ISNIE

International Society of Neutron Instrument Engineers

Virtual Design and Engineering of Neutron Instruments Meeting 2021

14-17 September 2021.

Presented by the ISNIE. www.instrumentengineers.org.

ISNIE

Conference Purpose

- The purpose of this virtual meeting is to continue the sharing of knowledge on all aspects of the design and operation of neutron instruments. The first DENIM meeting was held at the Rutherford Appleton Labs near Oxford in the UK in 2012. Since then yearly meetings have been held all around the world, the last face to face one was at NIST near Washington DC in 2019. Last year we also ran a virtual meeting due to COVID.

- This meeting is held under the management of the International Society for Neutron Instrument Engineers (ISNIE). All are welcome, we are looking for as diverse a range of members as possible for all facilities and from all staff involved in neutron instruments.

- Please sign up if you not already a member! To do this, go to the website shown on page 1.

- During the break each day breakout rooms are available for people to talk on common topics of interest.

How to Access the Conference.

REMINDER

- As with vDENIM 2020 the conference will run using the Big Blue Button system hosted by JCNS.
- Please prefer Google Chrome or Firefox to attend the vDENIM.
- To ask questions please use a “?” within the chat, use “!” for remarks.
- Do not use the raise Hand functionality!

- Please remember
- Sessions will be recorded!
- Within coffee rooms please use headset.
- Main room access:
- https://go.fzj.de/V_DENIM_2021

Big Blue Button
Open Source Online E-Learning Software

See end of booklet for more information.

Many Thanks to the Organising Committee

Event Committee

• Trudi Gurney	ISIS
• Michael Wagener	FZJ
• Maike Philipp	FZJ
• Elbio Caldaza	FRM-II
• Peter Galsworthy	ISIS
• Nancy Hadad	NIST
• Guido Vehres	FZJ
• Paula Luna	ISIS
• Jorge Gonzalez-Teodoro	ESS-Bilbao
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ISNIE Executive Officers

• David Anderson	ORNL
• Nancy Hadad	NIST
• Iain Sutton	ESS
• Scott Olsen	ANSTO
• Sylvain Desert	LLB

Directory

Main room

https://go.fzj.de/V_DENIM_2021
Please only use this room during conference times

Coffee rooms

Vacuum: Scott Olsen (ANSTO)
https://go.fzj.de/vacuum

Alignment: Dan Adler (NIST)
https://go.fzj.de/alignment

Neutron guide systems / neutron windows: Iain Sutton (ESS)
https://go.fzj.de/guide_windows

Radiation and Slit Shielding: Elbio Calzada (FRM II)
https://go.fzj.de/shielding

Motion Control: Nick Webb (ISIS)
https://go.fzj.de/motion_control

Project Management: Sylvain Desert (LLB)
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Electronics: Kevin Pritchard (NIST)
https://go.fzj.de/electronics

Choppers: Peter Galsworthy (ISIS)
https://go.fzj.de/choppers

Conference Program.

Time US East	Time W Europe	Monday	Tuesday	Wednesday	Thursday	Friday
		Sep-13	Sep-14	Sep-15	Sep-16	Sep-17
			Moderator: David Anderson	Moderator: Iain Sutton	Moderator: Nancy Hadad	
6.30am	**12.30pm**		**Log In**		**Log In**	
6.40am	12.40pm		Olsen (ANSTO) - AUS		Rennie -Uppsala Uni- SWE	
7am	**1pm**		Introductory Welcome	**Log In (7am US East – 1pm W Europe)**	Neutron Windows	Log In
7.05am	1.05pm	Welcome	Kambara (J-PARC) - JPN	Simms (ISIS) GBR	Belhorma - MOR	Panel Debate I
		Drinks Start	He gas lines for CCRs	Projet Mgt for LOKI	Neutron Diffractometer Design	Instrument Design – David Anderson (ORNL)
7.30am	1.30pm		Hanslik (FZJ-ZEA-1) - GER	Tspatsaris (ESS) - SWE	Paulin (CNEA) - ARG	Panel Debate II
			Shielding Concept for the HBS	ESS Chopper Standardization	Polarised Reflectometer Design	Operational Issues: Scott Olsen (ANSTO)
8am	**2pm**		**BREAK**	**BREAK**	**BREAK**	**BREAK**
8.15am	2.15pm	Welcome Drinks	Coates (ORNL) - USA	Zakalek (JCNS) - GER	Nisbet (ISIS) - GBR	Panel Debate III
		Conclude	STS II Instrument Selection	HBS Target Development	Slit Control on a PCB	Neutron Guide / Vacuum Jackets (Don Pierce (NIST))
8.40am	2.40pm		Graves (ORNL) - USA	Swenson - USA - Commercial	Sutton (ESS) - SWE	ISNIE Exec
			Steerable Optics	Neutron Supermirror manufacture	Event Horizon II - the future	Conference Close
9.05am	3.05pm		Lin (ORNL) - USA	Poster slam session	AGM	
			STS II Guides Alignment			
9.30am	**3.30pm**		**Session ends**	**Session ends**	**Session ends**	**Session ends**

Talk Abstracts and Posters

- Talks are for 20 mins with 5 minutes for questions.
- Please type in any questions and the moderator will read them out.
- In the Poster slam the Poster presenter will talk for 5 mins on their poster.
- In the moderator panel discussions again please type in questions.

Small improvements to the helium gas hose for closed cycle refrigerator.

Wataru Kambara – J-PARC – Japan

Abstract:

The beam intensity of J-PARC has reached 700 kW, and the time for each experiment has been shortened. As a result, the frequency of switching experiment has increased, and the frequency of changing sample environment equipment has also increased. The problem is how to handle the helium hose of the refrigerator. If you try to move the cold head and compressor while they are connected by the helium hose, the hose will be twisted and become a kink. As a countermeasure, we developed a small rotary joint for the helium hose, and I will introduce our small improvement.

Further development of a shielding concept for the HBS-Prototype at Forschungszentrum Juelich.

Romauld Hanslik – ZEA-1, FZJ, GER.

At the so-called Big Karl experimental area of the **Co**oler **Sy**nchrotron (COSY) of Forschungszentrum Juelich a Prototype of the HBS Target-Moderator-Reflector (TMR) assembly will be installed. This assembly will allow performance tests and developments of target handling, target cooling systems and biological shielding.

