

VESPA: STAP Spectroscopy report (October 2022 – April 2023)

General Information

The VESPA project has undergone a general reshaping exercise in order to bring activities back on track and meet completion within end of 2027. CNR has set up in 2022 a dedicated board to manage the instruments construction contribution, and the VESPA review has taken place on February 2023 with attendance of all partners involved. As a result of the collaborative efforts between CNR and ESS, the project is under rebaselining. These efforts allowed to frame the staffing requirements and recruitment procedures are underway. At present, interim for instrument scientist (R. Senesi), ESS part-time scientist (M. Hartl), project manager/lead engineer (L. Whitelegg, from September 2023), lead engineer (L. Di Fresco), neutronics scientist (J. Scionti) and a CNR project office unit are in operation.

VESPA instrument scope configuration, as set out in the scope setting and the approved TG2 documentation, is confirmed.

Summary of progress is described below.

Beam line optics and shielding

The technical specifications are complete: the guide system components to be procured are identified and described in detail in the VESPA Neutron Guide Specification document – that is available on the ESS Confluence VESPA Instrument page

(https://confluence.esss.lu.se/display/VES/VESPA+Internal+Page?preview=/441470854/441470914/JAN%202023%20VESPA%20Guide%20-%20Tech%20Spec_DRAFT%20rev.DEC%202021.docx)

The specification includes:

- system breakdown (16 sections)
- substrate material definition for each section (Cu, Al, or glass based substrate)
- geometry profile of the optics in the horizontal and vertical plane (elliptical/parallel)
- mirrored coating m-value for each section (optimization on m-values distribution)

- neutron windows

Vespa Guide Specification Table		design						geometry					coatings				no. windows
Pos.	section	Substrate material	axis - hor.	profile - hor.	axis - vert.	profile - vert.	number of channels horizontal	$W_{entrance}$	$W_{exit,max.}$	$h_{entrance}$	$h_{exit,max.}$	L	top	bottom	left	right	
[#]							[]	[mm]	[mm]	[mm]	[mm]	[mm]	[m-value]	[m-value]	[m-value]	[m-value]	
1948.6	1-NBOA	Cu	straight	elliptic	straight	elliptic	1	45.80	32.82	35.11	39.32	3479.0	4	4	4	4	2 (in/out)
5448.5	2-BBGOA	Cu/Al	straight	elliptic	straight	elliptic	1	32.73	36.40	39.35	39.89	482.5	4	4	4	4	2 (in/out)
5492	3-PSC A	Al	straight	elliptic	straight	elliptic	1	30.41	30.00	39.91	40.00	82.0	4	4	4	4	1 (in)
6025	3-PSC B	Al	straight	parallel	straight	parallel	1	30.00	30.00	40.00	40.00	1316.0	4	4	4	4	0
7500	3-PSC C	Al	straight	elliptic	straight	elliptic	1	30.00	31.93	40.00	41.07	388.0	4	4	4	4	1 (out)
7922	4-IN-BUNKER	Al	straight	elliptic	straight	elliptic	1	32.08	40.32	41.16	46.13	2044.5	4	4	4	4	2 (in/out)
10062.5	5-FOC	Al	straight	elliptic	straight	elliptic	1	40.65	42.48	46.34	47.53	556.5	4	4	4	4	2 (in/out)
10632	6-HEAVY SHUTTER	Al	straight	elliptic	straight	elliptic	1	42.53	44.94	47.55	49.15	794.0	4	4	4	4	2 (in/out)
11440	7-FEEDTHROUGH	Cu/Borofloat	straight	elliptic	straight	elliptic	1	44.98	53.70	49.17	55.21	3510.0	4	4	4	4	1 (in)
15051	8-HALL1	Borofloat	straight	elliptic	straight	elliptic	1	53.71	57.29	55.21	57.79	1947.8	3.5	3.5	3.5	3.5	0
16998.75	9-T0	Borofloat	straight	elliptic	straight	elliptic	1	57.29	58.71	57.79	58.83	878.5	3.5	3.5	3.5	3.5	0
17879.25	10-HALL2	Borofloat	straight	elliptic	straight	elliptic	1	58.71	61.64	58.83	61	2094.0	3.5	3.5	3.5	3.5	0
20210	11-HALL3 (s-FOC MONITOR)	Borofloat	straight	elliptic	straight	elliptic	1	61.70	61.19	61.05	61.49	25440.0	3	3	3	3	0
45500	12	Borofloat	straight	elliptic	straight	elliptic	1	61.19	66.53	61.48	56.52	4449.0	3.5	3.5	3.5	3.5	0
50000	13	Borofloat	straight	elliptic	straight	elliptic	1	53.86	46.90	56.52	52	2998.0	4	4	4	4	0
53000	14	Borofloat	straight	elliptic	straight	elliptic	1	46.90	37.24	52	46.21	2998.0	4.5	4.5	4.5	4.5	0
56000	15-JS1	Borofloat	straight	elliptic	straight	elliptic	1	37.24	29.90	46.2	42.29	1646.0	5	5	5	5	0
57764	16-JS1-JS2	Borofloat	straight	elliptic	straight	elliptic	1	29.28	25.37	41.99	40.16	677.0	5	5	5	5	1 (out)

