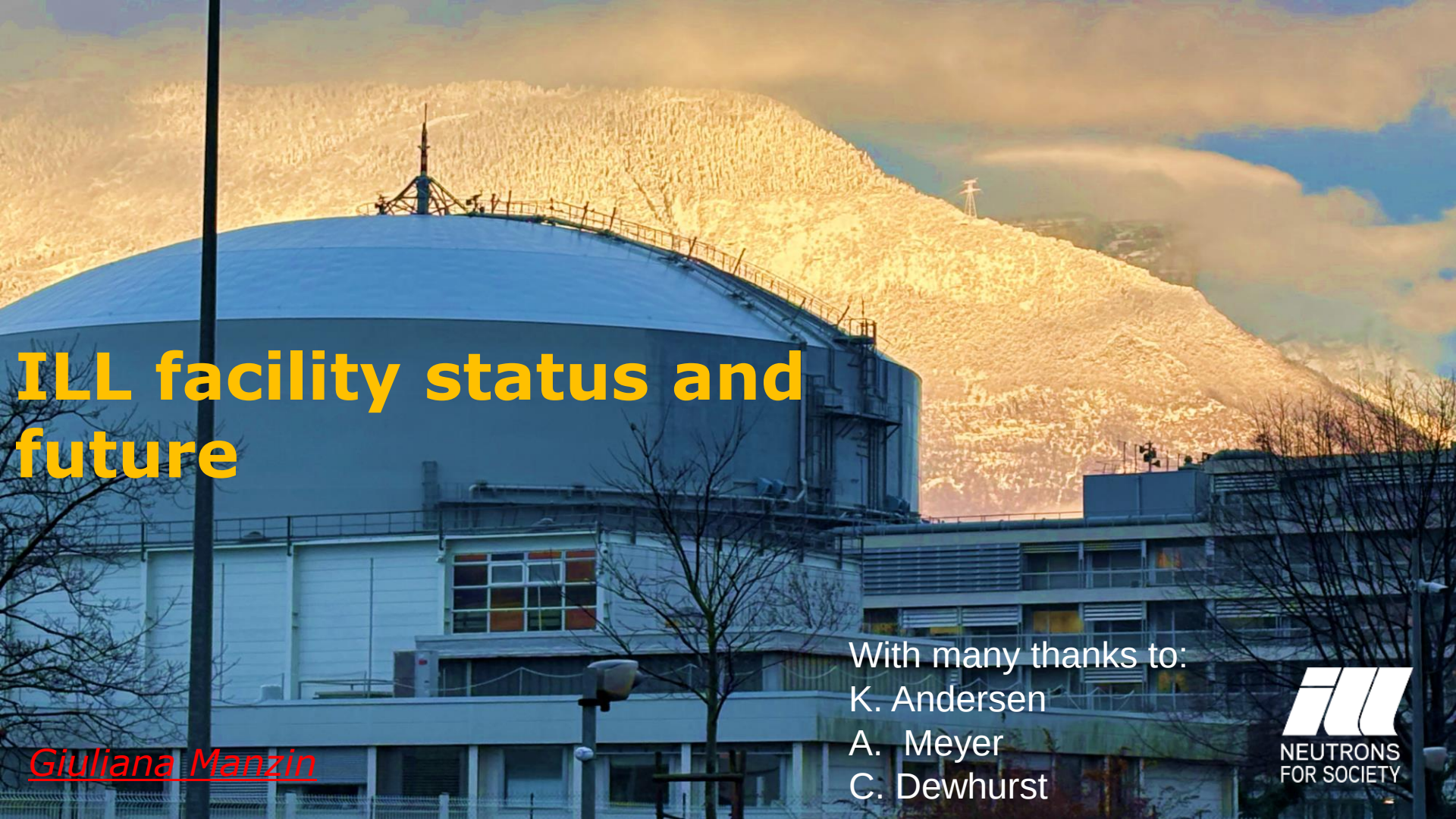


ILL facility status and future

Giuliana Manzin

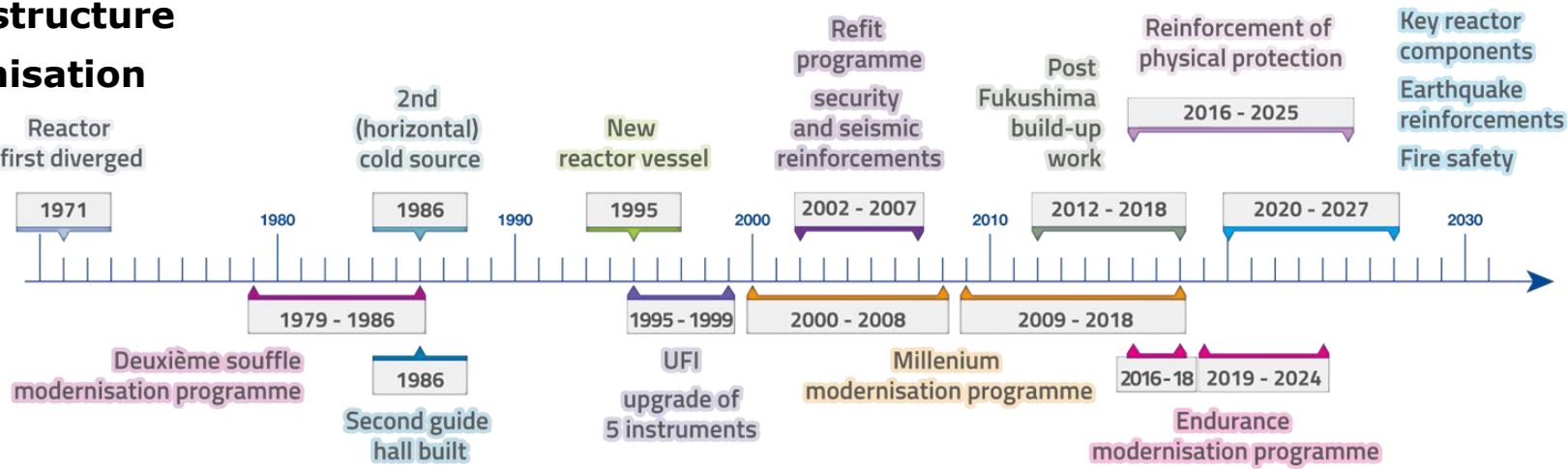
With many thanks to:
K. Andersen
A. Meyer
C. Dewhurst

NEUTRONS FOR SOCIETY

2027: 60 years of ILL

Constant renovation: the secret to our success

- **Reactor**
- **Instruments**
- **Neutron distribution**
- **Safety and security**
- **Infrastructure**
- **Organisation**



NEUTRONS FOR SOCIETY

Why do we have to make these changes?

They form the foundation upon which our science is built