The HBS prototype target as well as the thermal moderator and the reflector are surrounded by an approx. 1 m thick multilayer shielding. The shielding consists of several layers of lead and borated polyethylene with a suitable support structure.

Start of development and first design of the HBS prototype shielding have been presented in 2020.

In this presentation, as a continuation of the 2020's presentation, further development work and experiences during the development and design phase are presented.

Main focus here is on safety aspects of the HBS-shielding und shielding gate as well as on challenges and experiences during the design and procurement phase.

Instrument Selection at the Second Target Station.

Dr Leighton Coates- ORNL, USA

An Instrument selection process recently determined the eight project constructed instruments at the Second Target Station (STS).

The neutron user community was strongly engaged during the instrument selection process, which resulted in a suite of instruments that will meet challenges at the frontiers of matter and energy. In this talk, I will give an overview of the selection process and a synopsis of the selected instruments.

Van Graves – ORNL, USA

A Second Target Station (STS) is being designed at the Spallation Neutron Source (SNS) and will be optimized to produce the highest peak-brightness cold neutron beams in the world. Several of the STS neutron scattering instrument concepts incorporate advanced beam transport optic designs which utilize Kirkpatrick-Baez (KB) mirrors of a few meters in length, and these optics generally require installation tolerances smaller than current alignment equipment can achieve. Thus, a means of supporting and manipulating these large mirrors with positional resolution at the micron level is required.

"Magnet movers" have been successfully utilized in multiple synchrotron facilities around the world for just such applications; these movers utilize eccentric, motor-driven roller bearings to position and orient heavy structures in five degrees of freedom with high resolution precision. STS intends to employ this "steerable optic" technology to remotely manipulate some discrete neutron optics that are located under beamline shielding. A test bed has designed and constructed to develop the software control system and demonstrate the ability of the mechanics to support and orient such optics with the required levels of precision. The design of this test bed and some early testing results will be presented.

Impacts of guide misalignments on ORNL Second Target Station instruments

Dr Jiao Lin, ORNL, USA.

Misalignment in the optical system of a neutron instrument can lead to significant reduction of its performance. At the second target station (STS) of Oak Ridge National Lab, the moderator size is significantly smaller than that of the First Target Station, making the guide misalignment a prominent concern. A study based on Monte Carlo neutron ray tracing simulation was carried out to evaluate the impacts of various types of misalignment on the performance of selected STS instruments.

The study shows that longer instruments, instruments with complex curved mirrors/guides, and instruments with a focus on small samples are prone to significant performance penalties due to misalignments.

Project managing technical pre-build activities for LoKI.

Jacob Simms, ISIS, GBR.

The European Spallation Source is an under-construction neutron facility based in Sweden that will have unique capabilities to greatly exceed and complement the worlds other neutron sources.

Organisations from across Europe are providing in-kind contributions from entire beamlines to accelerator systems to detector control software. ISIS is providing two beamlines, LoKI and Freia, for which I am in charge of the technical pre-build at RAL.

My role on this project is both pre-build project manager and lead mechanical technician so I can bring some insight into how I manage the mechanical installation and keep all stakeholders informed.

Part of my talk will focus on how I have project managed the large project, provided feedback to the designers of each section and ultimately ensured information is captured for hand over to ESS. I will show some of the documentation I produce as well as other techniques; creating video walkthroughs.

I will then talk on the technical challenges faced by LoKI due to the increased radiation levels expected and the need for a ‘bunker’ area. This includes the set-up and testing of different kinematic feet for in-bunker components and how I had to liaise with multiple disciplinary groups to develop robust remote handling features.

HBS Target Development

Paul Zakalek, JCNS, GER.

Compact accelerator-based neutron sources (CANS) produce neutrons by proton induced nuclear reactions with energies well below the spallation threshold. Within the HBS project, a target was developed for a 70 MeV proton beam with a peak current of 100 mA and an average power of 100 kW. Engineering challenges like a high surface power density of up to 1 kW/cm^2, a compact target design to maximize the brilliance and mechanical problems due to the intense proton beam needed to be tackled.

On the main challenge of heat deposition and cooling the concept to implement microchannels in the target material to increase the heat transfer coefficient was applied. A complex microchannel structure allows a homogeneous energy deposition within the target as well as a similar proton stopping power independent on the target position. This results in a well-defined Bragg-Peak of the proton beam which is positioned inside a beam stop at the backside of the target minimizing the accumulation of protons within the target. First tests with a high-power electron beam heating the target surface showed that such a designed target can withstand power densities beyond the design goal of 1 kW/cm^2.

At DENIM 2021, we will present the microchannel target developed for the HBS source. We will describe the challenges encountered and the solutions found.

Progress in Neutron Chopper System Standardisation, Certification and Serial Production at the European Spallation Source

Nikolas Tspatsaris – ESS, SWE

A fundamental feature of the ESS long pulse spallation source is the de facto need of multiple choppers which will necessitate the procurement, installation and operation of the highest number of neutron choppers to date at any neutron scattering facility.

The installation schedule for the ESS instruments shows a bimodal distribution of concentration of chopper installations during 2021-2023 and 2024-2025. In total, over 80 chopper axes are scheduled during this period. As previously demonstrated the need significantly outpaces the European supply. Even if the supply is spread out over more time and front loaded with early deliveries the current capacity is not sufficient given the specificities of the neutron chopper market.

We have developed a concept for a common chopper solution which reduces the ESS chopper delivery schedule strain while allowing the available commercial suppliers to focus on complex and/or high-speed systems.

Our concept of commonisation & standardisation has the following benefits to ESS:

- Increases the commonality between systems allowing faster tuning, integration, installation and commissioning, reducing risk delays for overall ESS milestones.
- A system based on well known, tested components is more easily maintained, lowering MTTR, reducing the spare part inventory and thereby increasing the instrument availability.
- Increasing the number of potential suppliers for chopper sub-systems reduces the risk of schedule delays for the supply of chopper systems. Allowing orders to be shifted to suppliers with spare capacity.
- ESS owned IP of chopper systems dramatically increases the ESS neutron chopper knowhow of the systems making system upgrades and obsolescence management easier as well as reducing the time for commissioning and maintenance.
- A common chopper project allows for larger scale procurements granting larger supplier discounts compared to individual instrument procurements.
- Additionally, there is a labour element (often invisible) in design, selection, purchase, SAT, installation, commissioning; this labour element may be very significant.

