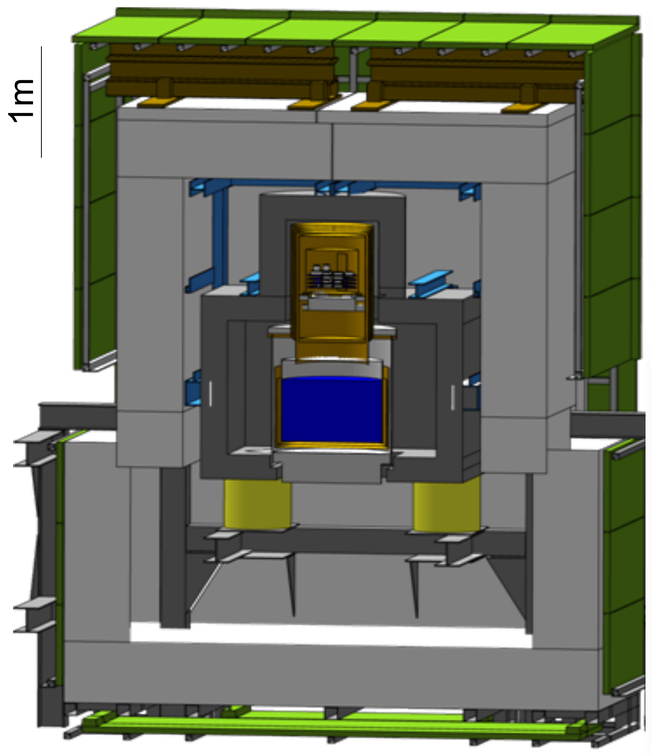
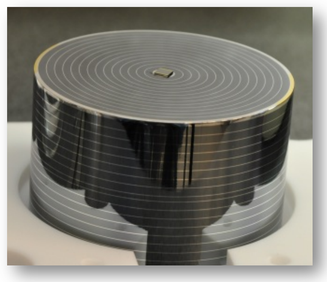
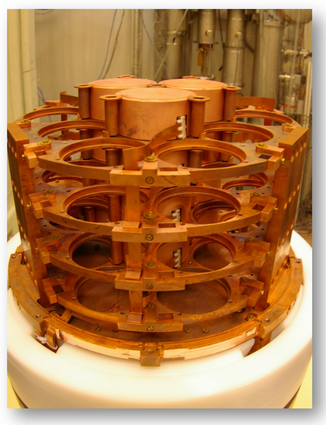
Direct DM search: from EDELWEISS to EURECA

Geertje Heuermann, Bernhard Siebenborn (KIT)







EDELWEISS II → III

10 ID → 40 FID detectors

(**F**ully **I**nter**D**igitized ring electrodes on all surfaces)

