

MIRACLES: STAP Spectroscopy report (October 2020 – April 2021)

Félix J Villacorta, on behalf the MIRACLES team*

General information

The MIRACLES project is evolving at a faster pace, after leaving the hardest part of the pandemics behind. There are still some big issues, related to the slow-moving Spanish Administration, the manufacturing of the NBOA (no evolution since summer 2020) and the delay in the incorporation of the hired instrumentation researcher by ESS-Bilbao. Unfortunately, a satisfactory solution for these issues seems still remote, and we must deal with some particular delays.

In any case, we are still capable to comply with the current delivery schedule. A summary of the progress is described below.

Beamline optics

The Neutron Beam Optical Assembly, NBOA, (section of the neutron beam extraction system that goes through the ESS monolith) is suffering significant delays, as all the components delivered by Swiss Neutronics. The delivery date has been postponed to September this year.

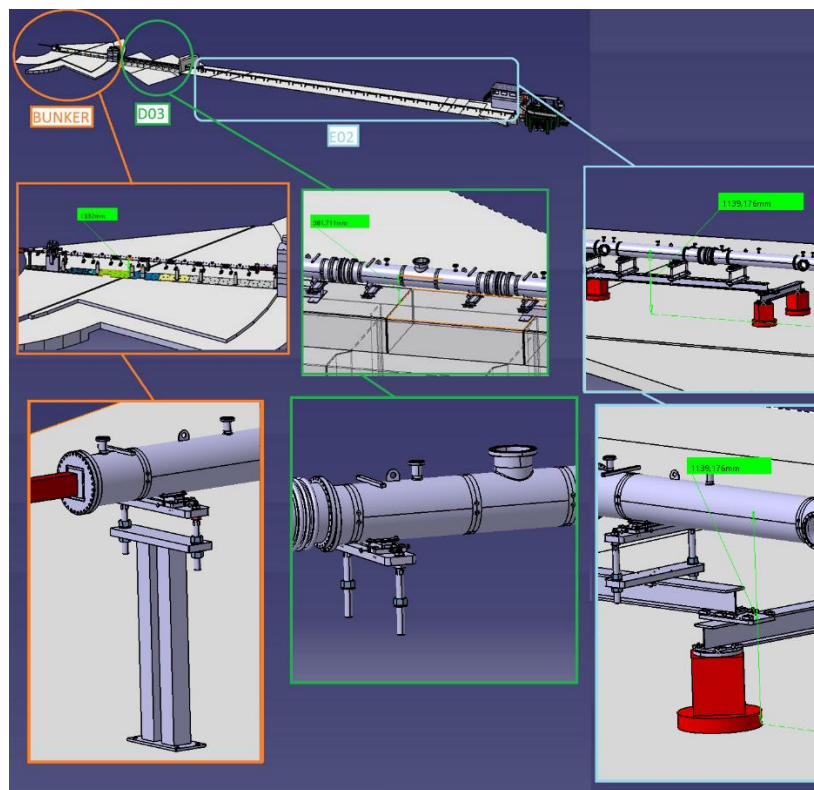


Figure 1. Illustration showing the different concepts for the guide housing alignment and supports for the different parts of the MIRACLES beamline.

The Bunker Wall Insert, BWI (section of the beamline that goes through the bunker wall) was tendered out. The awarded bidder was S-DH.

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The specifications documentation for the CTV[†] of the out of bunker guide was submitted. Feedback from ESS is expected on these days. Conversations with potential providers (S-DH, Mirrotron, Swiss Neutronics) have been scheduled in the following days.

The CTV for the in-bunker guide is scheduled for June 2021.

Significant advances have been reached in the design of the guide supports and guide housing alignment (ESS-Bilbao is doing the detailed design, see Figure 1). An Intermediate Design Review will be held (review meeting scheduled the 20th April), to evaluate the maturity and adequateness of the design.

Choppers

The tender process for the MIRACLES choppers has suffered a significant delay attributed to issues in the Spanish Administration. Fortunately, the final ok to the tender was given this month, so it is expected to be launched in April.

The installation dates (Q3-2024 and Q2-2025) remain intact.

Secondary Spectrometer

The CTV documentation for the scattering vessel and mechanical assemblies within was approved the 5th of March. All the technical documentation has been transferred to the lawyers, expecting that the tender will be out faster than the one of the choppers.

The experimental works to develop a complete study (including a prototype) of the optical part of the analyzer (Si crystals, gluing strategies and shielding) is suffering delays due to the difficulties in the incorporation of our new instrumentation researcher (he is a non-European researcher, so it is practically impossible for him to fly to Spain). Some actions are being considered to mitigate this delay so the impact to the whole project will be minimized.