Some institutes participating in neutron instrument construction have experience, but for most there are significant non-recurrent engineering (NRE) costs and time that will be saved through a common project.

Enables the most cost-effective fulfillment of our ESS policy of delivering CE certified systems for operation at ESS.

Manufacturing of advanced neutron supermirrors using of cluster ion beams, an innovative surface-modification nanotechnology

D.R.Swenson – American Physics and Technology LLC, USA

We are investigating the use of two new surface treatment methods based on Gas Cluster Ion Beams (GCIB) for the manufacture of neutron supermirror optics. This technology is capable of smoothing surfaces to sub-angstrom tolerance, works equally well on planar or curved surfaces, and can be used on most any material. We have constructed a large process chamber to accommodate substrates as large as 1.2 m x 0.15 m for cluster ion beam treatments. Large flat and curved metal supermirrors have been manufactured with M=4.5 supermirror coatings and they will soon be tested at the SNS for neutron reflectivity. We report our preliminary results.

Poster Slam – 1 – NILE – Paula Luna – ISIS - RAL

Background

- NILE (Neutron Irradiation Laboratory for Electronics) will be a dedicated facility for the irradiation of micro-electronics with mono-energetic neutrons produced by a DT (Deuterium-Tritium) and a DD (Deuterium-Deuterium) compact fusion reactor source.
- Independent operation from the ISIS source. The science program will benefit from an increased beamtime and availability, provided ChipIr is the only atmospheric-like neutron facility now available to industry in Europe.
- Applications: development of fast neutron detectors, fast neutron imaging, neutron activation analysis, enhance PPD study of the Migdal effect for Dark Matter detection, space weather studies by RAL Space under SWIMMR project, etc.
- Contributions to the project: ISIS, PPD and RAL Space.

Scope

- Complement ChipIr studies and the scientific and industrial program to the beam off periods.
- Refurbish the R80 Bunker to enable the safe and independent use of DT and DD generators.
- Test and Commission by the start of the TS2 long shutdown (Jun 2021-Mar 2022).
- Provide engineering support for the integration of the Migdal experiment in the NILE bunker, expected to take place in November 2021

Key aspects of the Project

DT and DD Generators

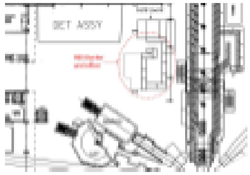
Left picture: DT Generator. Right picture: DD Generator

- DT at 14.1 MeV and DD at 2.45 MeV.
- Maximum output: DT=10^{10}n·s^{-1}, DD=10^{9} n·s^{-1}
- Supplier: Adelphi Technology Inc.

Location

R80 bunker

Former bunker:
- 1m thick concrete walls
- 0.8m deep trench
- 1m thick roof



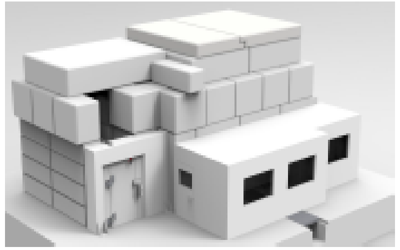


Figure: The NILE facility located in the R80 Bunker.

Shielding Design of the Bunker

Shielding assessment for the generators in the former Siemens bunker:
- Simulation target of 3 μSv/h to add further conservatism to the actual 7.5 μSv/h dose rate criteria around instruments.
- Isotropic point source of 10^{10}n/s and 10^{9}n/s for both the DT and DD, respectively.
- Neutron and gamma radiation was assessed:

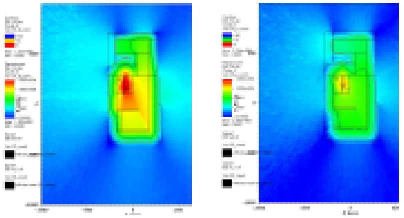


Figure: DT neutron and gamma dose

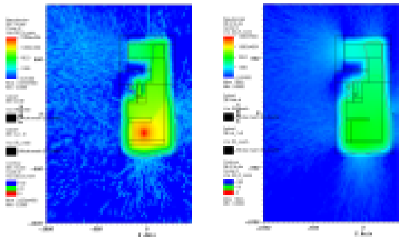


Figure: DD neutron and gamma dose

Results show additional shielding is required locally near the sources, inside the trench, at bunker entrance, on the roof, by the end wall and at certain areas to block existing shine paths.

Operation

DT and DD sources will necessarily operate one at a time. The interlock system is designed to prevent both generators from energising simultaneously.

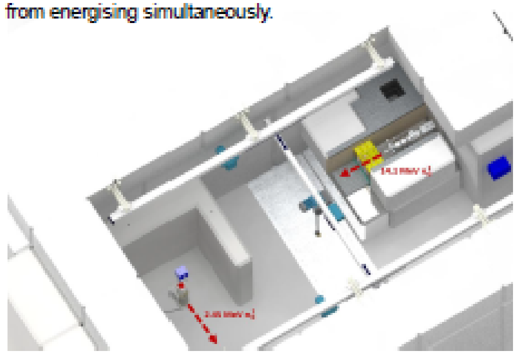


Figure: Two separate areas for operating the generators in the bunker

<u>DT source area:</u>
- Sample position @ direct beam past the collimator
- Thermal position 30cm x 30cm area @ beside DT generator

Figure: DT source area

<u>DD source area:</u>
- Details of the sample area to be further discussed with PPD.

