintillation detection
- Particle identification : α background rejection
- Pile-up rejection : faster than heat channel, but small signal
- Calorimetric detection : Si/Ge wafer (D ~ 5-6 cm) + MMC

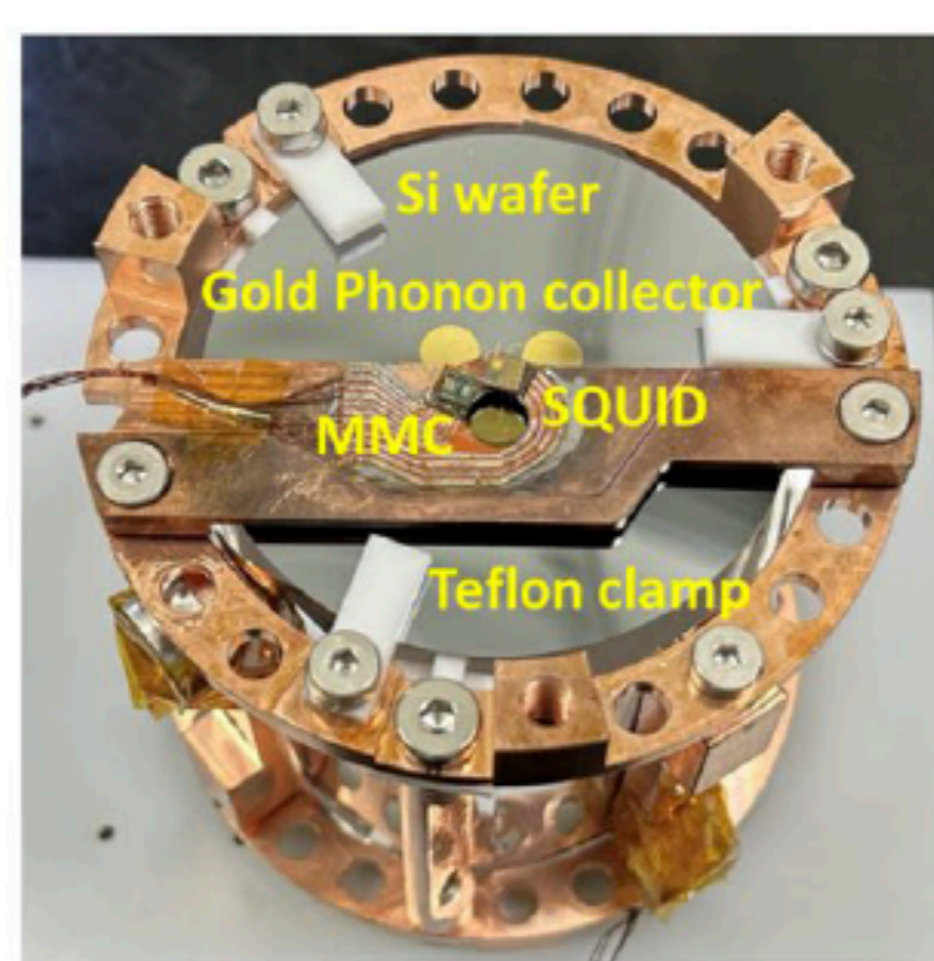
