

## Agenda and Minutes for muon JRA meeting, 24<sup>th</sup> September 2014

### Agenda:

1. Review of the JRA and associated deliverables, in NMI3/FP7-II
2. Review of deliverables associated with muons within the Outreach JRA (NMI3/FP7-II)
3. Upcoming NMI3-related meetings
4. Finances
5. Forward look to SINE 2020

### Attending:

1. Peter Baker
2. Steve Cottrell
3. Adrian Hillier
4. Philip King
5. Elvezio Morenzoni
6. Don Paul
7. Jamie Peck

### Discussion:

#### 1. Review of the JRA and associated deliverables in NMI3/FP7-II

Steve Cottrell presented an overview of the deliverables still to be completed before the end of the current JRA, summarised below:

##### *Software Development for muon Data Analysis*

- D17.2 (Software routines implemented and released within the Mantid framework): M36  
A framework for ALC analysis has now been implemented within Mantid and subroutines for both Phase Quadrature and Rotating Reference Frame transforms are in-hand. Work is ongoing at PSI investigating applications of Graphics Processing Units (GPU) for optimising fitting procedures.
- D17.4 (Report of an application of linked analysis and simulation): M48  
Integration of Quantum with Mantid is almost complete. A paper discussing user application of DFT codes in analysis will be written up by Jamie Peck. Steve Cottrell mentioned a plan to implement dipolar field calculations within Mantid. Elvezio Morenzoni suggested the possibility of including example applications of musrSim, and Peter Baker suggested including recent results from the Monte Carlo simulations of the MuSR spectrometer.

##### *Concept Studies for Future Muon Sources*

- D17.5 (Report of concept study): M48  
Elvezio Morenzoni reported that work towards a report on novel beam methods is progressing well, this will likely be presented at the Future Facilities workshop in Huddersfield.
- D17.7 (Document considering options for a muon facility at the ESS)  
Steve Cottrell reported that since the project was defined it has become clear that a muon source will not be included in the initial development of the ESS. Therefore, the opportunity has been taken to refocus this deliverable as a 'Future Facilities Workshop', to be held at the University of Huddersfield January 2015.

##### *Detector Technologies for Pulsed Muon Sources*

Good progress was reported with the development of an APD test system, with the focus of the present work aimed at understanding basic parameters of these devices in the context of their operation at a pulsed muon source. The design of this test system has been reported as part (a) of deliverable D17.8 (Design document for an APD detector array). Steve Cottrell reported that further work using the test system may be beneficial to properly understand the deadtime characteristics of these devices, and therefore the future direction of the project is currently being reviewed. The outcome of this review will be reported in part (b) of

deliverable D17.8, which will set out how the subsequent deliverable (D17.9 – Prototype APD detector Array for an ISIS Spectrometer) might best be realised. Final results will be reported as planned as deliverable D17.10.

## **2. Deliverables required for the end of the Outreach Work Package:**

Steve Cottrell presented an overview of deliverables still to be completed as part of the Outreach Work Package.

*Development the Muon User Community*

- D2.16 (Workshop on aspects of soft mater): M30  
A two day meeting is planned for 2015, focussing on applications of the  $\mu$ SR technique for studies of soft matter. The meeting will also include a discussion of laser stimulated  $\mu$ SR and a Facility User Meeting. A date for the meeting is still to be decided.

## **3. Forthcoming NMI3 sponsored meetings:**

- ***Magnetic Resonance and Muons – A Complementary View of Materials, 15 Dec, 2014, London, UK.*** The meeting is being organised by the IOP BSRG: Magnetic Resonance group and will discuss the complementarity of muon techniques with the more established magnetic resonance techniques. Presentations will cover aspects of condensed matter physics and chemistry, highlighting the novel information that muon measurements can provide.
- ***Future muon sources, 12<sup>th</sup> - 13<sup>th</sup> January 2015, University of Huddersfield.*** This is a joint meeting between two FP7 activities; NMI3 and the Accelerator and Applications Network of EuCARD-2. Organised to satisfy deliverable D17.7, it will unite scientists and engineers involved in the development and application of accelerator-based muon sources and provide a forum to discuss and exchange ideas about future facilities. Jamie Peck gave a review of the programme as it stands, including a description of the organisation; a two day meeting split into five sessions with *Muon production and accelerators, specialised beams and accelerators for novel experiments* on the 12<sup>th</sup> January, and sessions titled *Facilities update & condensed matter  $\mu$ SR* and *Novel applications for muons* to be held on the 13<sup>th</sup> January. Registration for the workshop is open.
- ***Soft Matter, Laser Excitation and Facility User meeting, Summer 2015.*** Dates for the two day meeting were discussed, with a date in early May proposed. However, Philip King highlighted that the UK Neutrons and Muons User Meeting (NMUM) was being held on 19<sup>th</sup> - 20<sup>th</sup> May. The possibility of holding the muon meeting as a satellite of NMUM was discussed; however, there was concern at the overall length of the combined meeting. It was generally agreed that a new date would need to be chosen, likely later in 2015.