Poster Slam 1 – Con't

Design

New elements:

- **Shielding**: concrete, polyethylene, B_4C
- **Interlock system** to control access to all areas of the NILE bunker.
- **User Office** and rack room alongside the bunker
- 500Kg SWL **X-Y Crane**
- **Bunker doorway**: 2 wax tanks, 7.7T.
- **X-Y mount** for the DT generator: +/-100mm beam direction, +/-15mm offset from beam centreline
- **DT collimator**: modular, 3-piece collimator
- **Services**:
  - **Electrical**: patch panels, electrical circuits, sockets, etc. All electronic requirements for operating both sources + particle physics experiments.
  - **COSHH extract**: single extension 4m long arm to reach DT and DD areas
  - **Gas system infrastructure**
  - **Air conditioning**
  - **Water supply**

Figure: Office plan view

Figure: XY table for DT

Figure: Doorway tanks

Installation and Commissioning

Figure: Bunker doorway

Figure: DT generator area

Figure: DT generator

Commissioning of the NILE Bunker for DT use was completed on the **16th July 2021**

Figure: interlock's beam on display on the bunker doorway

Figure: Plasma in DT chamber

Figure: Bunker room; beam on lights

Acknowledgements: Chris Frost, Carlo Cazzaniga, Maria Kastriotou, David McPhail, Steve Lilley, Michael Starling, Peter Phillips, Peter Barnes and Nigel Sage.

ISIS Experimental Operations – Instrument Support

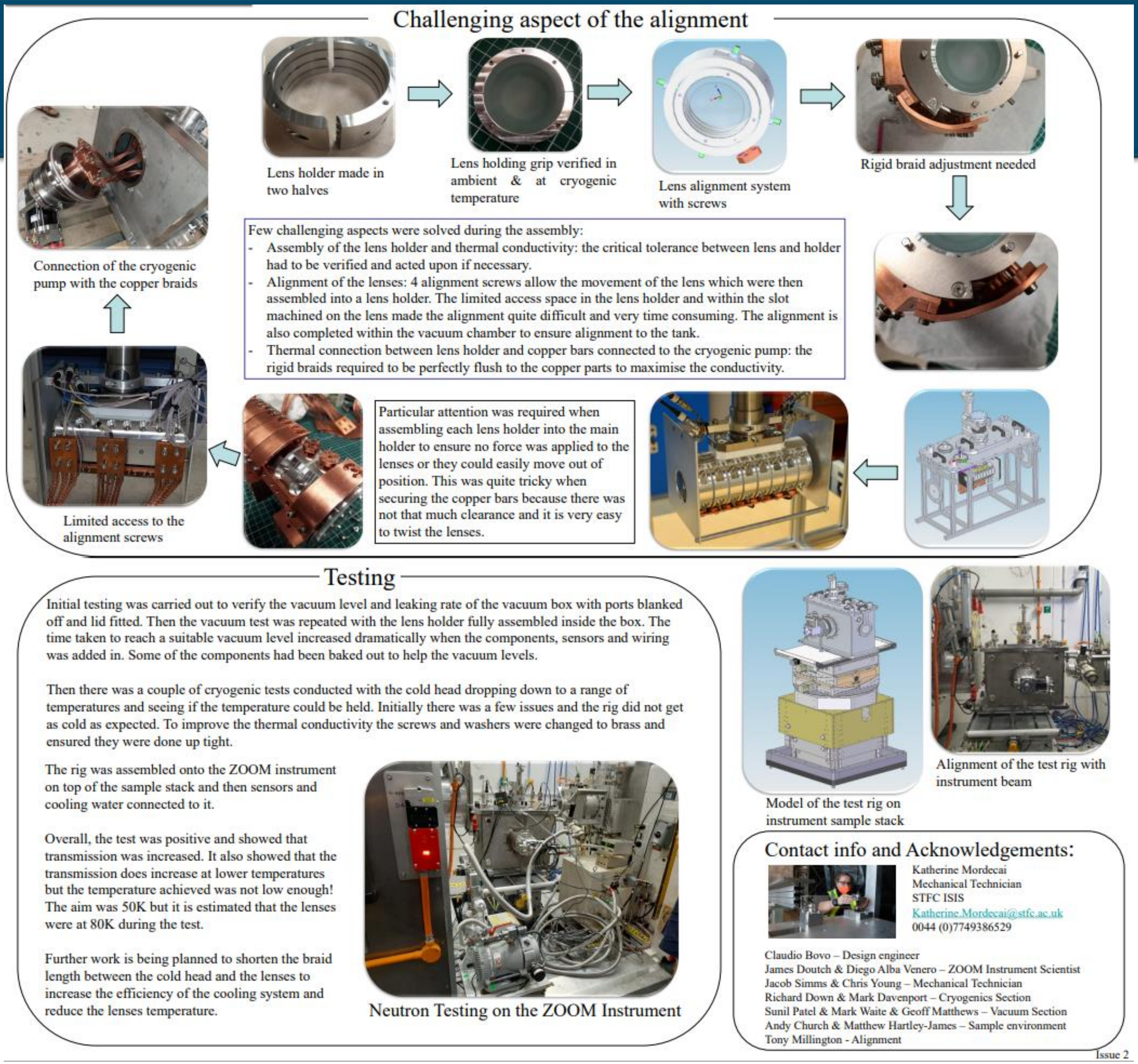
Science & Technology Facilities Council
ISIS Neutron and Muon Source

Compound refractive lenses (CRL) for ZOOM instrument

There is a requirement to improve the focussing of neutrons on the ZOOM beamline. An assembly of the lenses and equipment required to reach the VSANS q-range with the ZOOM instrument has been designed, manufactured assembled and developed in-house at ISIS.
The focussing rig is made up of 8 bi-concave lenses placed back to back and connected to a cryogenic cold head via copper braids and to an independently adjustable vertical linear stage which allows the lenses to be moved in or out of the beam. The lens assembly has been placed inside a vacuum box with sapphire windows for the beam to avoid interaction of neutrons with air. The lenses were aligned together and then this assembly was aligned to the neutron beam. A B4C mask in front of the lenses allows only the central neutrons to pass through.

The assembly of the CRL test rig was critical to the testing. The assembly is complex and has some unusual components. Some of the components required alterations to adapt them to ensure they could perform as effective as possible. The efficiency in thermal connectivity between some of the components was critical to the test.
The vacuum and cryogenic testing of the assembly and then the neutron testing of the assembly required many different stages to ensure capability and to achieve the best performance.

