



VESPA, the Neutron Vibrational Spectrometer at the ESS

Spectroscopy STAP, April 2026

ADRIEN PERRICHON
ON BEHALF OF THE VESPA TEAM

21 APRIL 2026 – ESS

Status update on VESPA

VESPA team current staffing level

Lorenzo
Di Fresco
(50% CNR)

Monika
Hartl
(100% ESS)

Liam
Whitelegg
(50% ESS)

Roberto
Senesi
(20% CNR)

Alexander
Johansson
(100% ESS)



Sam
Lambrick
(20% CNR/ISIS)

Amalia
Chambon
(20% DTU)

Helen
Popland
(100% ESS)

Rosa
Camilleri
(100% ESS)

Adrien
Perrichon
(100% ESS)

CNR Milano joining the VESPA team to help with the beam monitors:

- Federico Scioscioli (since March 2026)

And acknowledging the continuous & extensive support from:

- NSS & NSS groups
- ISIS Neutron & Muon Source, feat. Rob Bewley, Davide Raspino, Duc Le, Winfried Kockelmann

Status update on VESPA

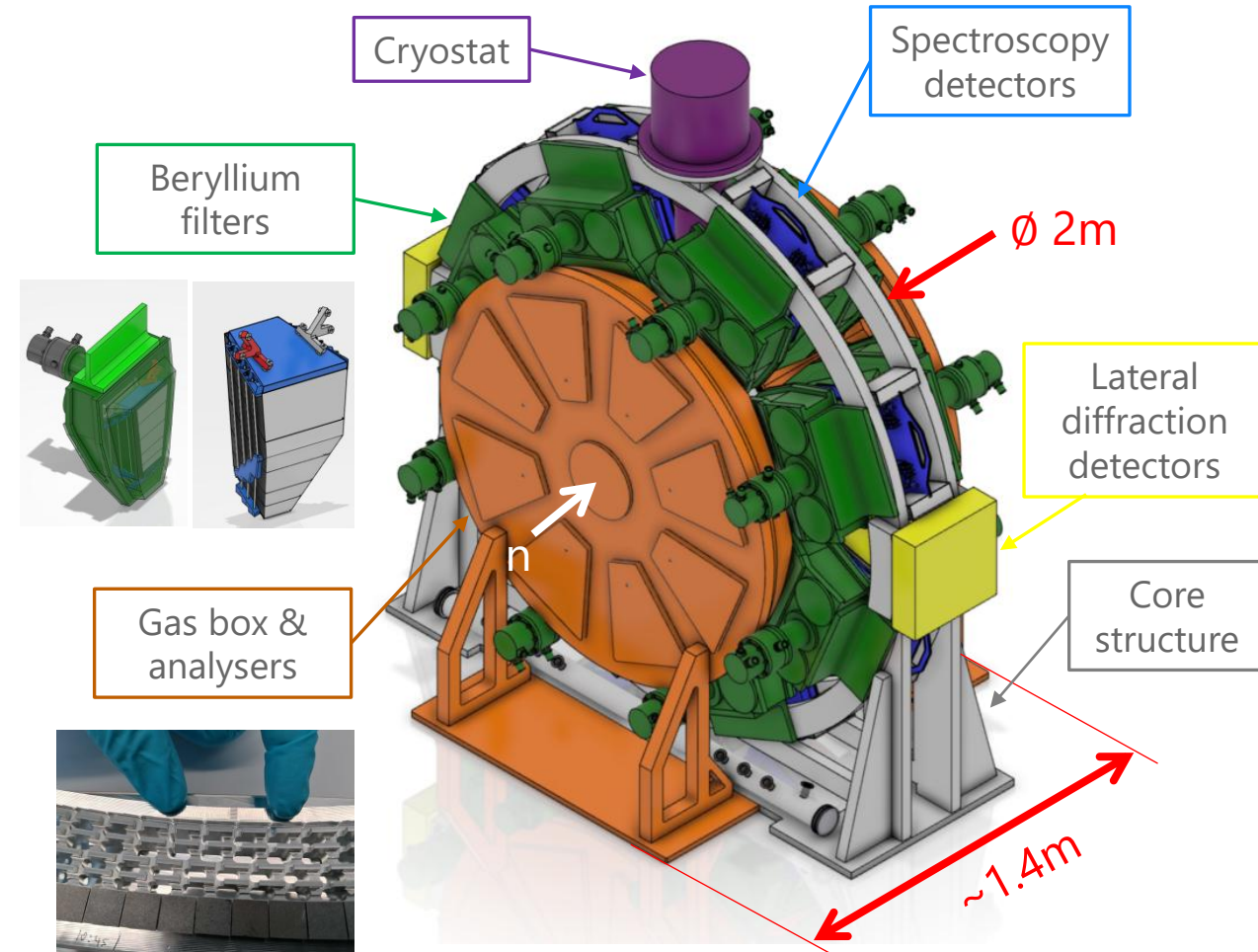


VESPA secondary spectrometer

Preliminary design review passed in January 2026 based on the model presented at STAP in October 2025

Since then:

- Minor modifications of the design to improve thermal/mechanical properties of the beryllium filter
- Agreement to transfer the scope of the analyser coating and of the detector system (spectroscopy+diffraction) to ESS
- Agreement to transfer the procurement of the detector tubes, the remaining HOPG crystals, the analyser backplate machining, the core structure, and the cryostat to ESS
- Tender for beryllium filter published April 17th



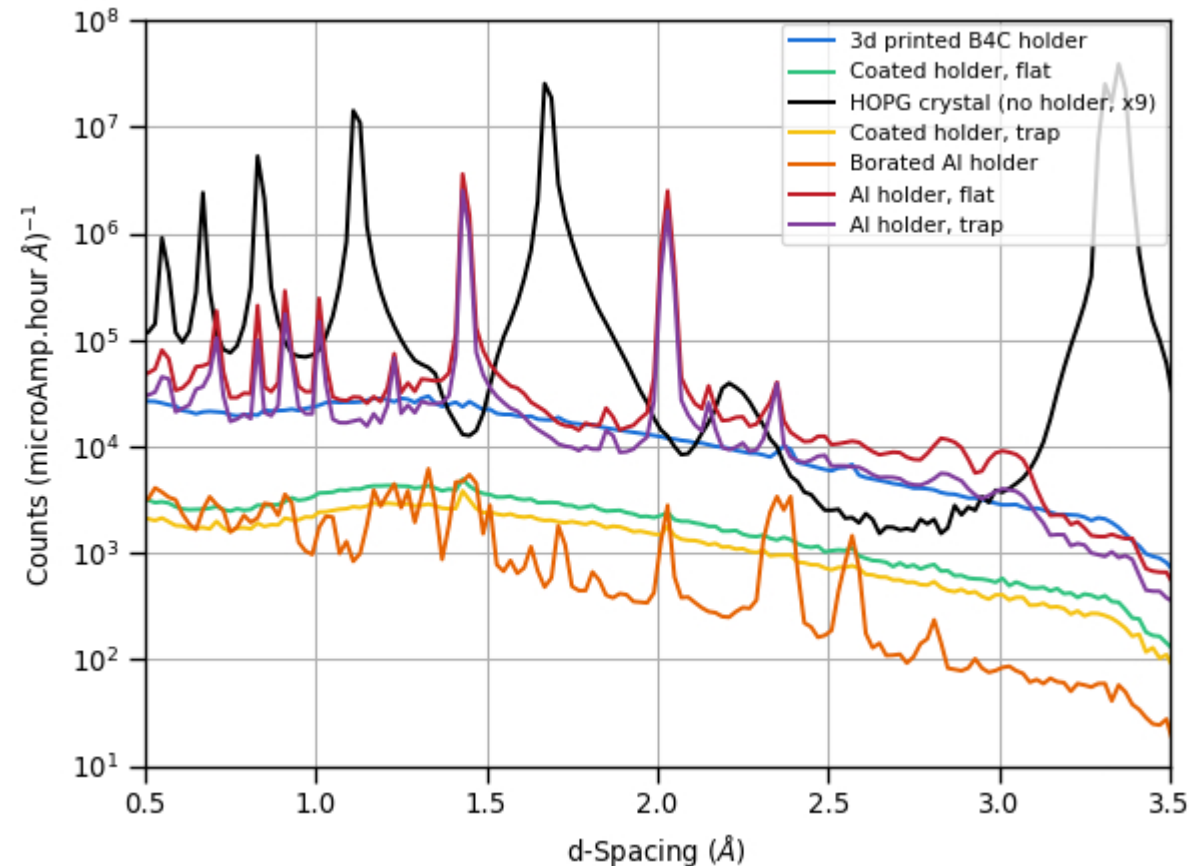
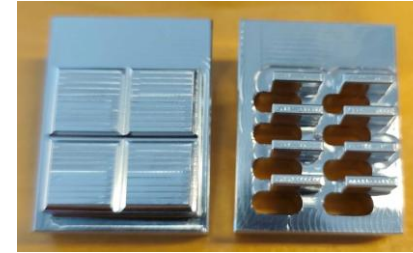
13,000 HOPG crystals, 280 kg of cryo-cooled Be, 600 ^3He tubes, in $< 2 \text{ m}^3$ footprint