## **4. Finance**

Steve Cottrell presented an overview of the finances for both the JRA and Outreach Work packages. Within the Outreach Work Package ~EUR 41.5k was earmarked to support muon activities; however, to date, none of this money has been claimed. It was agreed that the component allocated for staff costs (EUR 13k) should be used by PSI, that between EUR 15-20k will be required to support the soft matter workshop being organised by ISIS, with the remaining funds being available to PSI to support travel attending meetings. It was suggested that, as coordinator of the Outreach activity, PSI will need to submit a claim to the EU for the funds, with ISIS invoicing PSI for meeting expenditure – Steve Cottrell will confirm.

## **5. A forward look to SINE2020**

The INFRADEV4 proposal (SINE2020) was submitted in September 2014. Steve Cottrell presented an overview of the tasks within the work packages and their associated deliverables. Notably, in contrast to the previous FP7-I and FP7-II, work involved in this project would be more of a collaborative effort with those within the Neutron community.

- **Sample Environment (WP7)**

*Task 3 – Next generation pressure cells for neutron and muon research (Coord: PSI; Partners: HZG, CSIC, ILL; Observers: ESS, HZB, CEA, MLZ, STFC).* Muons involved in work for an improved piston cell (particularly sample pressure at low temperatures) and developing anvil cells (considering integration with  $\mu$ SR spectrometers).

*Task 4 – Complementary in-situ measurements for neutron and muon experiments (Coord: STFC; Partners: CEA, MLZ, PSI; Observers: ESS, ILL).* Muons working to develop sample handling, RF cavities and experimental techniques for studying muoniated radicals (akin to EPR).

**Deliverables**

7.3 (piston cell design), 7.10 (piston cell report);  
7.8 (anvil cell design), 7.16 (anvil cell report);  
7.6 (sample cell, environment and cavity design);  
7.12 (sample cell, environment and cavity report);  
7.13 (RF commissioning report);

- **Instrumentation and Detectors (WP9)**

*Task 4.3 – Silicon Photomultipliers for Muon Spectroscopy (Coord: PSI; Partners: STFC).* Application of SiPMs of interest to neutrons (Task 4.3) and muons – it was noted that these are different projects but with a common theme.

Focus of muon work will be a performance evaluation of emerging commercial SiPMs, considering their suitability for  $\mu$ SR detector arrays and providing feedback to industry. Work will also investigate alternative technologies for  $\mu$ SR detectors and suitability of technologies for pulsed and continuous muon sources.

**Deliverables**

9.8 (report evaluating commercial SiPMs);  
9.13 (report evaluating alternative technologies for  $\mu$ SR detectors);

- **Data treatment software (WP10)**

*Task 2 – Guidelines and Standards*

*(Coord: STFC; Partners: ESS, FZJ, PSI; Observers: ILL)*

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

*Task 4 – Atomistic Modelling, DFT calculations*

*(Coord: ESS; Partners: ESS, FZJ, PSI, ILL, CEA, UNIPR – 24M PDRA)*

Developing work started in FP7-I  $\Rightarrow$  new methods, case studies and involving users' in project through a workshop. Work likely of interest to other science areas, need for collaboration with neutron community. Appointment of a two year PDRA planned to lead work at Parma developing DFT applications.

**Deliverables**

10.7 (Atomistic modelling software and use cases for data analysis ready for user test);

- **e-Learning (WP3)**

*Task 1.6 – Extension of e-learning platform for muons*

*(Coord: UCPH; Partners: STFC, PSI)*

Similar benefit from e-Learning resources for neutrons and muons  $\Rightarrow$  similar requirements

Examples developed to investigate how learning tools for neutrons can be applied to muons

Potential to use materials developed in future muon schools

***Deliverables***

D3.3 (prospects of e-learning for muons)