LD R&D setups



AMoRE-pilot



AMoRE-I



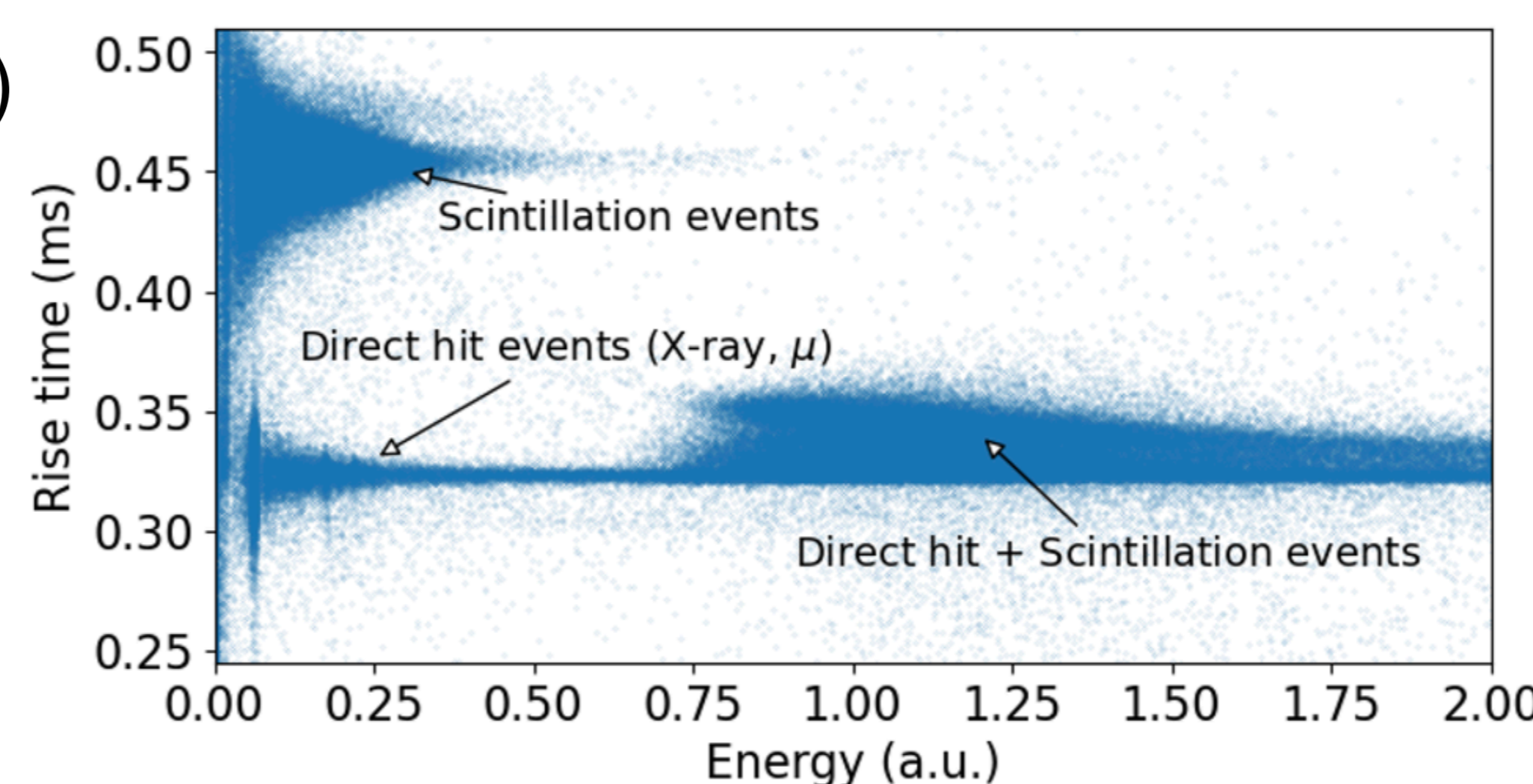
AMoRE-II

References

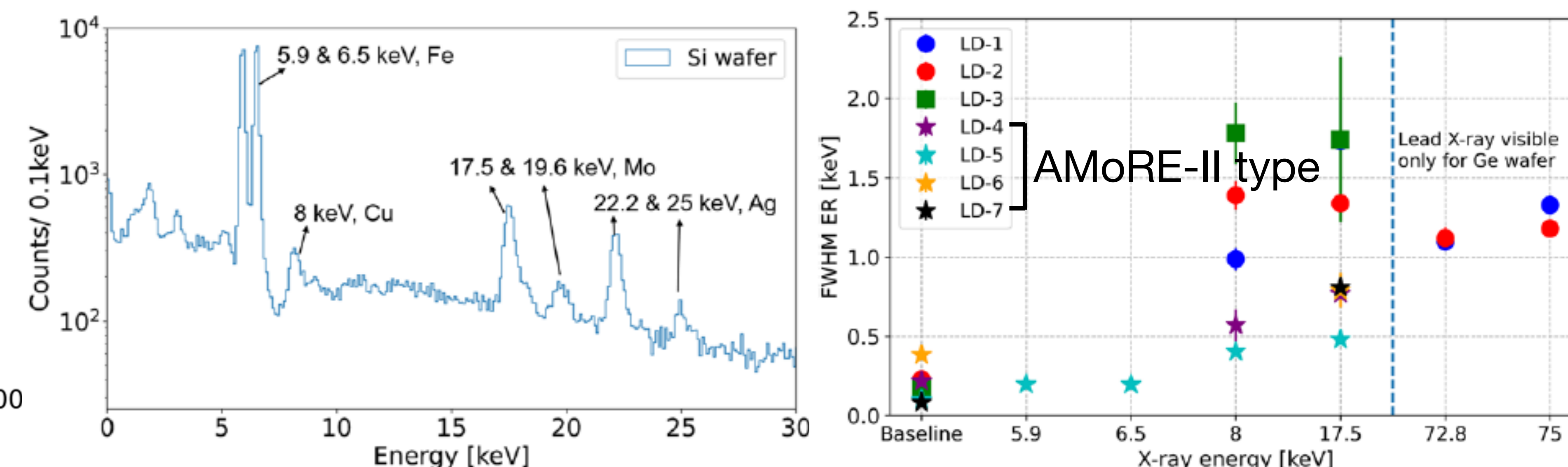
IEEE TNS 70, 1307 (2023), JLTP 218:92 (2025), EPJC 85:172 (2025)