Poster 2 Con't



Challenging aspect of the alignment

Lens holder made in two halves

Lens holding grip verified in ambient & at cryogenic temperature

Lens alignment system with screws

Rigid braid adjustment needed

Connection of the cryogenic pump with the copper braids

Few challenging aspects were solved during the assembly:

- Assembly of the lens holder and thermal conductivity: the critical tolerance between lens and holder had to be verified and acted upon if necessary.
- Alignment of the lenses: 4 alignment screws allow the movement of the lens which were then assembled into a lens holder. The limited access space in the lens holder and within the slot machined on the lens made the alignment quite difficult and very time consuming. The alignment is also completed within the vacuum chamber to ensure alignment to the tank.
- Thermal connection between lens holder and copper bars connected to the cryogenic pump: the rigid braids required to be perfectly flush to the copper parts to maximise the conductivity.

Particular attention was required when assembling each lens holder into the main holder to ensure no force was applied to the lenses or they could easily move out of position. This was quite tricky when securing the copper bars because there was not that much clearance and it is very easy to twist the lenses.

Limited access to the alignment screws

Testing

Initial testing was carried out to verify the vacuum level and leaking rate of the vacuum box with ports blanked off and lid fitted. Then the vacuum test was repeated with the lens holder fully assembled inside the box. The time taken to reach a suitable vacuum level increased dramatically when the components, sensors and wiring was added in. Some of the components had been baked out to help the vacuum levels.

Then there was a couple of cryogenic tests conducted with the cold head dropping down to a range of temperatures and seeing if the temperature could be held. Initially there was a few issues and the rig did not get as cold as expected. To improve the thermal conductivity the screws and washers were changed to brass and ensured they were done up tight.

The rig was assembled onto the ZOOM instrument on top of the sample stack and then sensors and cooling water connected to it.

Overall, the test was positive and showed that transmission was increased. It also showed that the transmission does increase at lower temperatures but the temperature achieved was not low enough! The aim was 50K but it is estimated that the lenses were at 80K during the test.

Further work is being planned to shorten the braid length between the cold head and the lenses to increase the efficiency of the cooling system and reduce the lenses temperature.

Neutron Testing on the ZOOM Instrument

Model of the test rig on instrument sample stack

Alignment of the test rig with instrument beam

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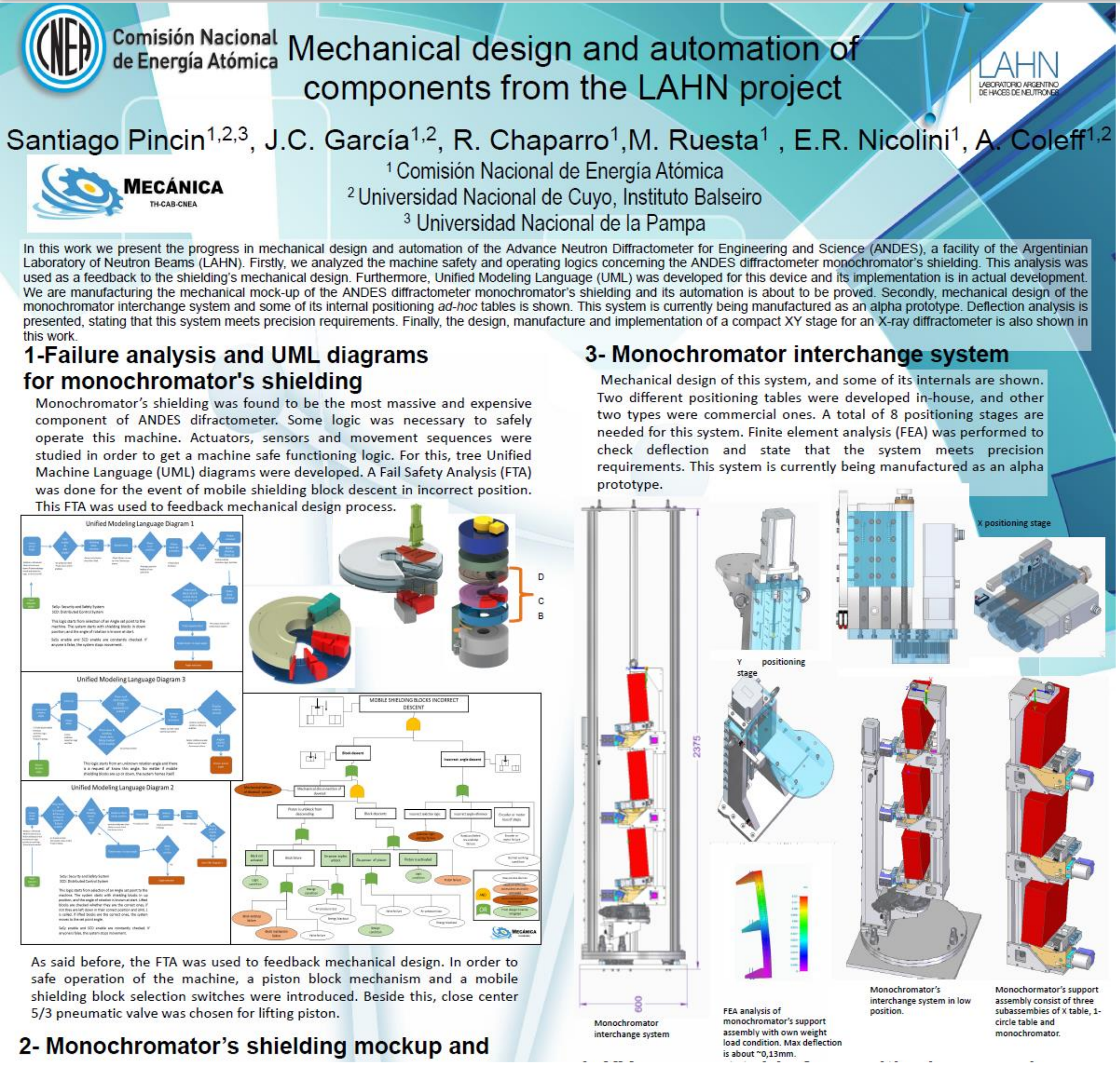
Jacob Simms & Chris Young – Mechanical Technician
Richard Down & Mark Davenport – Cryogenics Section
Sunil Patel & Mark Waite & Geoff Matthews – Vacuum Section
Andy Church & Matthew Hartley-James – Sample environment
Tony Millington - Alignment