section	Geometry				
	$W_{entrance}$	$W_{exit,max.}$	$h_{entrance}$	$h_{exit,max.}$	L
	[mm]	[mm]	[mm]	[mm]	[mm]
1-NBOA	45.80	32.82	35.11	39.32	3479.0
2-BBGOA	32.73	36.40	39.35	39.89	482.5
3-PSC A	30.41	30.00	39.91	40.00	82.0
3-PSC B	30.00	30.00	40.00	40.00	1316.0
3-PSC C	30.00	31.93	40.00	41.07	388.0
4-IN-BUNKER	32.08	40.32	41.16	46.13	2044.5
5-FOC	40.65	42.48	46.34	47.53	556.5
6-HEAVY SHUTTER	42.53	44.94	47.55	49.15	794.0
7-FEEDTHROUGH	44.98	53.70	49.17	55.21	3510.0
8-HALL1	53.71	57.29	55.21	57.79	1947.8
9-T0	57.29	58.71	57.79	58.83	878.5
10-HALL2	58.71	61.64	58.83	61	2094.0
11-HALL3 (s-FOC MONITOR)	61.70	61.19	61.05	61.49	25440.0
12	61.19	66.53	61.48	56.52	4449.0
13	53.86	46.90	56.52	52	2998.0
14	46.90	37.24	52	46.21	2998.0
15-JS1	37.24	29.90	46.2	42.29	1646.0
16-JS1-JS2	29.28	25.37	41.99	40.16	677.0

section	Coatings			
	top	bottom	left	Right
	[<i>m</i> -value]	[<i>m</i> -value]	[<i>m</i> -value]	[<i>m</i> -value]
1-NBOA	4	4	4	4
2-BBGOA	4	4	4	4
3-PSC A	4	4	4	4
3-PSC B	4	4	4	4
3-PSC C	4	4	4	4
4-IN-BUNKER	4	4	4	4
5-FOC	4	4	4	4
6-HEAVY SHUTTER	4	4	4	4
7-FEEDTHROUGH	4	4	4	4
8-HALL1	3.5	3.5	3.5	3.5
9-T0	3.5	3.5	3.5	3.5
10-HALL2	3.5	3.5	3.5	3.5
11-HALL3 (s-FOC MONITOR)	3	3	3	3
12	3.5	3.5	3.5	3.5
13	4	4	4	4
14	4.5	4.5	4.5	4.5
15-JS1	5	5	5	5
16-JS1-JS2	5	5	5	5

Identification of the best strategy to manage the sub-system interfaces with interdependent subsystem is ongoing, in particular to identify the ownership and the design lead of the interfaces of the guide system with respect to choppers, and the vacuum system. Effort is now carried out in order to progress quickly towards CTV. The WP01 (guide system, and heavy shutter) may be supplied as a whole including all the components for the guide system, the heavy shutter, and the 2 sets of slits part of the beam transport and conditioning system.

