The SuperNEMO ββ source production

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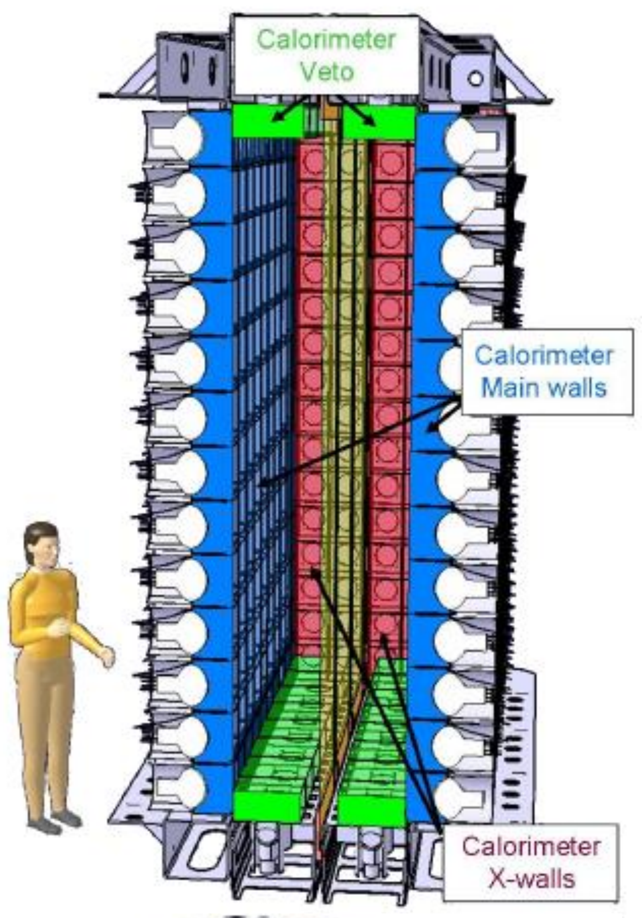
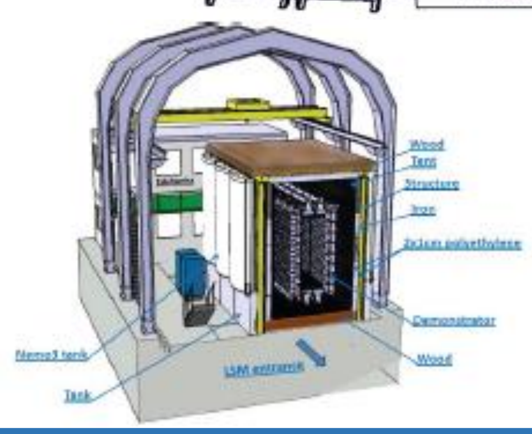
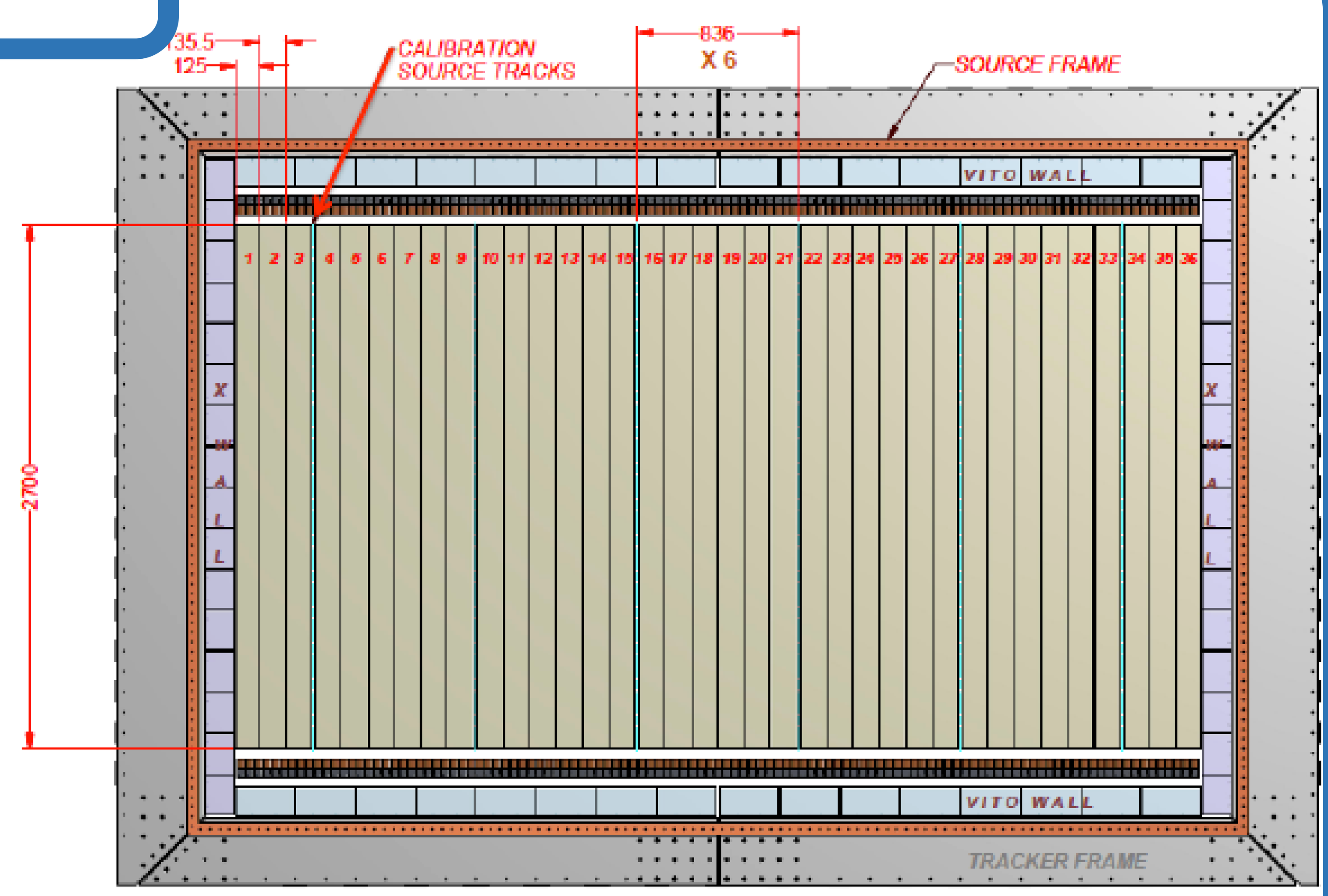
SuperNEMO