- **To maintain the performance level of our reactor**
- **To ensure our capacity to continue to improve the performance of our instrument suite**
- **To reinforce safety levels to ensure they satisfy evolving requirements**
- **To continue to operate throughout the coming decade**

NEUTRONS FOR SOCIETY

Reactor critical work

Shut down n. 196: 300 days

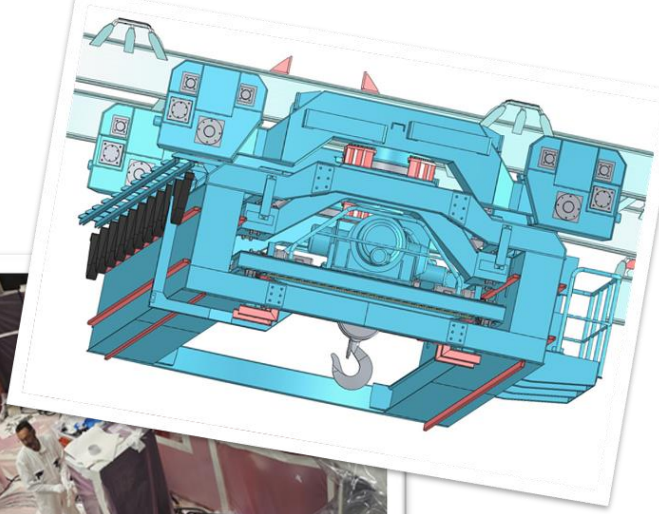
- **Polar Crane Level D**
- **Fire detection system and sprinklers**
- **RC3B H1-H2**
- **Seismic reinforcement of the Storage Pool**
- **Fire protection water storage**

