

Update on the Muons in the EU-SINE2020 project

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STFC - ISIS

What is SINE2020?

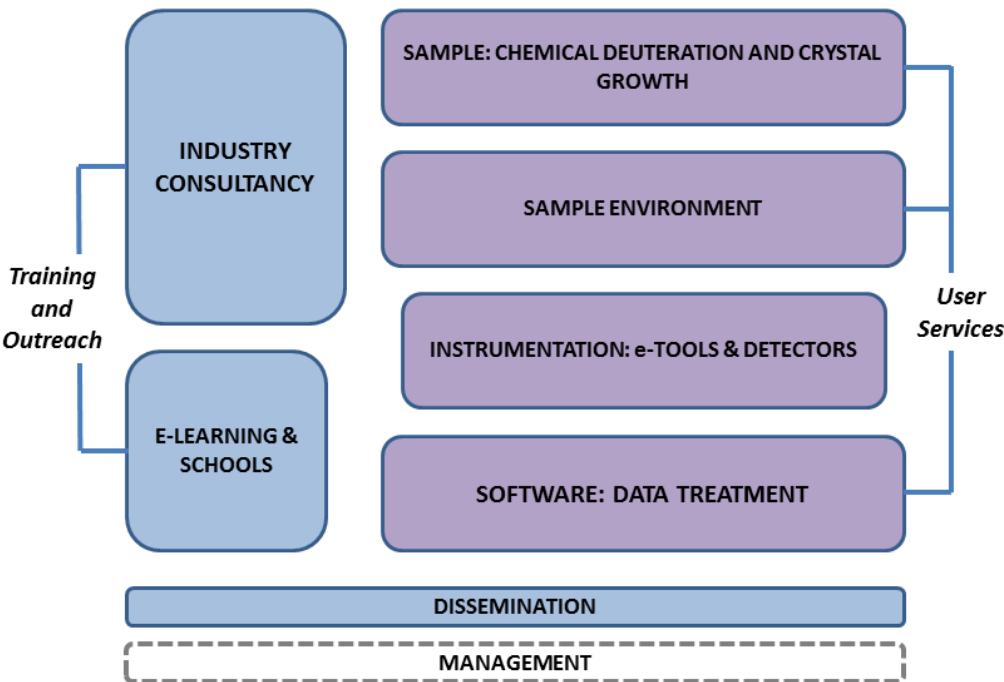
- Part of H2020, 12 countries, 18 partner institutes
- Latest in a series of EU funded projects developing neutron and muon techniques, (JRAs in FP6, FP7 - NMI3 and NMI3-II)
- 2015 - 2019
- *Prepare for ESS and Develop the innovation potential of neutron (& muon) LSFs*

Why Muons?

- A closely related complementary technique
 - Available at two national neutron sources
-
- Muon spectroscopy was a good ‘fit’ because:
 - The activities will benefit both neutron and muon techniques
 - Opportunity to enhance complementarity

What is SINE2020 doing?

Project Structure



Project Work packages

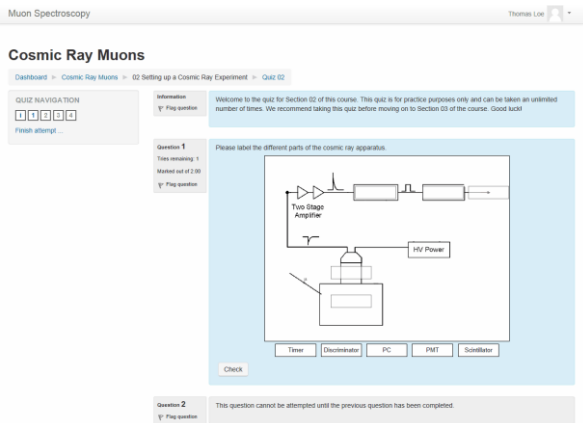
1. Management
2. Dissemination
3. e-learning & schools
4. Industry consultancy
5. Sample – chemical deuteration
6. Sample – crystallogenesi
7. Sample environment
8. Instrumentation – e-tools
9. Instrumentation - detectors
10. Data treatment software

Where do Muons fit in?

- Muons are involved in:
 - e-Learning and Schools (WP3)
 - » STFC and PSI
 - Sample Environment (WP7)
 - » STFC and PSI
 - Instrumentation and Detectors (WP9)
 - » STFC
 - Data treatment software (WP10)
 - » University of Parma and STFC

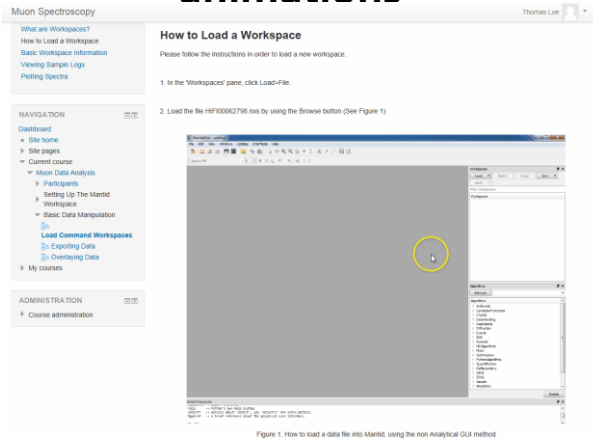
e-Learning (WP3)