- $2\beta0\nu$ experiment combining tracking and calorimetry
- ββ source at center: 36 foils 2700x135(125)x0,25mm^3
- 7kg of ^{82}Se will be installed in a demonstrator.
- Other isotopes are also envisaged: ^{150}Nd, ^{48}Ca…

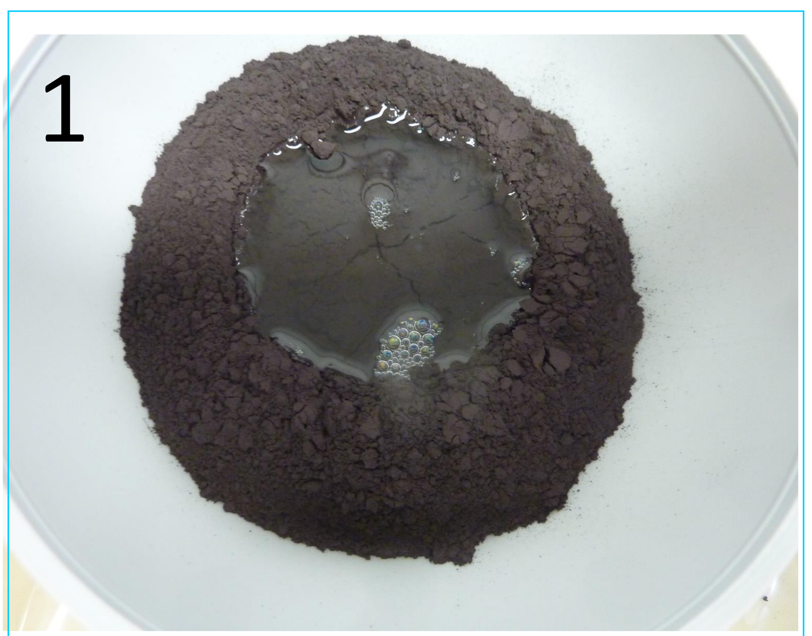


Under 1700m of mountain rock in LSM
(Laboratoire Souterrain de Modane, France)



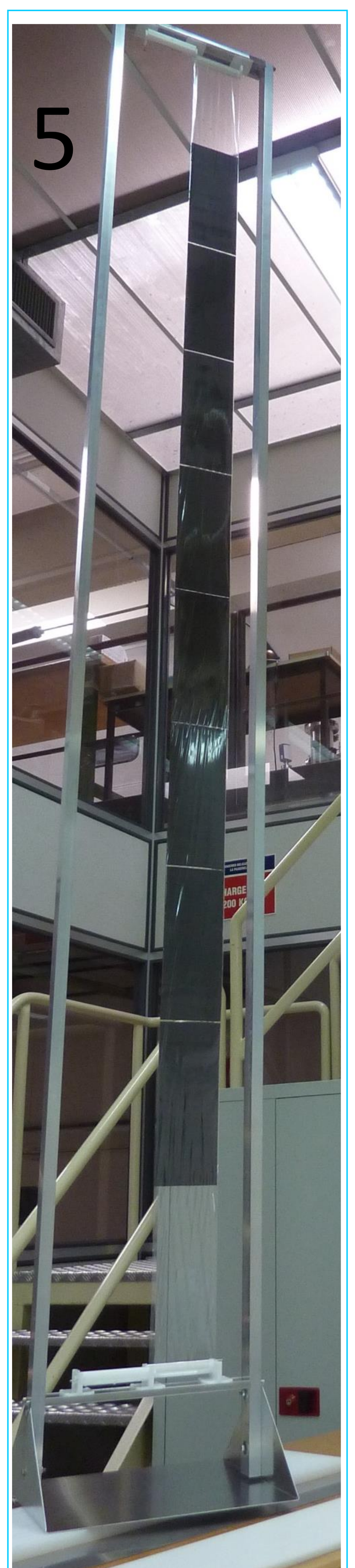
2 Source Foils 125mm x 2700mm (1&36)
34 Source Foils 135.5mm x 2700mm (2-35)
TOTAL SOURCE SURFACE = 131139cm²