→ increase sensitivity by x 40

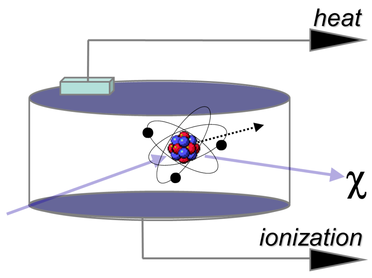
< 0.03 events/kg/year

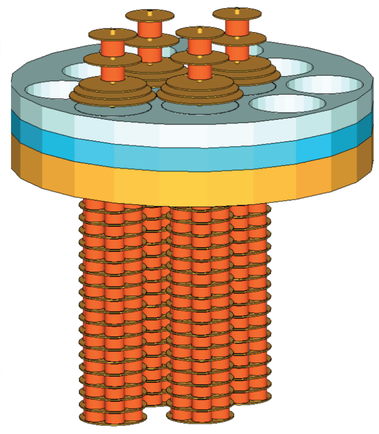
EDW III → EURECA

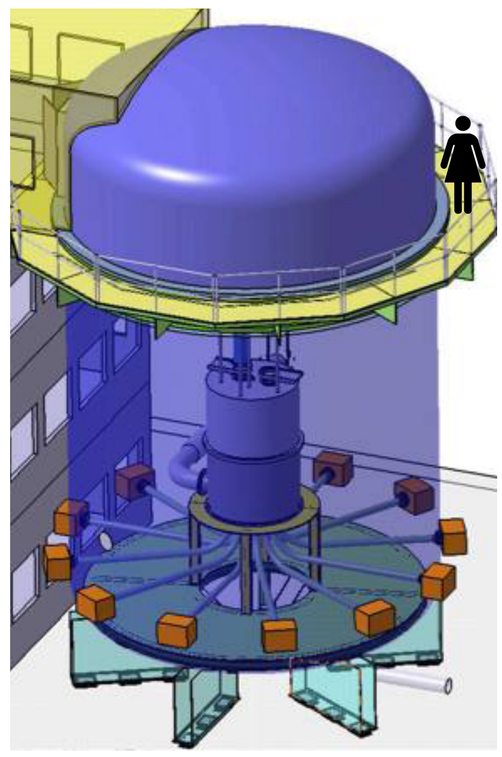
1000 FID/$CaWO_4$ detectors

→ increase sensitivity by x 25

< 10^{-3} events/kg/year







Integrated Readout Electronics

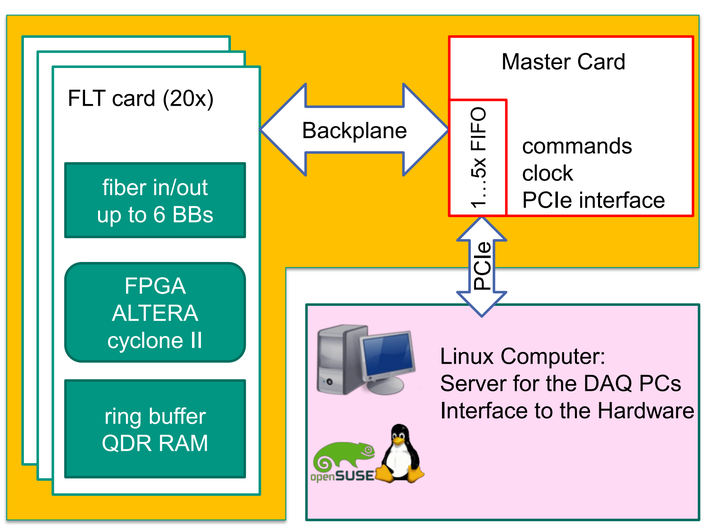
FPGA based DAQ for 40+ Detectors

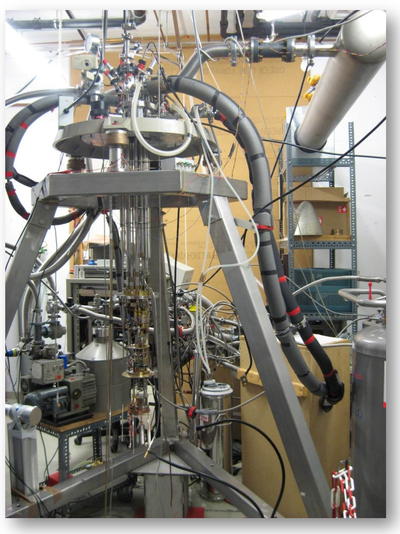
Internal trigger for event readout

→ data reduction & high sampling readout

Integration of external detectors

→ active muon veto, Rn-monitoring, trigger on muons





Temp.: T_{op} = 19 mK

Heat: t_{rise} <10 µs

t_{fall} ~100 ms

Ionis.: t_{rise} <1 µs

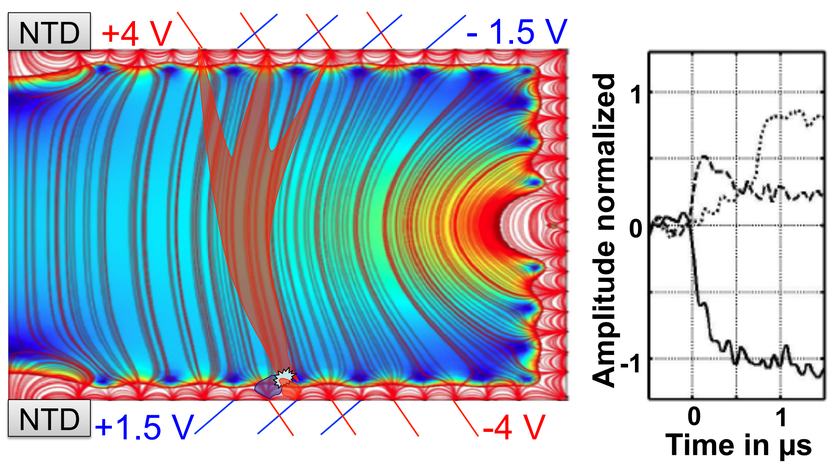
40 MHz sampling → additional spatial info