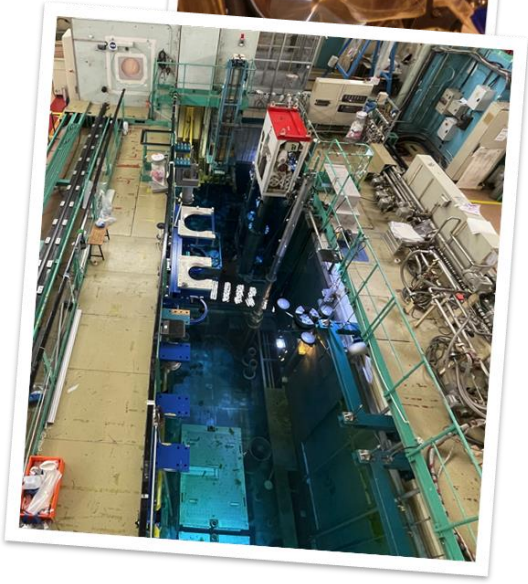
NEUTRONS FOR SOCIETY

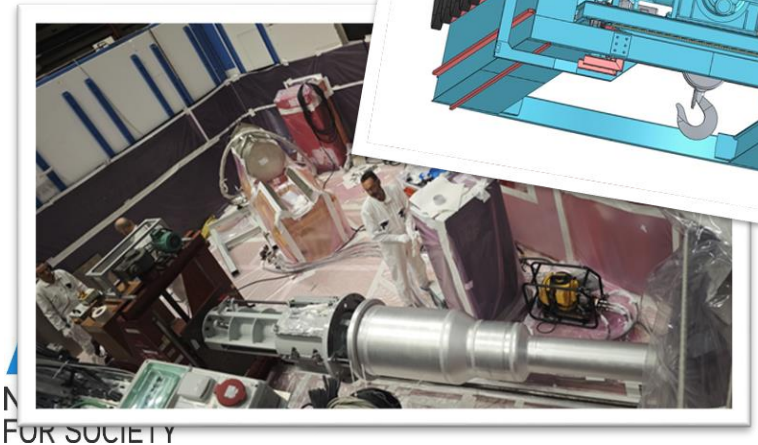
Reactor critical work

Shut down n. 196: 147 days

- Seismic reinforcement canal 3
- DDG H13 and H6
- Level C crane
- Replacement of security bar n. 3
- RC3B H5