The beam line shielding will be delivered through the ESS Common Project.

The Change Request has been signed by ESS and In Kind partner representing entity in June 2022.

Kick off date to be defined,

The rebaselining work in progress for the VESPA project will provide an updated time schedule and work plan before the end of the year 2023. Milestones for all the interdependent tasks will be set accordingly to meet the agreed date of delivery.

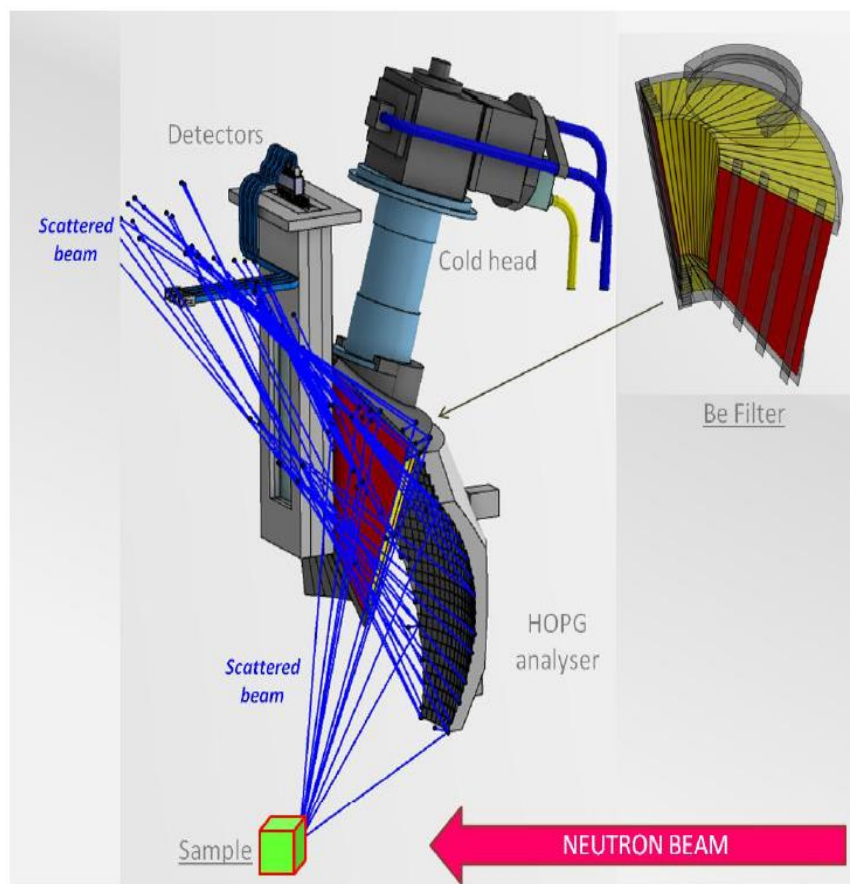
Choppers

VESPA choppers will be delivered through the ESS Common Project. The Change Request has been signed by ESS and In Kind partner representing entity on June 2022. Kick off expected in June 2023.

The technical specifications for the chopper system have not been changed since the formal offer by ESS chopper group of July 2021.

Secondary spectrometer

The secondary spectrometer design is confirmed, with arrangement in vacuum environment. As part of the detailed design, a neutron path verification, with a full scale MCSTAS simulation from source to detector counts focusing on parametric dependence from secondary components, will be carried out. As an example, parameters such as sample size and thickness, HOPG tile thickness effects, detector shape, thickness, capture profiles; dependence on sample container shape