Status update on VESPA



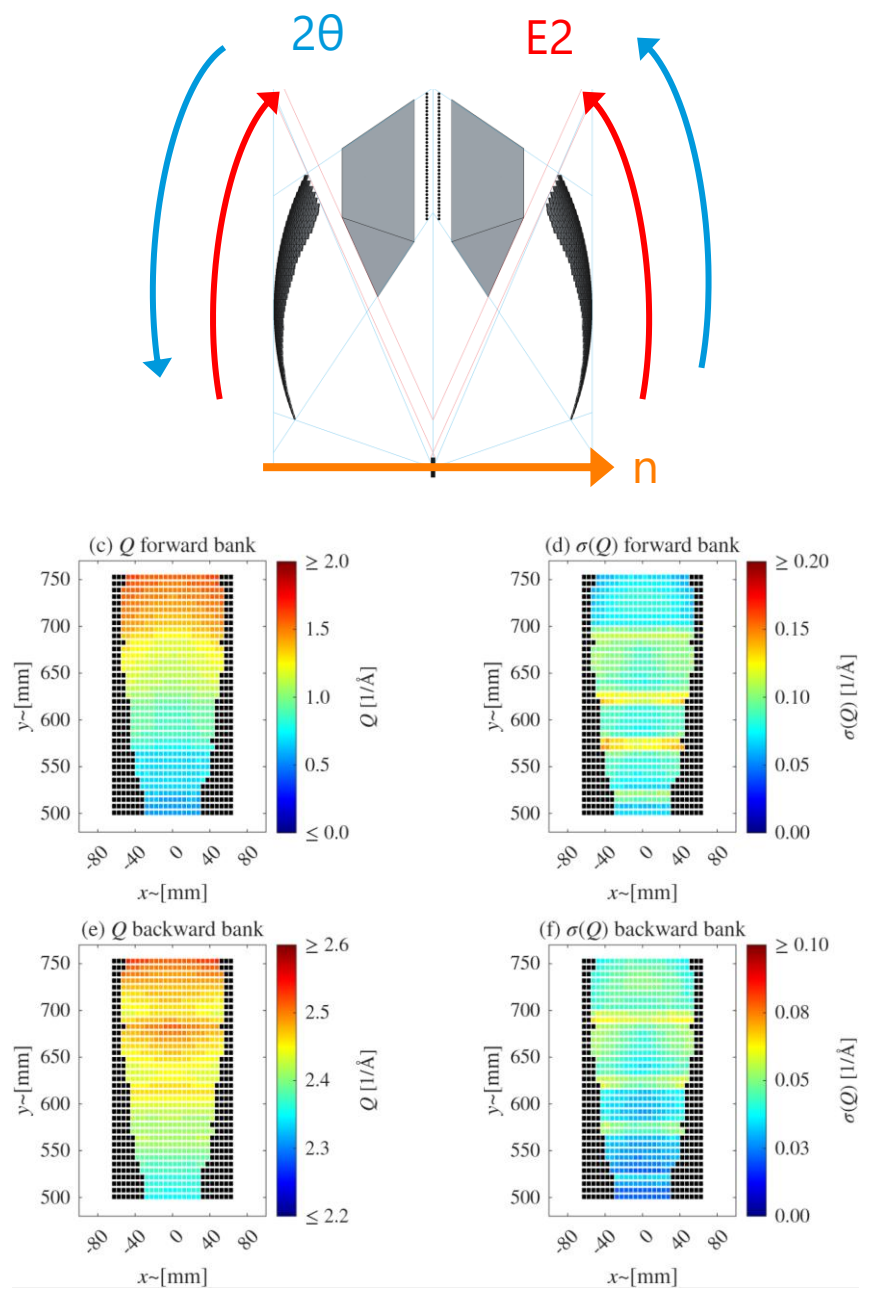