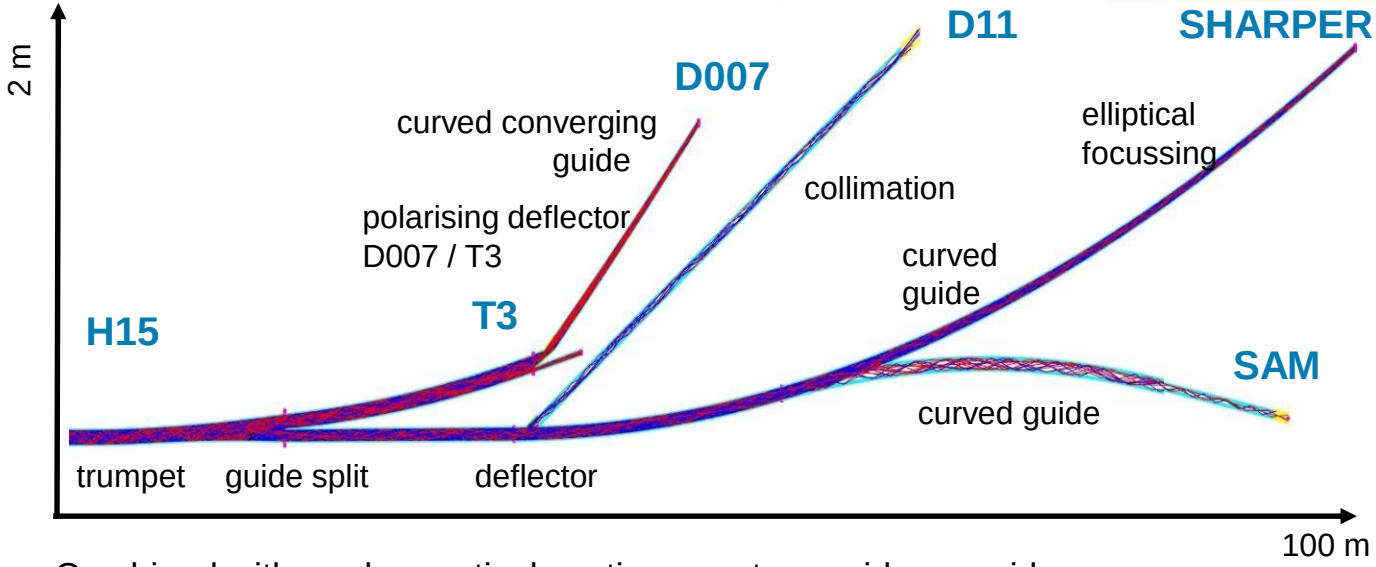


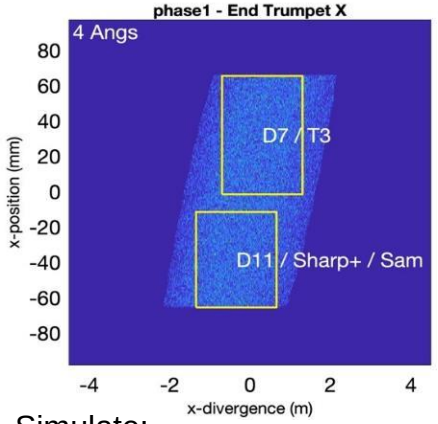
Future Reactor Operations

- **3 cycles of different lenght/power to guarantee 170 neutron days per year**
- **Conclusion of the casemate reinforcement program**
- **LEU conversion program on track: FOAK irradiated in 2029**
- **Full conversion by the end of 2032**

NEUTRONS FOR SOCIETY

20 Years of Continuous Instrument-Upgrade Programs





Simulate:
- neutron flux
- spatial filling
- divergence profile

- Combined with modern optical coatings neutron guides provide more neutrons to a greater number of instruments
- Computer simulations of neutron transport and guide optics reveal subtleties and routes to optimization otherwise hidden by complexity

NEUTRONS FOR SOCIETY

ILL instrument suite

40 state of the art instruments

Typical instrument classes:

Some exist in thermal-, cold- and hot-neutron form

- **2-axis diffraction**
- **Small-angle scattering (SANS)**
- **Reflectometry**
- **Time-of-Flight (TOF) spectrometer**
- **3-axis spectrometer**
- **Spin-echo spectrometer**
- **Back-scattering spectrometer**
- **Neutron imaging**
- **Irradiation**
- **Fundamental physics**

