

Strategy with SICCAS

- Produce NaI powder at ~1ppm in K
- Grow a crystal gaining a factor 10 in K
- Melt and regrow gaining a factor 8 in K
 - a.k.a. zone refinement
- Final target purity: ~10ppb
- Jan 2015: we ordered the production of 10kg powder + two growth cycles:
 - Testing samples foreseen for each step
 - 18k€ total cost

4 crystals produced in Aug 2015



#1 and #2
shipped to Milano

#3 and #4
stay at SICCAS

measured together
by HPGe @LNGS
(Matthias)

Cut for samples
from different areas
(loan)

Measured by ICPMS
(Stefano)

#3 melted and
regrown

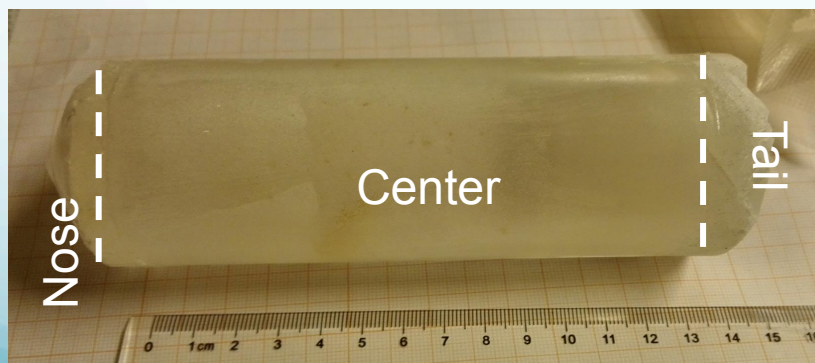
shipped to Milano

#4 surface treated with:
HP SiO₂ powder
Silicon Oil / Acetone

#4 melted and regrown

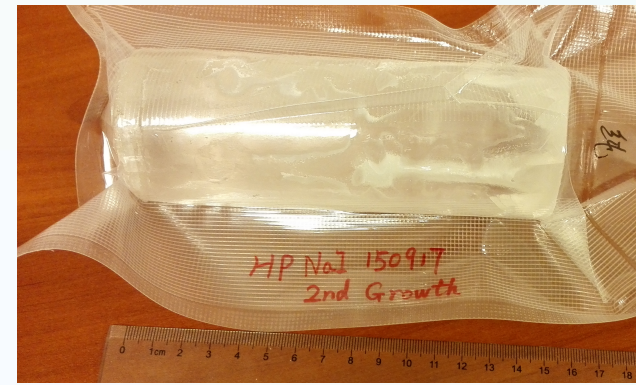
K in NaI powder and crystals

| sample | ready | mass | Kunshan ICP-MS | SICCAS ICP-MS | MIB HP Ge | LNGS ICP-MS | LNGS HP Ge |
|--------------------------------------|--------|-------------|-------------------|------------------|------------------------|-------------------------|----------------------------|
| powder 1 st batch | Apr 15 | 20g | 4.1 ppm | 4.7 ppm | 20 ppm | <2 ppm | |
| powder 2 nd batch | Jun 15 | 200g | 2.88 ppm | | <3 ppm (prelim.) | 400 ppb (prelim.) | |
| 2 crystals 1 st growth | Aug 15 | 2x 1.2kg | | <300 ppb | | see table below | 250±80 ppb (prelim.) |



| Sample ID | K conc [ppb] |
|--------------------------|-----------------|
| Crystal 1 center clean | 90 ± 10 |
| Crystal 1 Nose | 120 ± 15 |
| Crystal 1 Tail | 1200 ± 20 |
| Crystal 2 Center dirty a | 138 ± 5 |
| Crystal 2 Center dirty b | 170 ± 30 |
| Crystal 2 Tail | 1050 ± 40 |

Ongoing



- Crystal from 2nd growth being shipped by SICCAS.
 - Which treatment?
- MIB triple quadrupole (collision cell): lacks manpower
- MIB – German company: optical MS could go to 10-30ppb (Massimiliano)
- 10kg Astro Grade ordered on Nov 20th from SA.
- Matthias measured a NaI powder sample from Ucrania: results awaited.