Highlight of LD R&D setup performance : ~ 10 mK, dry DR

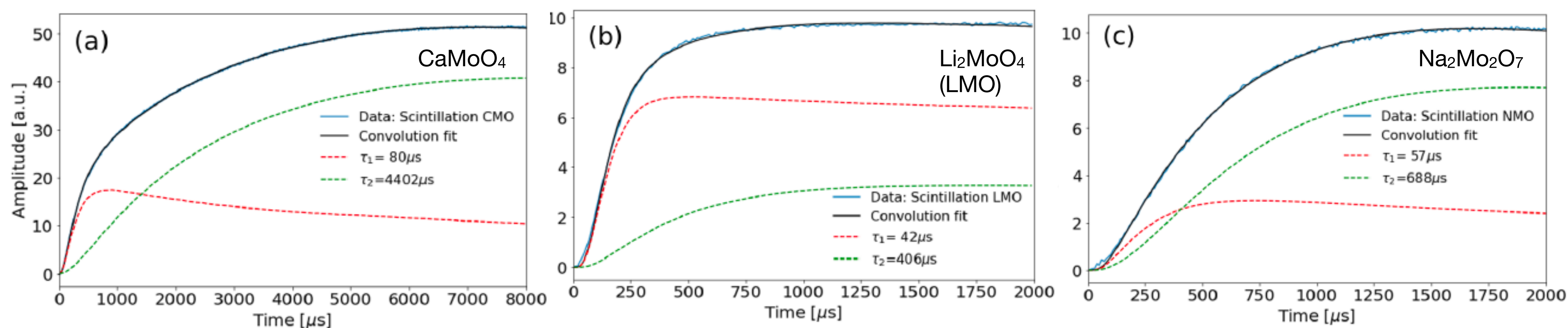
• Scintillation vs direct radiation