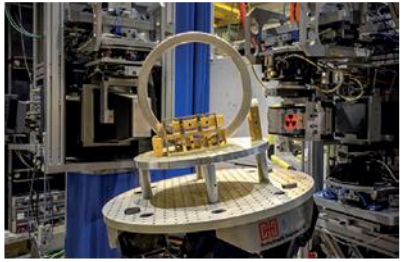

D10+

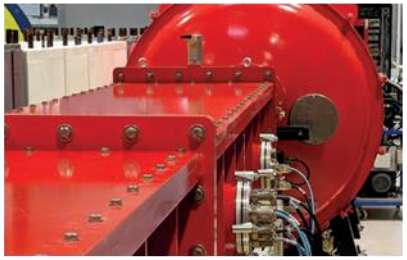

NeXT


FIPPS

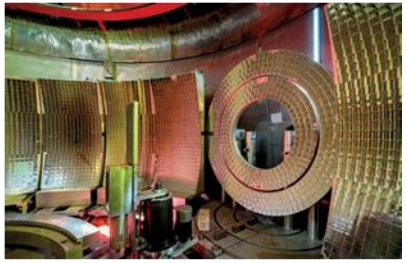

SHARPER


PANTHER


SALSA


SAM


D16


IN13

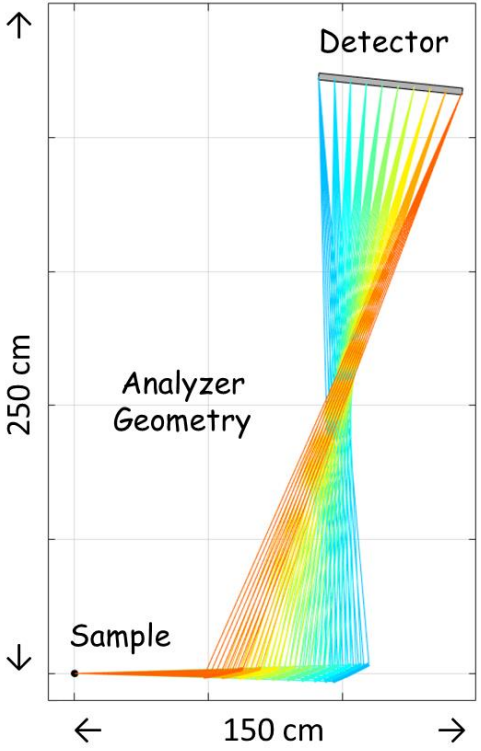
NEUTRONS FOR SOCIETY

Increased capacity and capabilty

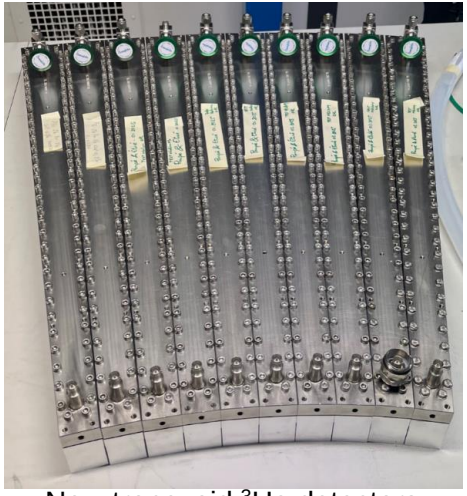
- Overall increase in count rate
- Reduction in background
- Enhanced automation
- Increase in Complexity
- Smaller samples, faster data collection, weak scattering level
- Kinetic measurements
- Operando/in-situ/time-resolved experiments
  (batteries / fuel cells, advanced manufacturing, phase transitions, …)
- Combination of radiations (X-Rays, RAMAN, pump and probe)
- New sample environments (high pressure/temperature/magnetic
- field, low temperature, levitation, …)

NEUTRONS
FOR SOCIETY

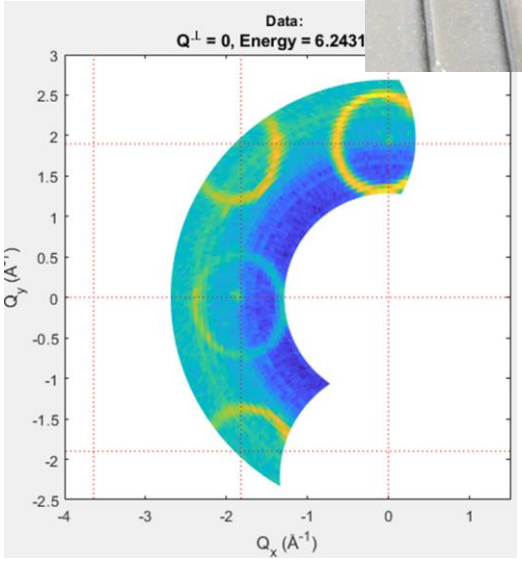
Marmot: multiplexing @THALES



- Combination of bent Si crystals and NiV/Ti super-mirrors
- Impressive early results, both in terms of data collection rate and signal quality
- Calibrations / addition of shielding to increase performance
- Continuous installation of the remaining channels
- Instrument in commissioning since end of September 2025