Cosmic Ray Practical from Diamond-ISIS CDT Training School



Introduces muon basics to people completely unfamiliar with the technique

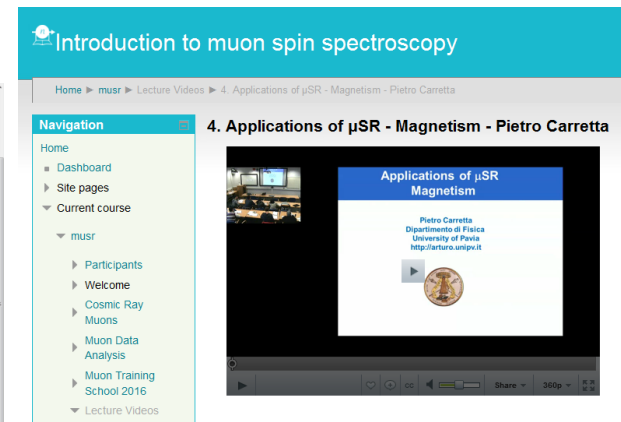
Mantid workbook exercises with walk-through animations



Pre-course materials for training schools; three-hour head start on data analysis

- Also have an introduction to different types of μ SR
- Excellent feedback from students
 - Development continuing

Talk videos online from 2016-2018 Muon Training Schools



Speakers recorded and final talks are awaiting upload after editing

Sample Environment (WP7)

Task 3 – Next generation pressure cells for neutron and muon research

- Improved piston cell, evaluating PE geometries for RIKEN beamlines, and considering the problems of developing anvil pressure cells for MuSR

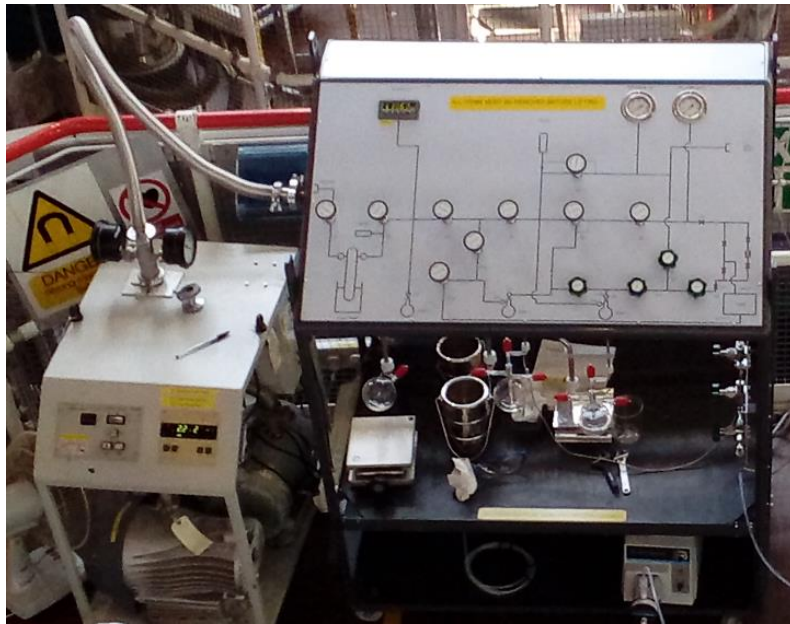
Task 4 – Complementary in-situ measurements for neutron and muon experiments

- Muons developing sample handling systems, RF setup for the study of muoniated radicals

SE for RF-MuSR

Ceramic cells for in-situ RF- μ SR measurements

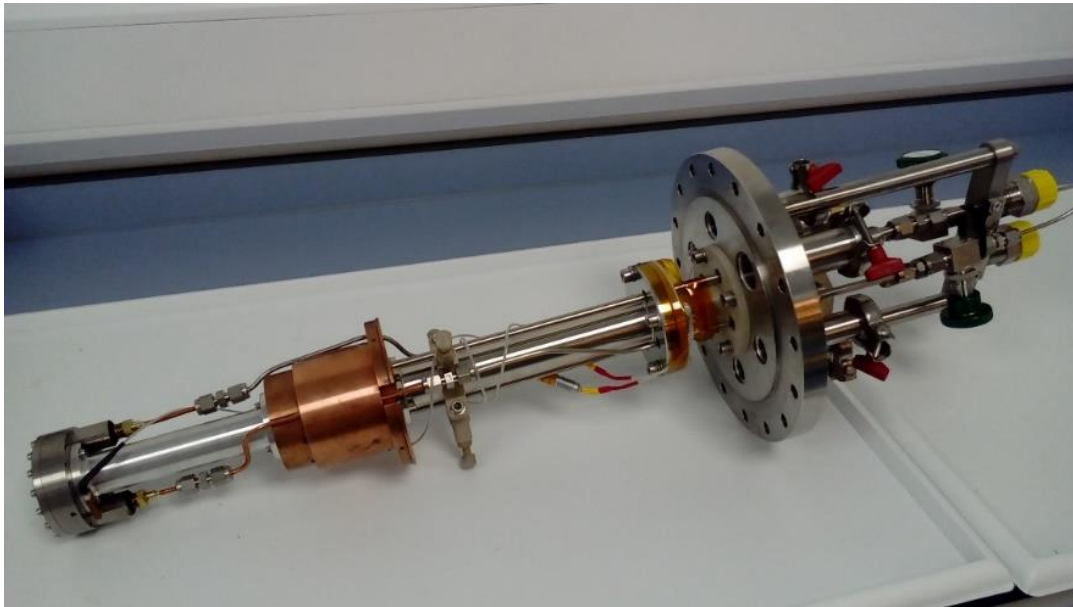
Leak-tight
In-situ loading
Compatibility with
He flow cryostats
RF flattened
solenoid