Issue 2

Poster Slam 3 Santiago Pinchin – CNEA – Mechanical design of LAHN project



Preliminary Design of time-of-backscattering spectrometer, MIRACLES, at the European Spallation Source

Jorge R. Gonzalez-Teodoro*, Felix J. Villacorta*, Aitor Zugazaga*, Idoia Mazkiaran*, Alex Conde*, Roberto Martínez*, Octavio González*,Gorka Bakedano*, Clara López**, Mario Pérez*

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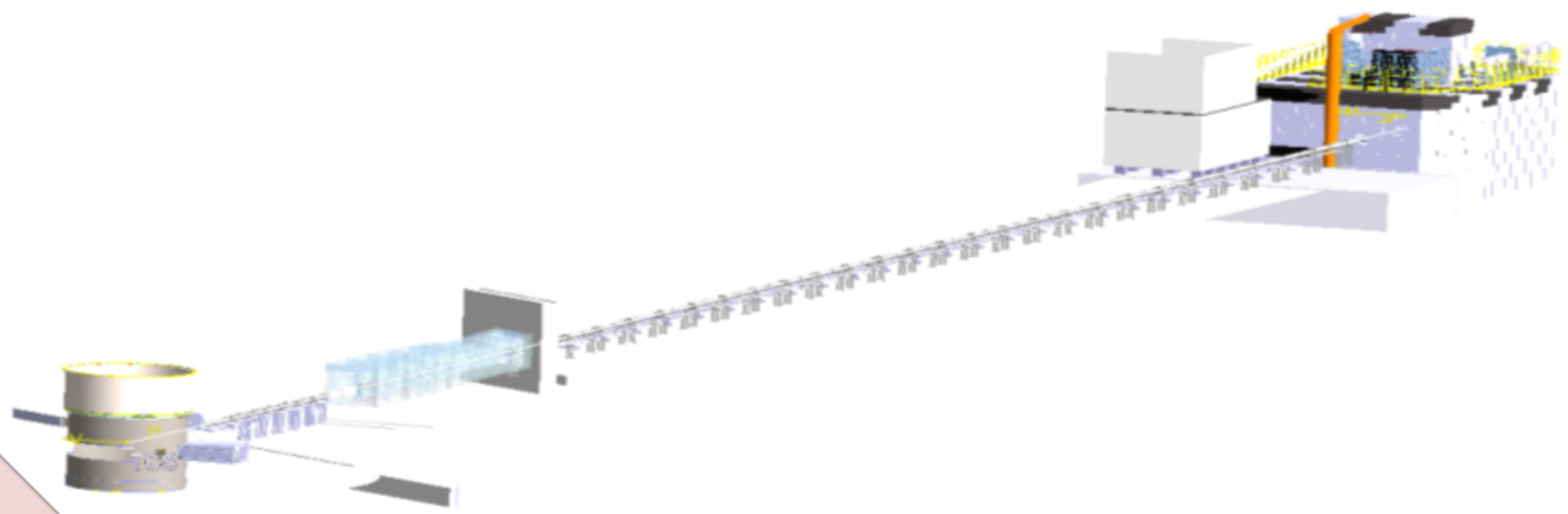
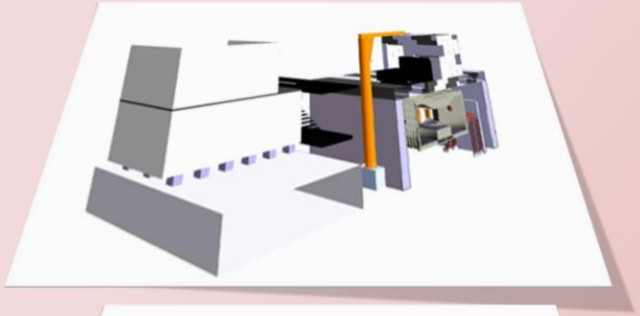
INTRODUCTION

MIRACLES will be one of the ESS long instruments (162.5 m from source to sample) located at the west sector. The design of the primary spectrometer (that tailors the energy and shape of the neutron pulse arriving to the sample) is optimized to transport cold neutrons with a neutron energy < 20 meV.

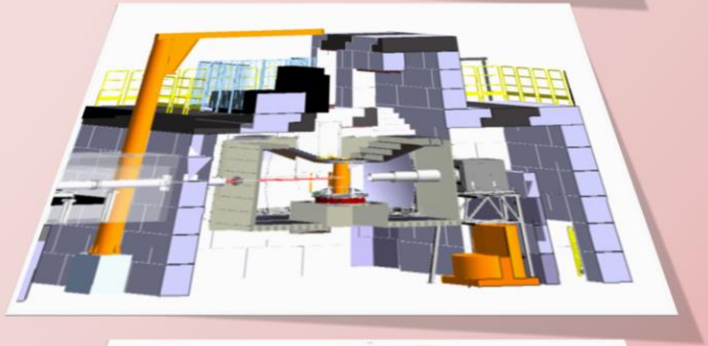


Poster 4 Con’t

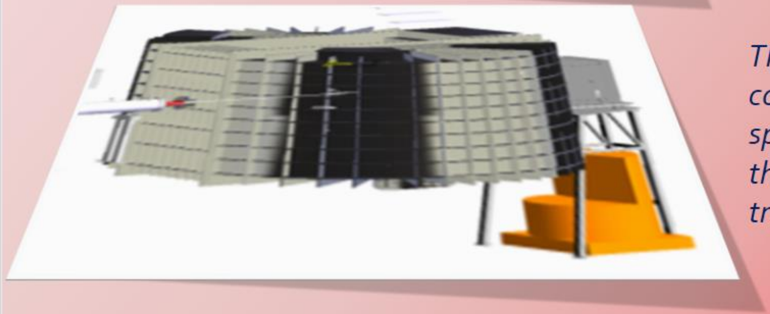
EXPERIMENTAL ZONE



The experimental area consists of the vessel holding the scattering system and assemblies, the polarization system, the control room, the sample preparation area and the sample positioning system and services