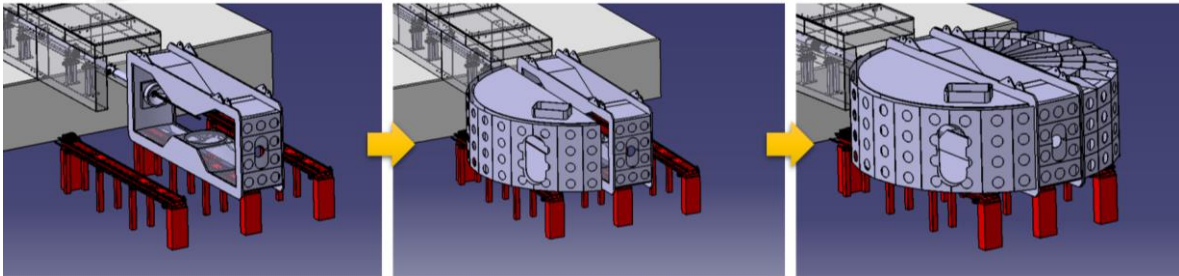


Figure 2. Installation sequence (proposal) for the MIRACLES scattering vessel.

In the meantime, first conversations were initiated with the ESS to draft the installation plan for the vessel. The use of an auxiliary crane to assist the main overhead crane has deemed mandatory to provide a successful installation of the vessel.

Experimental End Station

Design specifications of the Experimental End Station of MIRACLES (that includes the Experimental Cave, the Control Room and the Sample Preparation Areas) are ongoing. Recent

[†] CTV: Call for Tender Verification. It is an ESS review of the technical specifications document of the tender when detailed design is outsourced.

advances are related to the development of the mezzanine that connects the cave to the control room and the rack room and to the access to the different areas. It is expected that the CTV will take place at the end of Q2-2021.

Detectors and Beam Monitors

The MIRACLES team is working together with Reuter Stokes and with CAEN in the development of preliminary experimental measurements. With Reuter Stokes, we are working in a concept for the U-shape connection of tube pairs (see Figure 3). And since the digitizer to be integrated to the ESS backend readout electronics will be the CAEN R5560B model, we are making a first purchase to test the CAEN 8-channel A1422 preamps. The idea is to integrate into the efforts of ESS to test the readout electronics along this year.

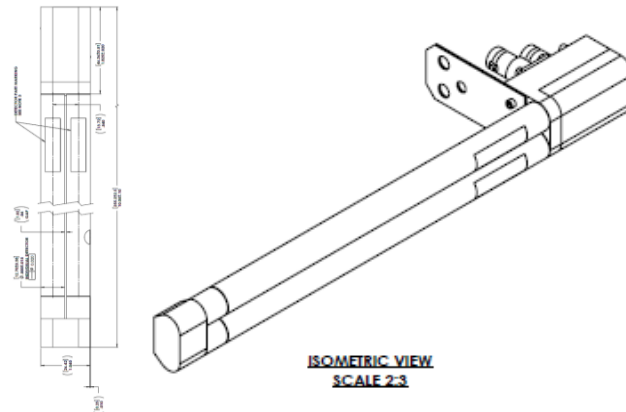


Figure 3. U-shape concept for serial connection of ^3He tubes for MIRACLES (from RS).

Also, we are giving final shape to the integration of MIRACLES into the ESS Beam Monitor Common Project. The technologies (beam monitor concept and even electronics) utilized for the 4 beam monitors of MIRACLES are now clearer, and are definitely oriented to cover the requirements of the MIRACLES pulsed beam in terms of flux-efficiency, dynamic range and time resolution. We will hopefully find an agreement in the following weeks.

Motion Control and Electrical Design

A concept for the thermal shutter is ongoing. Using a SMC actuator, the next steps are now the integration of the shutter vessel, bellow and mechanical assembly into the MIRACLES operation. The detailed design will be carried out internally at ESS, and an Intermediate Design Review is anticipated to take place in Q3-2021.

On the other hand, several discussions have taken place between the MIRACLES team and the responsible of the ESS Common Electrical Project. We are in favor of a customized agreement, more based on expertise than in electrical zones (upstream or downstream the racks), as suggested by ESS. However, we are confident that eventually an agreement can be drafted to start working in the detailed electrical design soon.

Data Management

Our proposal of a new method to model QENS data, lead by Prof. Jan Swenson, of Chalmers University of Technology, and supported by the MIRACLES and the C-SPEC teams, were awarded under the ESS SREss3 programme.



2020-11-23

Prof. J. Swenson
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Dear Prof. Swenson

cc Prof. H. Bordallo, Dr. F. J. Villacorta, Dr. P P Deen, Dr. D. Noferini, Dr. T. Holm Rod

Re: SREss3 Funding

We are pleased to inform you that your proposal "A new method to model inelastic and quasielastic neutron scattering data by molecular dynamics simulations" has been granted funding under the Tillväxtverket SREss3 programme at ESS