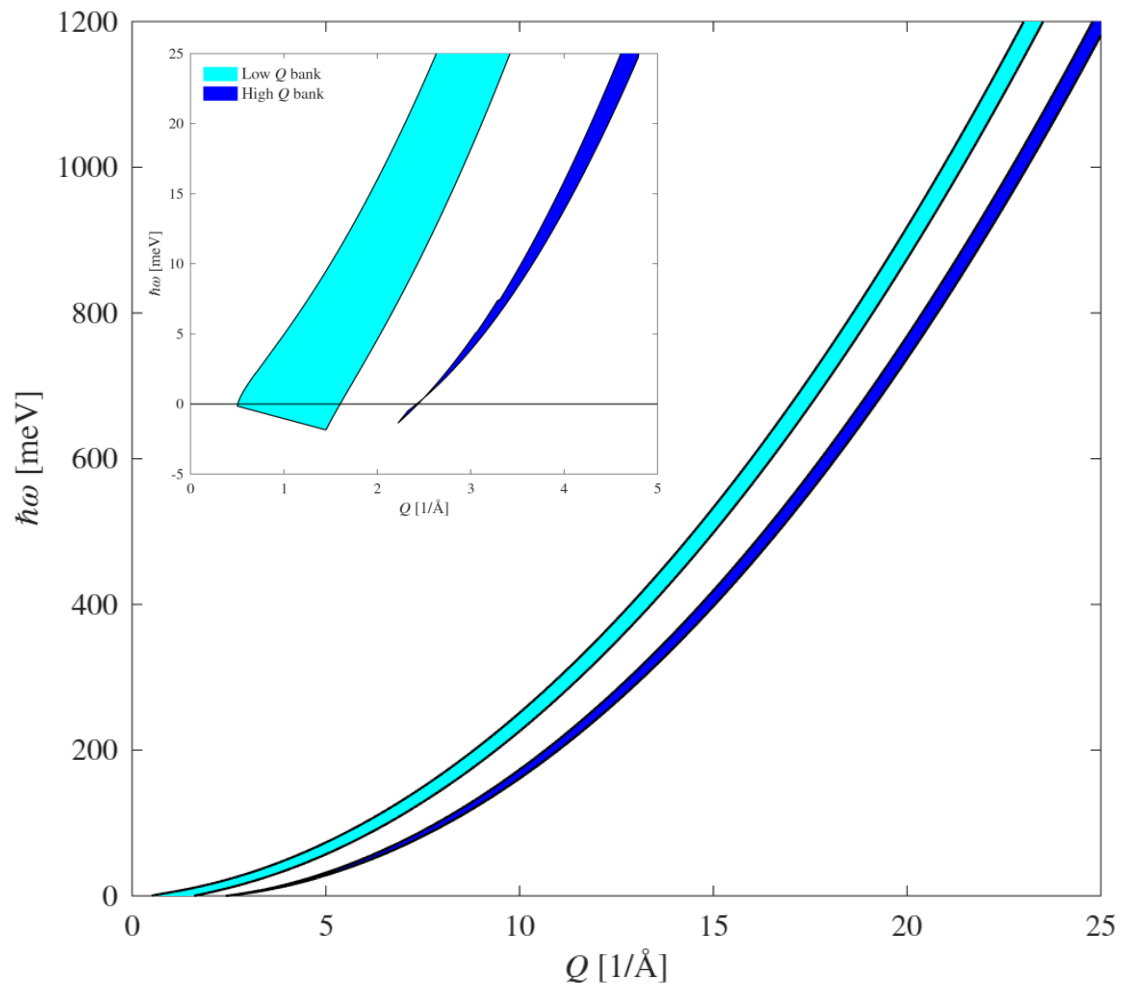
Prototyping activities