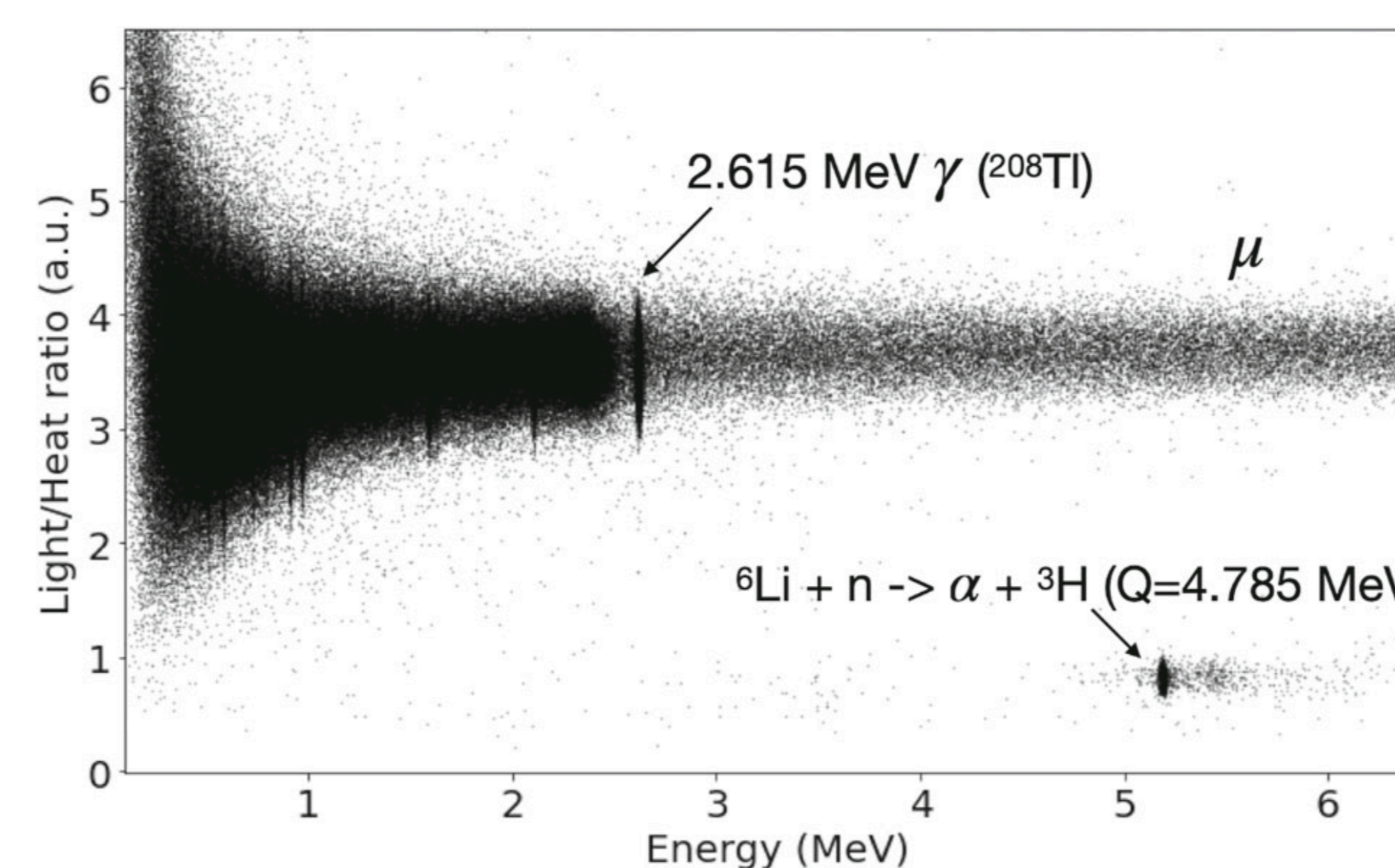
• Energy resolution



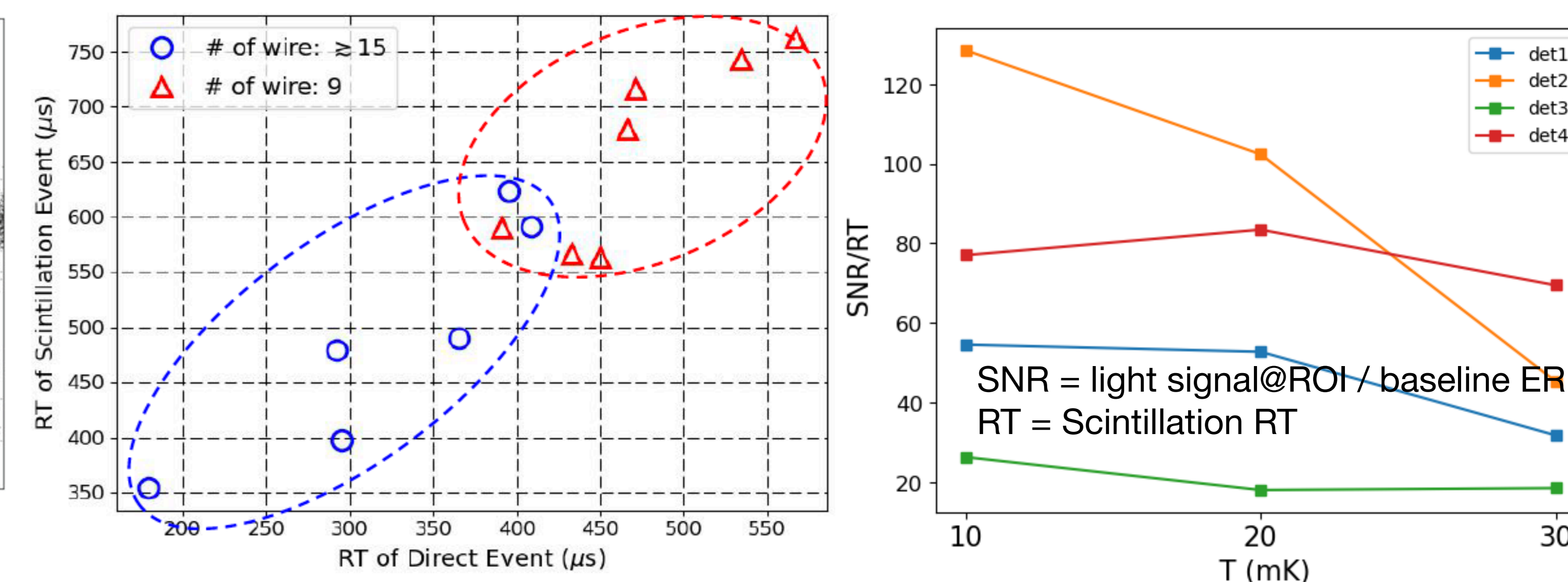
• Scintillation characterization by Mo-containing crystals