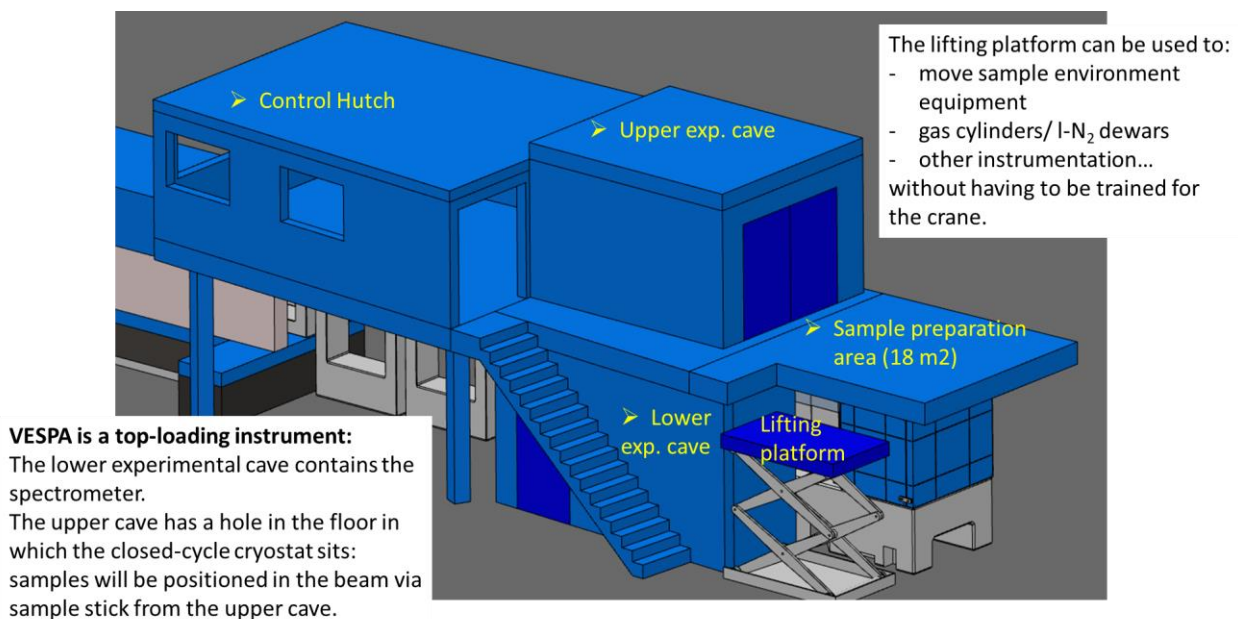


(annular, flat, etc) and thickness, will be inspected. In addition, a further check on position tolerances will be carried out. With regards to the HOPG grade and quality, the VESPA team intends to collaborate with existing experimental initiatives at ISIS on this matter, in contact with the TOSCA instrument scientist. It is envisaged to carry out a series of Xpress/Commissioning measurements to check for outliers, peak and

integrated reflectivity, background, testing 10-20 tiles for every supplier, and with 2-3 suppliers to be tested. Further investigation will be carried out on Be filter slab assembly for inspection/minimization of gaps; thermal expansion effects, and consequent tightness of Be assembly when cooled, will be evaluated.

Cave and Hutch

The experimental cave is the main subsystem to be delivered within the WP02; the design is not completed, there is a concept design that is obsolete and will be updated with the support of ESS CAD engineers;



the definition of the functional requirements is complete;

the experimental cave and control hutch will be procured from an external supplier;

the release of a 3D model for the concept layout of the cave is expected in June 2023; the tender documentation will be completed accordingly.

the concept model will address the main design dependencies of the cave with the design of the secondary spectrometer assembly.

The full development of secondary spectrometer design needs will address missing reference details in order to finalize the design of the cave.

The interfaces design management is the most critical aspect of the two subsystem (cave/secondary spectrometer) and will be cared of accordingly.

On a general note, while it appears that the project can move forward as intended, challenges regarding the full recruitment of the staffing scheme agreed upon at the VESPA review may have an impact on the progress rate. Thanks to the renewed collaborative efforts between CNR and ESS there are clear indications that such challenges can be tackled.

The VESPA Team