- Analyser backplate geometry & coating tested on MARI at ISIS in Feb 2026: significant improvement in thickness control, but performance still needs to be improved (next iteration ready for Q3-Q4)
- Beryllium filter assembly: 3D printed full scale model in preparation
- HOPG: 1500 crystals from Optigraph (module 0) to be tested on IMAT in May 2026, & 100 "final" crystals from Momenitive to be tested Q3-Q4



Status update on VESPA

VESPA's Q-resolution



Status update on VESPA



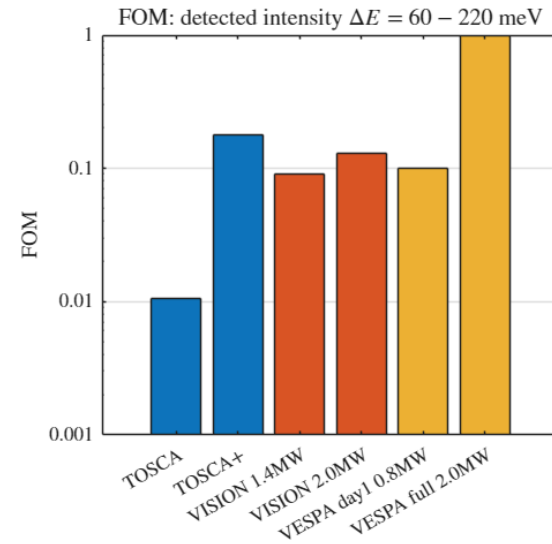
VESPA's predicted performance & rescoping strategy

Detected intensity FOM

- VESPA day 1 (4 out of 16 modules, ESS at 0.8MW): comparable in HF mode to state-of-the-art instruments
- Completed VESPA at nominal 2.0 MW: $\sim 10\times$ more intensity