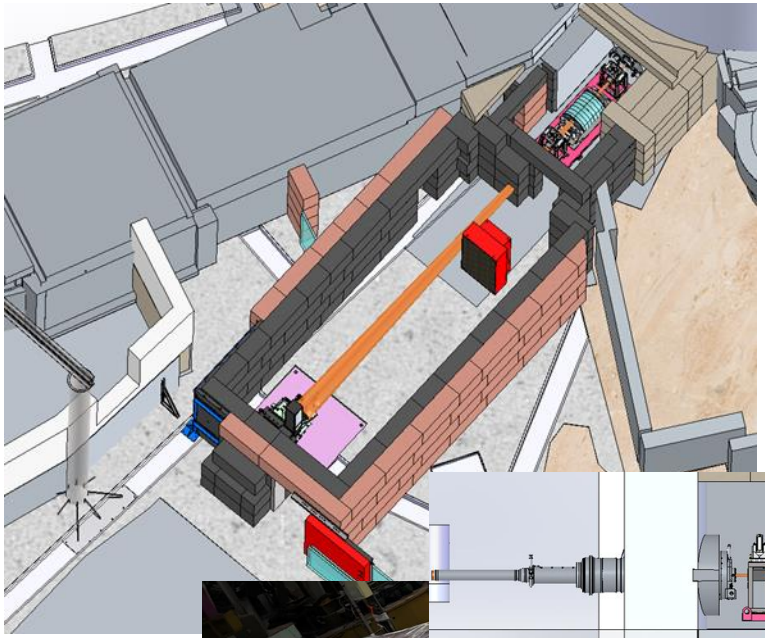


New trapezoid ^{3}He detectors



NEUTRONS FOR SOCIETY

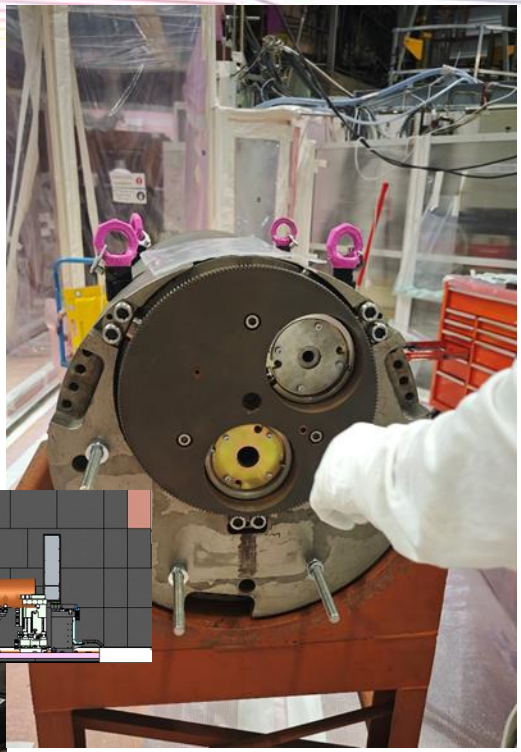
ThrILL – Thermal Imaging Instrument

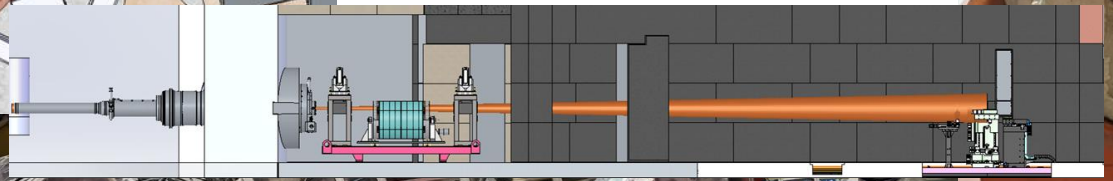


Already installed:

