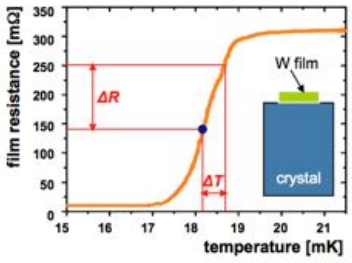
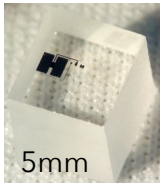
The NUCLEUS experiment

Fundamental physics with CEvNS at low energies

Gram-scale cryogenic detectors @10mK

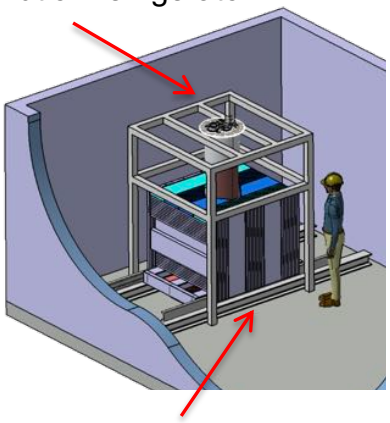




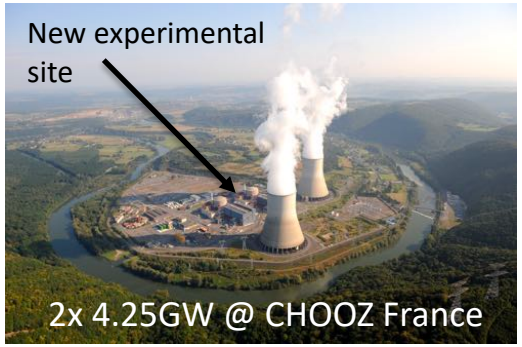
Demonstrated ultra-low threshold: **E_{th} = 19.6eV**

- Direct measurement of nuclear recoil
- No quenching factor uncertainties

Dilution refrigerator



Pb, PE shielding (5t)



10g Phase (-2023): Precision 10%
1kg Phase (2024-): Precision <=1%

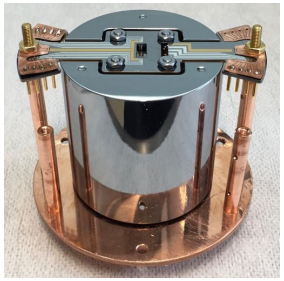
CEvNS >= IBD if , …

- 10eVish threshold ✔
- Background under control

& if, …

- Compact setup
- Robust setup
- Easy-to-operate setup
- Price tag is ok !

Challenges



"Compactifying" the shielding

Automizing detector operation

Use cases

- Reactor power monitoring
- Plutonium removal
- Unique (?) CEvNS application: breeding reactors

My personal dream:
A table-top CEvNS experiment