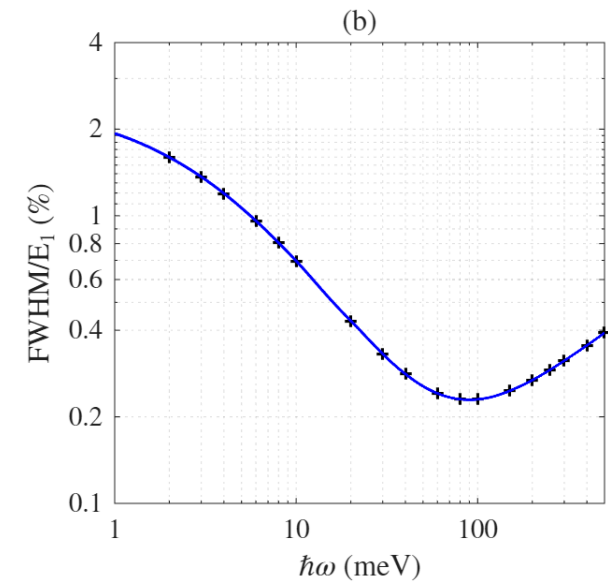
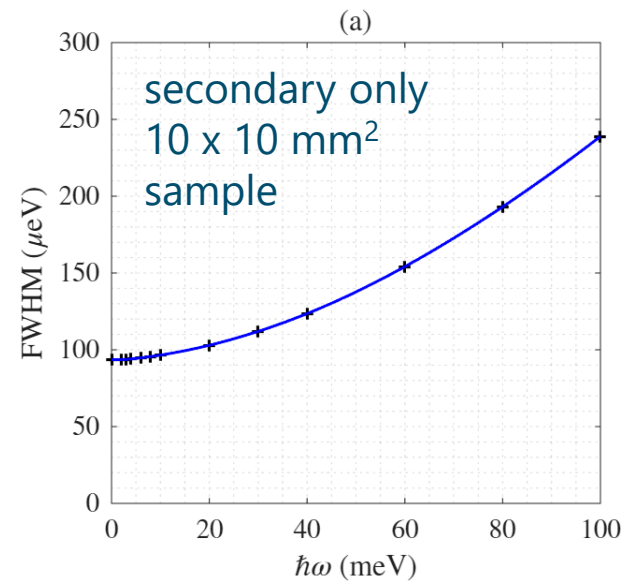
Flexible energy resolution (0.8-2.5% E_i)

Excellent signal-to-noise $> 1e4$ (HOPG limit)



Proposed rescoping in 3 stages:

- In 2026: purchase of HOPG & ^3He tubes (cost saving from bulk purchase & inflation)
- In 2027 & 2028: build 4 additional modules (total 50% coverage) for day1/day2 operation, to ensure state-of-the-art performance
- 2028 onward: build remaining 8 modules