- Beam tube
- Main shutter
- Primary casemate

Commissioning: October 2026



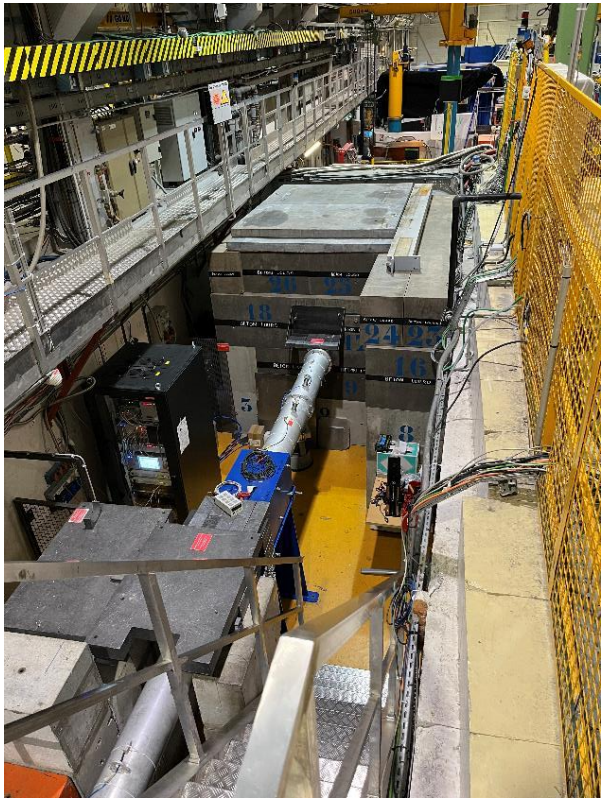


H6 – main shutter with 2 integrated pin-holes for highest flux (28 mm) and high resolution (14 mm)

NEUTRONS FOR SOCIETY

New Imaging Instrument on a Cold Beam – PORTO

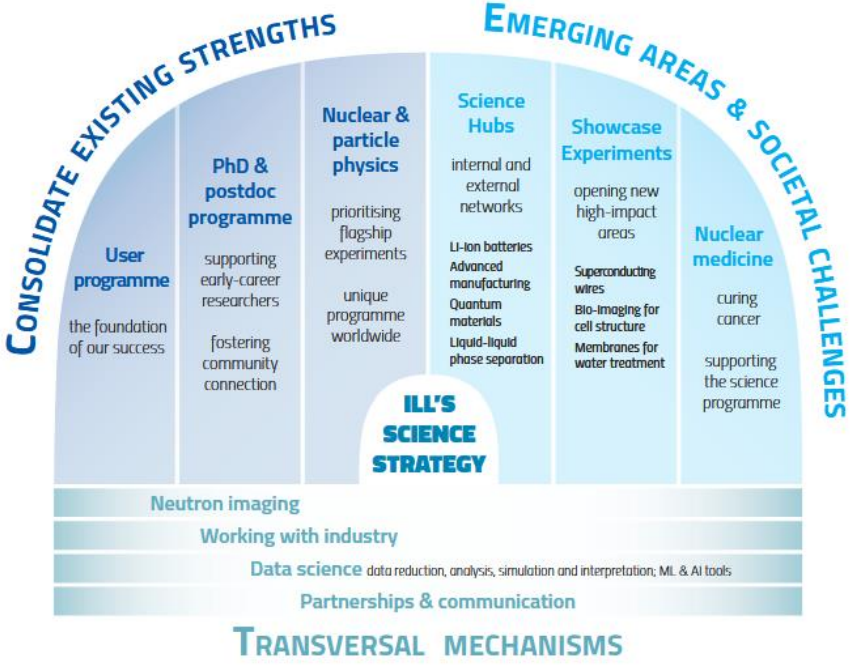
- 2nd imaging instrument for white-beam tomography
- Similar flux than NEXT
- In user operation on PF1b beamport 1 cycle/year
- From idea to realization in less than one year