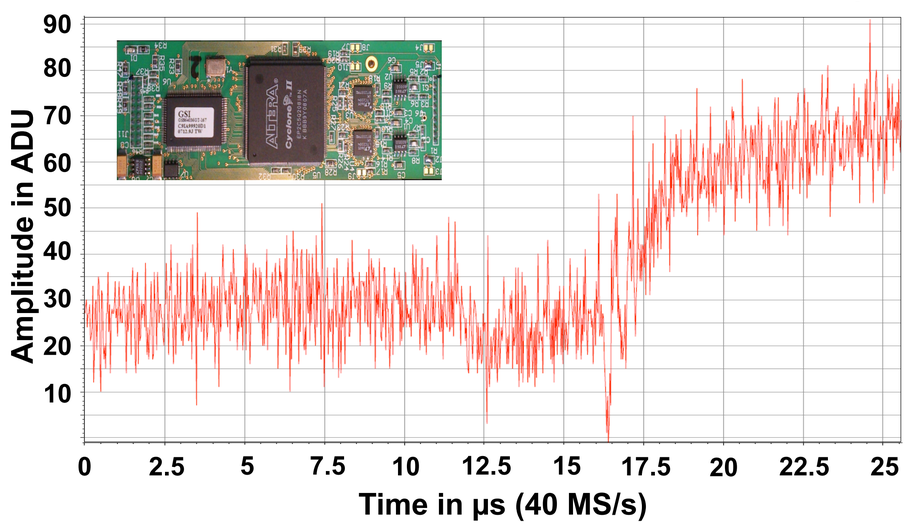
cryogenic tests supported by

HELMHOLTZ ASSOCIATION

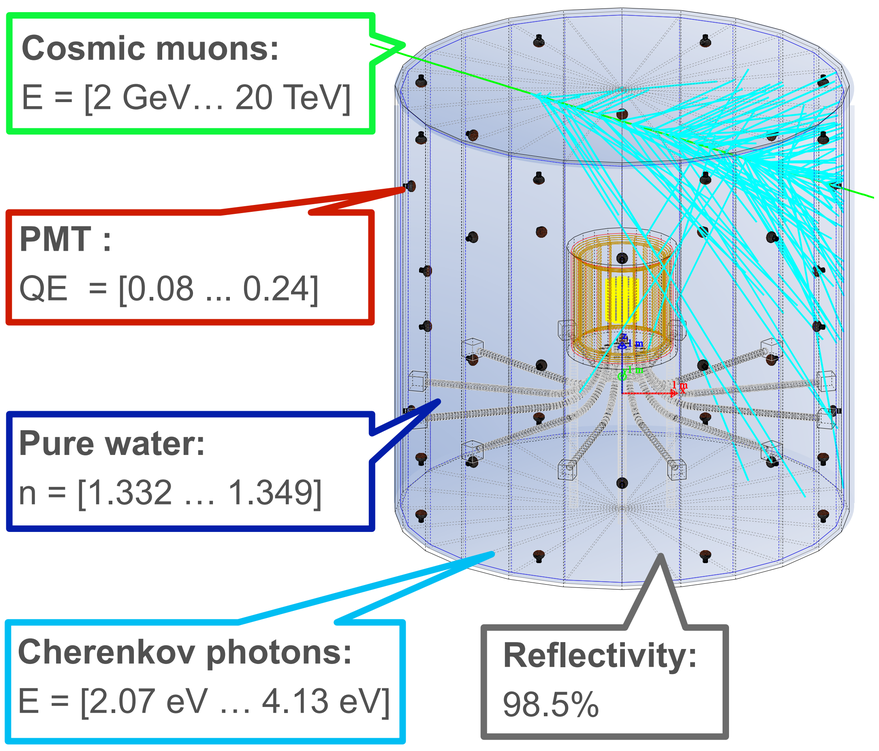
Alliance for Astroparticle Physics

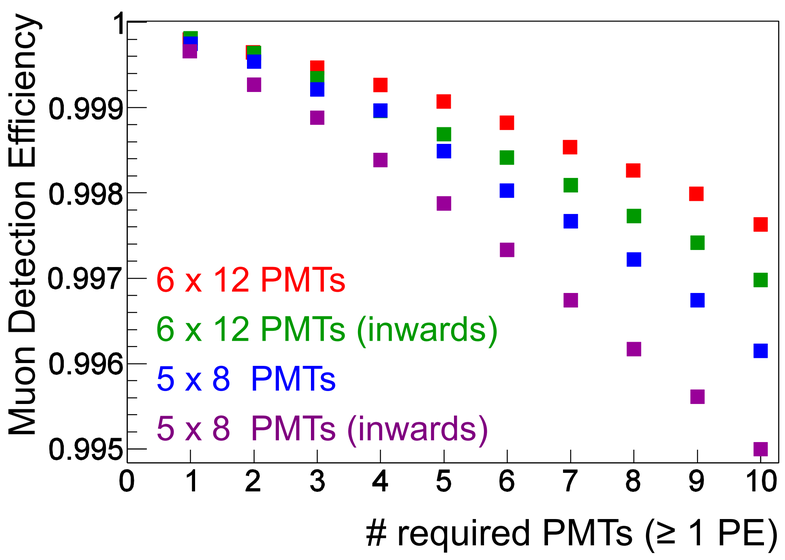
Time-resolved Ionization Channel

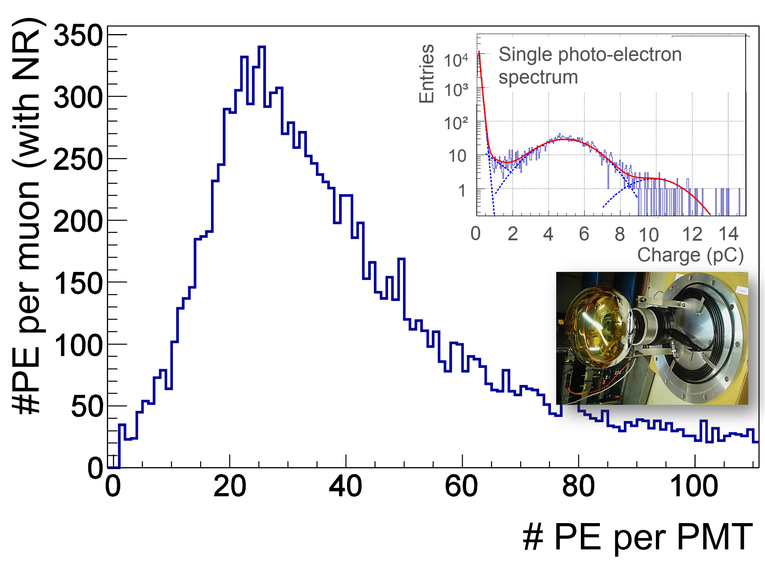




Shielding Concepts and Background Suppression







Reduce background by a factor of 10^3

How To:

- optimise shielding concept
- improve radio-purity of materials
- lower detector tower bkg budget

Irreducible µ-induced Background:

single nuclear recoil (NR)

- w/o µ-veto: ~ 1.4 events/ton/year
- with µ-veto: < 0.4 events/ton/year

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