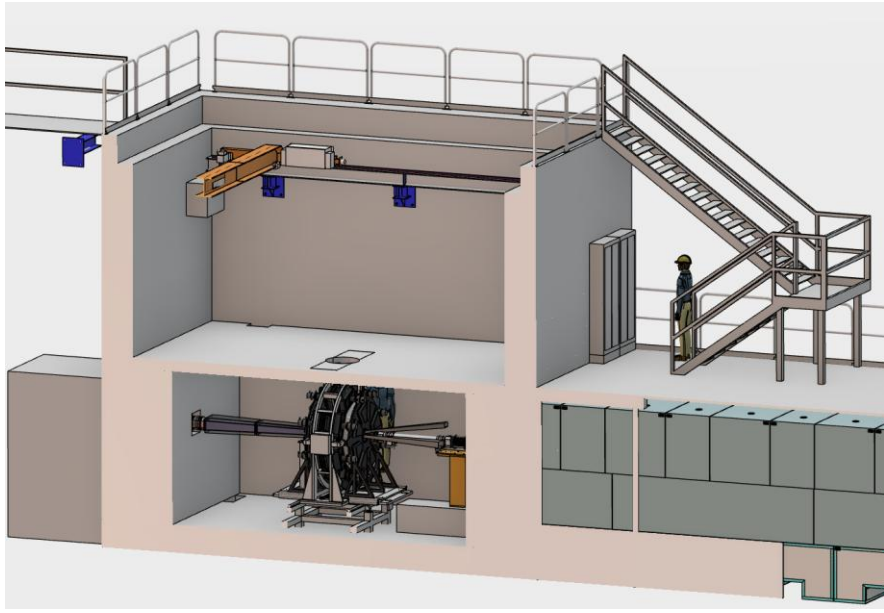
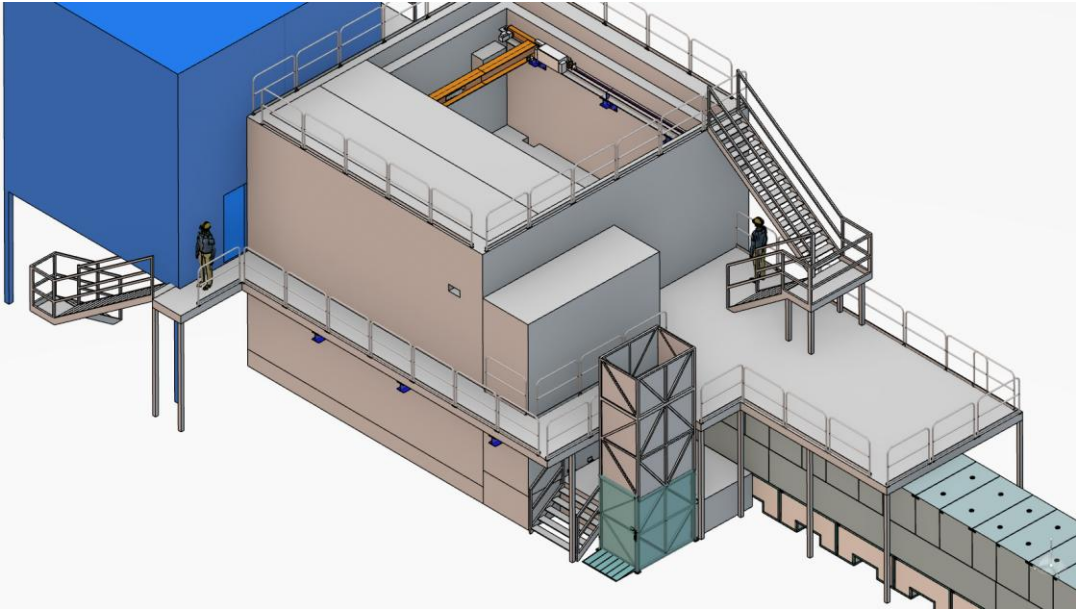
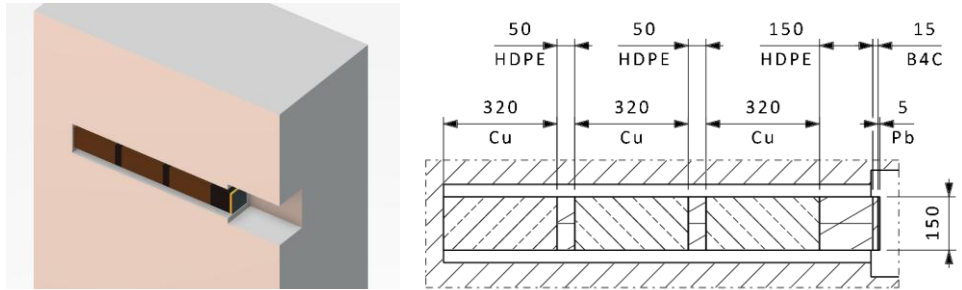


Status update on VESPA

VESPA's cave, hutch, sample prep. area & beam stop

Extremely rapid progress with:

- Preliminary design of the cave completed & reviewed
- Preliminary MCNP simulations completed
- Tender for the entire civil work published on April 17th