Novel ^{82}Se foil preparation

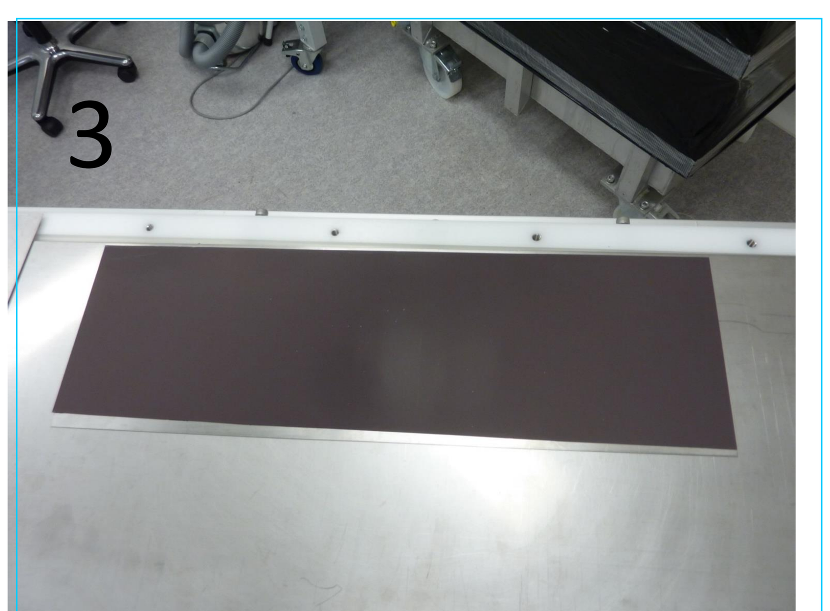


Mix ^{82}Se powder with PVA (Poly-vinyl-alcohol) glue

Pour onto mould



Install in frame



Cut into stand-alone pads

Insert in Mylar protection

- in ISO 6 clean room
- 25 out of 36 foils will be built with this design

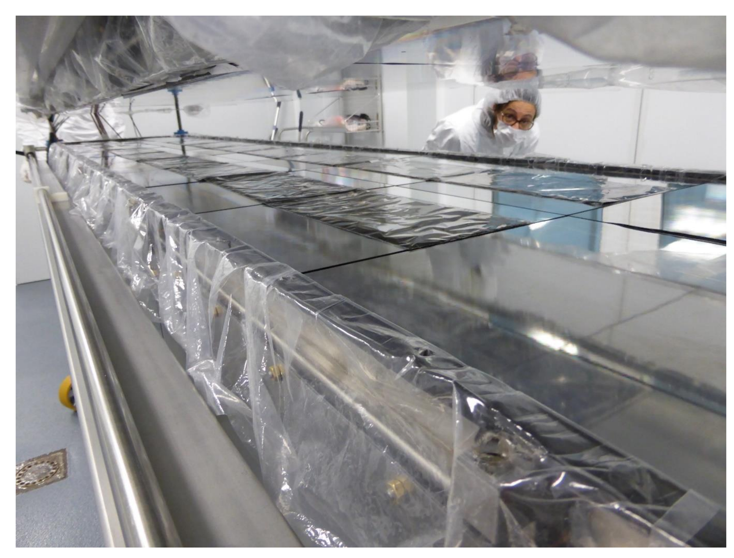
Choice of material

Required radiopurities for main background sources : $\mathcal{A}(^{208}Tl) < 2$ µBq/kg and $\mathcal{A}(^{214}Bi) < 10$ µBq/kg

- 5 different ^{82}Se powder purification techniques compared for the best background reduction: distillation, chromatography, chemical precipitation…
- Radiopurity measured in a dedicated detector BiPo with sensitivity of 2-10 µBq/kg

Every ingredient is measured for radiopurity and validated before integration in demonstrator (PVA, Se, Mylar etc…)

- Raw Mylar (10% of total source mass) : $\mathcal{A}(^{208}Tl) < 49$ µBq/kg and $\mathcal{A}(^{214}Bi) < 210$ µBq/kg
- PVA (10% of total source mass): $\mathcal{A}(^{208}Tl) < 12$ µBq/kg and $\mathcal{A}(^{214}Bi) < 768$ µBq/kg



Installation in demonstrator

^{82}Se foils will be installed last, after tracker and calorimeter : planned for the end of 2016
Extensive study for reducing background
Good opportunity to validate purification techniques