Stainless-steel rig for sample-
preparation and handling

Cold trap
3 Degas ports
Inert gas
Release valve
In-situ

SE for RF-MuSR



- Oil-bath Temperature control (-50/+100C)
- Sample circulation
- In-situ capability
- Leak-tight & O₂-proof
- Large sample volume

Dedicated RF-compatible insert
+ advanced RF coils

>> ω

RF field strength

Field homogeneity



Instrumentation - Detectors (WP9)

Task 4.3 – Silicon Photomultipliers for Muon Spectroscopy

- Application of SiPMs of interest to neutrons and muons
- Evaluating emerging commercial SiPMs, considering their suitability for μ SR detector arrays
- Investigating alternative technologies for μ SR detectors and suitability of technologies for pulsed and continuous muon sources



D. Pooley, “future detector technologies for μ SR”

Data treatment software (WP10)

Task 2 – Guidelines and Standards

- Muons already making use of Mantid / NeXus data format \Rightarrow Scope for adopting new standards and refining functionality to help users' moving between techniques

Task 4 – Atomistic Modelling, DFT calculations

- Developing new methods & case studies. Mantid as a platform for hosting site refinement and beyond. Work likely of interest beyond the muon community ... complementarity with neutrons.



R. De Renzi, “TBD”

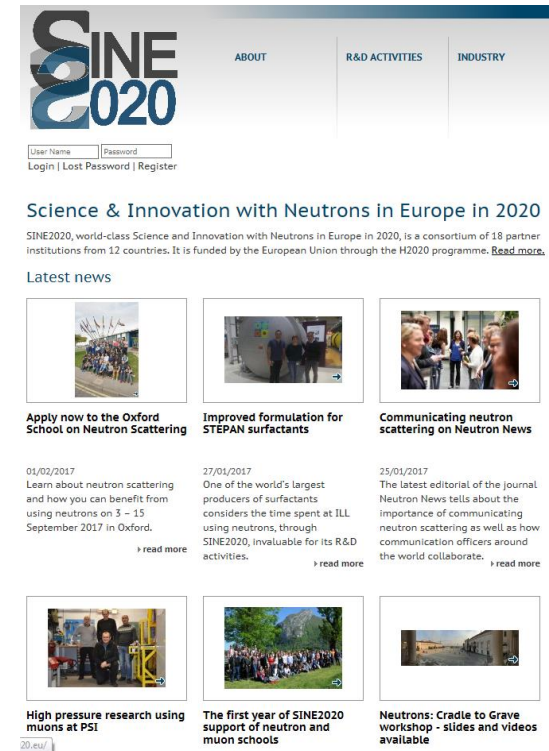
More Information?

- The SINE2020 website at:

<http://www.sine2020.eu/>

- For more about muon facilities and muon research worldwide:

<http://muonsources.org/>



The screenshot shows the SINE2020 website homepage. At the top left is the SINE 2020 logo. To its right are navigation links for 'ABOUT', 'R&D ACTIVITIES', and 'INDUSTRY'. Below the logo is a login section with 'User Name' and 'Password' input fields, and links for 'Login', 'Lost Password', and 'Register'. The main heading is 'Science & Innovation with Neutrons in Europe in 2020'. Below this is a paragraph describing the consortium and its funding. A 'Latest news' section follows, featuring three news items with images and brief descriptions:

- Apply now to the Oxford School on Neutron Scattering** (dated 01/02/2017): Learn about neutron scattering and how you can benefit from using neutrons on 3 - 15 September 2017 in Oxford. [read more](#)
- Improved formulation for STEPAN surfactants** (dated 27/01/2017): One of the world's largest producers of surfactants considers the time spent at ILL using neutrons, through SINE2020, invaluable for its R&D activities. [read more](#)
- Communicating neutron scattering on Neutron News** (dated 25/01/2017): The latest editorial of the journal Neutron News tells about the importance of communicating neutron scattering as well as how communication officers around the world collaborate. [read more](#)

At the bottom of the news section, there are three more items:

- High pressure research using muons at PSI** (dated 20.01.2017): [read more](#)
- The first year of SINE2020 support of neutron and muon schools**
- Neutrons: Cradle to Grave workshop - slides and videos available**

(feedback is always highly appreciated)



That's all Folks!