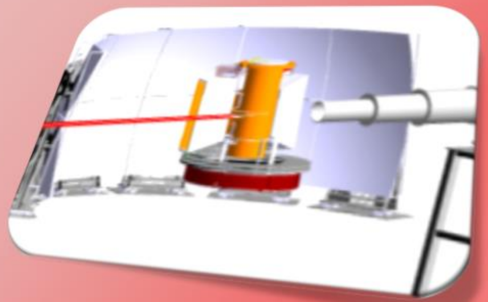


The experimental cave has been calculated to give the needed shielding in operation and maintenance periods for the scientists and technicians and give the required services for the experiments in a minimal space to achieve the removal and installation of the in-vessel components

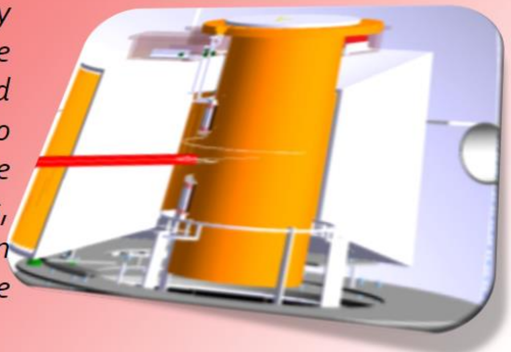


The scattering vessel is the vacuum container that hosts all the components comprised in the scattering characterization system of the MIRACLES spectrometer, as well as the sample exposure system, and some components of the beam transport and conditioning system (slits, normalization and transmission beam monitors, get-lost tube) as well as the polarization system.

The core of the instrument is the near-backscattering system sample-analyzer-detector. High resolution will be achieved using a 150º coverage panel analyzer of radius 2.5 m covered with bent silicon crystals



A 3He detector array assembly will be strategically located around the sample chamber to collect efficiently the backscattered neutrons, keeping the high-resolution performance of the spectrometer



Tough, low-scattering window materials for neutron instrumentation – a glass that is not fragile

Dr. A. R. Rennie – Uppsala University, SWE

Glassy metals provide an attractive route to low-scattering window materials for neutron instruments and sample environments. Recent neutron studies with AMLOY-ZR0l, a zirconium based bulk metallic glass, (previously known as AMZ4) from Heraeus have shown high transmission and low levels of small-angle scattering as well as the complete absence of Bragg diffraction peaks [1]. Additive manufacturing is creating advances in many areas: it is very well suited to low-volume production of specialist components and can be used with the material fully retaining the glassy structure. Tests on samples 2.2 mm thick showed neutron transmission of 0.9 to 0.95 for wavelengths between 0.5 and 15 A. Compared with alternative materials the mechanical properties are attractive: the Youngs modulus measured under compression is about 90 GPa and the stress at break is 1.5 to 1.7 GPa at ambient temperatures. The resilience of the material when compared with low scattering alternatives such as quartz glass or single crystals of sapphire or silicon is much better. It has not been widely realised that glassy metals can now be used readily as large mechanical components: additive manufacturing is valuable to keep materials costs low for complex components. Simple components can be made by suction casting.
Potential applications for this material have been identified as, for example, vacuum windows for neutron instruments and as components in complex sample environments such as shear cells. The benefits and safety advantages can make consideration of designs with this new material worthwhile. The presentation will show scattering data and other results that identify a wide working range for components made of AMLOY-ZR0l.

1. A. Ericsson, V. Pacheco, J. J. Marattukalam, R. M. Dalgliesh, A. R. Rennie, M. Fisk, M. Sahlberg 'Crystallization of a Zr-based metallic glass produced by laser powder bed fusion and suction casting' *Journal of Non-Crystalline Solids* (2021), in press. https://doi.org/10.1016/j.jnoncrysol.2021.120891

Design of powder neutron diffractometer around the Morocco Research reactor

Belhorma Bouchra, CNESTEN, MOR

The National Center for Energy, Science and Nuclear Technology (CNESTEN-Morocco) has a 2MW research reactor equipped with 4 beam ports, one central thimble and one thermal column. In addition to radio-isotope production, the main present reactor utilization is the neutron activation analysis using the central rotary specimen rack and a pneumatic transfer system. Neutron diffraction is among the experiments projected on the axial piercing beamport where the thermal neutron fluxes in the core edge are around $1{,}8.10^{12}$ to $7{,}8.10^{12}$ $n.cm^{-2}s^{-1}$. A preliminary design of powder ND has been done. Design finalization and Installation of neutron diffraction is projected after PGAA and neutron imaging experiments that are ongoing around the tangential beamport with the technical assistance of IAEA.

In this talk, the reactor parameters will be shown, and a review of the reactor utilization will be given. The preliminary design of ND technique projected around the axial beamport will be discussed.

Implementation of a Polarized Neutron Reflectometer at LAHN

M. A. Paulin – CNEA, ARG

The Argentine Laboratory of Neutron Beams (LAHN) will host a Polarized Neutron Reflectometer that is currently being transferred from the Helmholtz-Zentrum Berlin in Germany, where it was operative until the BER-II reactor stopped its operation in December 2019. Known formerly as V6, the instrument will be adapted to comply with the neutron beams that will be provided by the novel multipurpose RA-10 reactor with a foreseen increase in its performance. The decision to transfer V6 to LAHN was substantiated by a science case built by the scientific community in Argentina. The implementation of an upgraded version of V6 at LAHN to fulfill the requirements of the science case and stand as a world class instrument is currently being carried out. In this presentation I will address the improvements that are being designed and the expected performance for the instrument installed at LAHN.

Slit Control on a PCB

Luke Nisbet – ISIS- RAL, GBR

This presentation covers the work done on a motion control development project, to look at ways of implementing distributed control in order to reduce the length and size of cables. Reduced cables would reduce the amount of, difficult to recycle, radioactive waste produced and means there’s less cable to be disposed at the end of life stage. Also, flexibility of control architecture potentially makes upgrading existing beamlines with new motion easier/ possible. There were a coupple options discussed on how to achive this but, we settled on a PCB based solution it the end. I decided that having a PCB able to drive 4x absolute encoded motors was a good way to achieve this, as it would hopefully be smaller than a 19” rack equivalent and able to control a whole slit. I will cover the work done to date as well as outline the test(s) that are still to be run.