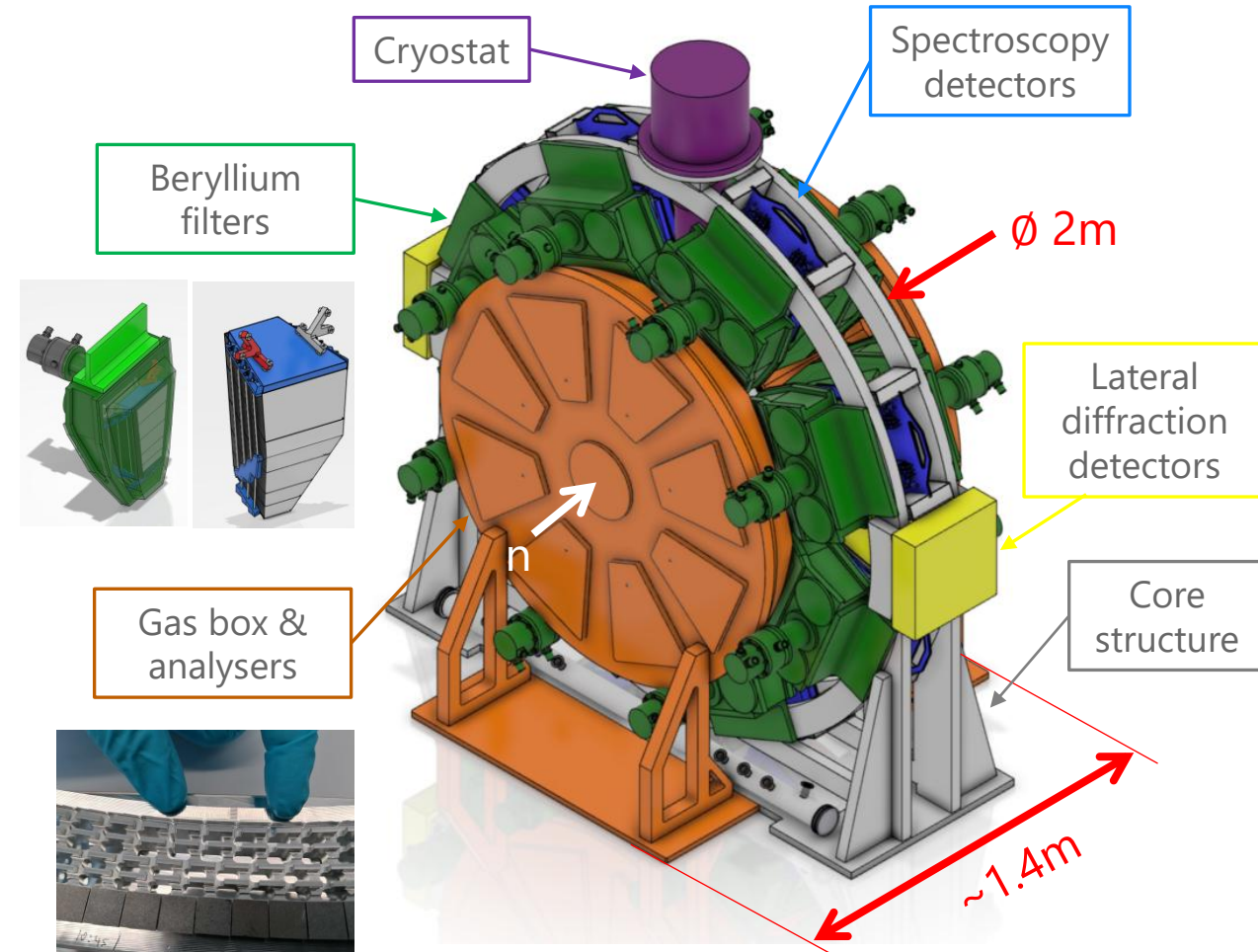
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Summary

Rapid progress over the past 6 months, with major achievements of completing the preliminary design of the secondary spectrometer and of the cave, hutch and sample prep. area

- All preliminary designs completed except detector electronics and diffraction banks
- Well-progressed prototyping of all critical components of the secondary: analyser backplate machining & coating, HOPG crystal performance, HOPG crystal assembly, etc
- All large procurements have started (guide, cave, beryllium filter) or will start at ESS shortly (HOPG crystals, ^3He tubes, cryostat)



TG5 in March 2029 (delay till May resolved)

13,000 HOPG crystals, 280 kg of cryo-cooled Be, 600 ^3He tubes, in $<2\text{ m}^3$ footprint