NEUTRONS FOR SOCIETY

Execution of the Science Strategy

- **Start the four Science Hubs**
- **Create Applied Science Instrument Group**
- **Initiate the process for Showcase Experiments,**
- **Expansion of imaging capacity and capability**
- **Enhance data science capabilities**



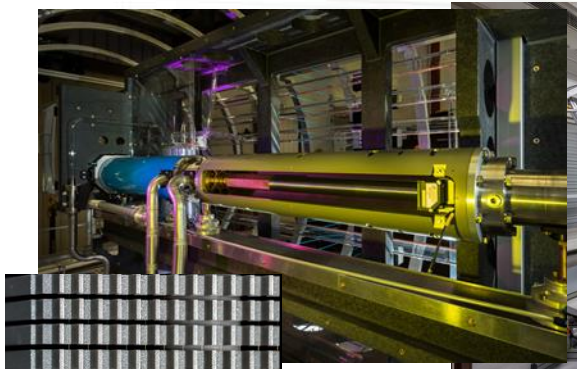
NEUTRONS FOR SOCIETY

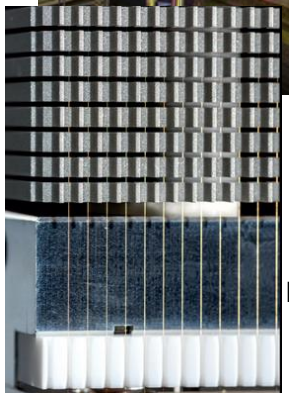
Capitalising on in-house technologies

- **Neutron Delivery**:
  Guides & Infrastructure
- **Neutron Optics**
  Monochromators, Supermirrors, Polarised ^{3}He
- **Neutron Detectors**
  Position sensitive, size, resolution, count rate
- **Sample Environment**
  Extreme conditions: precise, reliable, autonomous e.g. pressure, humidity, high temperatures, low temperatures, magnetic fields
- **Engineering services**
- **Instrument control, Electronics & Computing**

NEUTRONS
FOR SOCIETY

Qualification of CSPEC 3He tubes detector



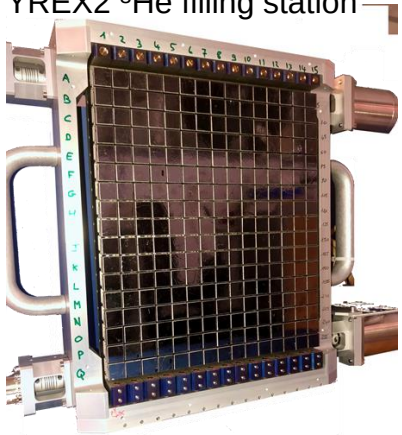


Detail of a trench detector

TYREX2 ^{3}He filling station

Bent Silicon Crystals for Marmot

H15 Guide separation



Double focusing monochromator
255 crystals
Crystal size: 14 x 14 mm²
Total area: 550 cm²

NEUTRONS FOR SOCIETY

Future of instrumentation and Projects

- Installation of velocity selector (Mirrotron) for LADI in July – approx. 2.5 increase in neutron flux
- Fabrication of PASTIS-3 set-up for polarization analysis on IN20 underway – installation end of 2026
- Fabrication of CSPEC @ ESS detectors according to plan – delivery of first 4 modules in March 2027
- Realization of 3He MEOB station for ESS progressing
- Development of a polarization analysis for IN16b – ErumPro by BMFTR
- Measures to reduce background in ILL7 ongoing
- Preparation of RC3B – ILL22 works for execution in winter shutdown 2026/2027 underway

Thank you for your attention!

NEUTRONS
FOR SOCIETY