Event Horizon II – The future of Neutron Scattering Technology.

Iain Sutton, ESS, SWE

Event horizon II is proposed as a sequel to the original 'event horizon – the future of neutron scattering technology'. A light-hearted exploration of possible futures for neutron scattering seen through the lens of major trends in society and technology - automation, artificial intelligence, hyper connectivity, virtualization.

It ended with a future in which experiments brought together scientist in a virtual space assisted by artificially intelligence while exposing samples at a fully automated, fusion powered, remote installation on the moon.

The sequel will explore how through disrupting many of societies systems and norms the global pandemic created an "alternative present" resembling some aspects of the possible futures and stress tested our installations under new conditions, revealing both strengths, weaknesses and the unexpected.

Though it remains far too early for a definitive assessment of this 'glimpse into the future' it may not yet be too early to examine some preliminary observations and explore directions for our future.

Utopia or dystopia ? The importance remains, as engineers to participate actively in the exploration, and creation, of our collective future.

Panel Debates

- In the panel debates we will pose questions relating to important topics and welcome questions and opinions from all interested parties.

Debate	Moderator	Theme	Key take home message
I – Instrument Design	David Anderson (ORNL)	A look at the key challenges for the next generation of instruments.	
II – Operational Issues	Scott Olsen (ANSTO)	Currently challenges with remote work, lack of user presence and the need for maintenance & upgrades.	
III – Guide Design – Metallic vs Glass Guides	Don Pierce (NIST)	Many facilities are changing to metallic guides – what are the pros and cons?	

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Attendance Numbers

- As at 9 Sep 2021.

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American Physics and Technology	USA	1
Canon Electron Tubes & Devices	Japan	1
Sypatico	Canada	1
HNF Technologies	Hungary	1
Mirrotron	Hungary	1

Facility / University	Abbreviation	Country	Attendees
Oak Ridge National Laboratory	ORNL	USA	24
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Forschungszentrum Jülich	FZJ	Germany	25
NIST - Center for Neutron Research	NIST	USA	14
European Spallation Source ERIC	ESS	Sweden	7
CSNS (China Spallation Neutron Source)	CSNS	China	6
Japan Proton Accelerator Centre	JPARC	Japan	4
Technical University of Delft	TUDelft	The Netherlands	2
Chinese Institute for High Energy Physics	IGEP	Chine	3
Technische Univertität München - FRM II	FRM II	Germany	1
South African Nuclear Energy Corporation (NECSA)	NECSA	South Africa	2
Helmholtz Zentrum Geesthacht	HZG	Germany	1
Helmholtz Zentrum Hereon	HZH	Germany	1
Australian Nuclear Science and Technology Organisation	ANSTO	Australia	2
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Argentinian Atomic Energy Commission (CNEA)	CNEA	Argentina	1
International Atomic Energy Agency	IAEA	Austria	1
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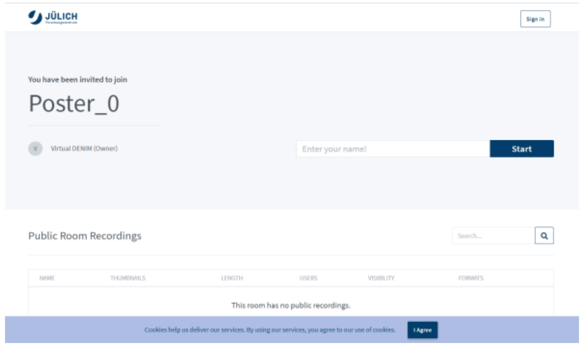
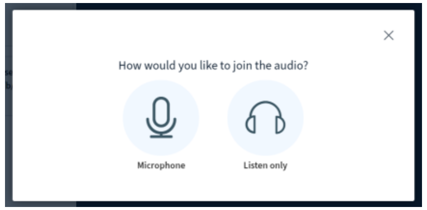
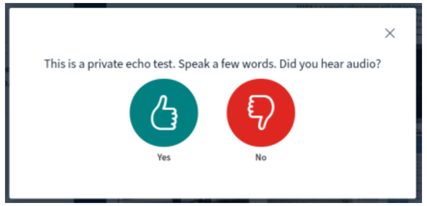


After connection is established you select how you want to join. Select Microphone if you want to talk to audience else just select headset. In either cases you have the possibility to communicate with a chat. The presenter has to join with microphone!



If you want to join with a microphone, then you are directed to an echo test page. Now you can talk with yourself to test your microphone and the speaker. If you hear yourself, click the Yes button to continue to the session. Please mute video and audio during the meeting.



Please mute yourself if you are not a speaker

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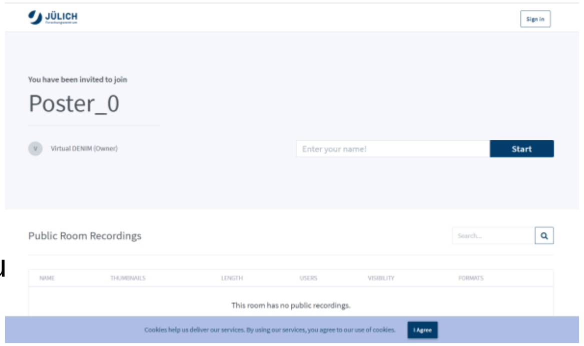

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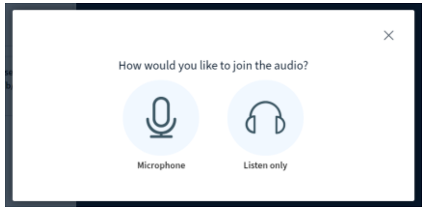

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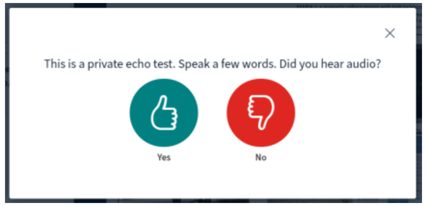

However, the moderator is going to mute all participants while entering the session.
In case you would like to participate in the debate please use the exclamation mark “!” within the chat. After being addressed by the moderator unmute your mic. Please don’t forget to mute it again.

Please mute yourself if you don‘t speak