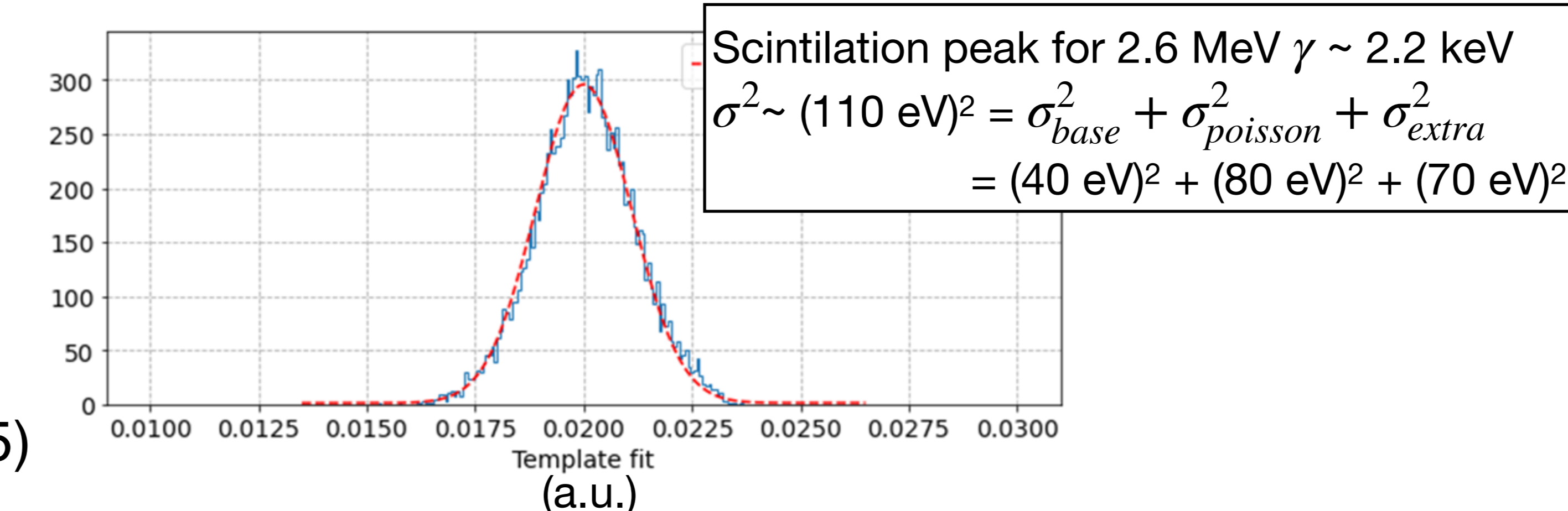
• Particle identification (LMO)



• Timing (LMO)



• Scintillation light collection (LMO)



Prospect

- Promising LD performance for AMoRE-II
- Continuing R&D for next-next generation experiment: Targeting pile-up rate $< 10^{-5}$ cnts/keV/kg/yr at ROI Enhance SNR (NTL amplification) & RT