



International Society for μ SR Spectroscopy

Newsletter No. 12 – January 2014

Greetings from the President of ISMS

This edition of the ISMS newsletter comes at the start of an exciting year for μ SR. The first week of June sees our triennial International Conference on Muon-Spin Rotation, Relaxation and Resonance (μ SR2014) that is to be held in Grindelwald, Switzerland. More details can be found later in this newsletter. Get your abstracts in by February 15th! In this newsletter you will also find a description of the current happenings in different parts of the muon world. Our wonderful facilities do not like to let the grass grow under their feet and you will see that there is a lot of new science, new developments and new ideas, which is exactly as it should be.

Let me first give you a few bits of news from the society. As many of you will know, Philip King has been promoted from Head of the ISIS muon group to oversee the spectroscopy and support division. Philip has served ISMS as the society's secretary since its founding, but he has decided that this is the right moment for him to step down. Philip's contribution to the society has been immense, providing expert administration for several incarnations of the ISMS committee and nursing all the previous newsletters through their production. We owe him a great debt of gratitude. I am also deeply grateful to Peter Baker, who has kindly agreed to take on Philip's ISMS responsibilities for the remainder of the term of the current committee, and in particular for his efficient assembling of this newsletter.

The term of the current ISMS committee is now however in its final days. The Grindelwald conference will see the "refreshing" of the committee membership, with the current President (me) handing over the reins to the President Elect, Khashayar Ghandi from Mount Allison University in Canada. The other members of his committee (2014-2017) still need to be identified, including the new President Elect (who will become President in 2017-2020) and if you would like to be considered for one of the positions, please contact Peter Baker, who will be organizing the election. Following our constitutional procedure, if more than one person comes forward for a particular position, there will be an electronic ballot of the ISMS membership. Again, more details can be found later in the newsletter, but this is your chance to shape the international society (or persuade a colleague to do it for you!).

As this is my final newsletter as President, let me offer you a few reflections on my perspective of the state of μ SR worldwide. The last few years have been a time of great scrutiny. We have seen international reviews happening for many of our facilities, and I have been involved with most of

these, either speaking to the international review committee on behalf of a facility (in the case of ISIS) or being part of the international review committee (for PSI, TRIUMF and RIKEN-RAL).

In all cases it has been heartening to see that even though none of our facilities were set up with the single aim of doing μ SR (muons have always piggy-backed on to something else, either a neutron facility or a particle physics facility), our muon programmes are always top-notch scientifically. They produce the strongest scientific output, by almost any metric, represent the best investment, deliver the widest science programme and either equal or outperform the other scientific activities at the various international institutions. How do they do that? Two reasons: first, our muon facilities have the most extraordinary talented and dedicated facility staff who innovate, designing new spectrometers and sample environment equipment, providing the technical know-how to achieve experiments which are truly extraordinary and enable new science; second, they have a creative, productive and world-class user base spread across many universities, countries and, crucially, many scientific disciplines. In other words, because of all of you! In this field we have a great story to tell, and as our international muon facilities navigate the (always) choppy financial waters in the years ahead those of us “on the ground” can do a great deal in helping them assembling the very strongest of cases for their continued growth and success.

On behalf of the ISMS committee, I wish you all a very happy and successful 2014 and see you in Grindelwald!

Stephen Blundell

President of ISMS

ISMS Executive Committee

President: ***Prof. Stephen Blundell, Oxford, UK***

President-elect: ***Prof. Khashayar Ghandi, Mount Allison University, Canada***

Vice-president, Americas: ***Prof. Andrew McFarlane, UBC, Canada***

Vice-president, Asia: ***Prof. Kenji Kojima, KEK, Japan***

Vice-president, Europe, Africa: ***Dr Alan Drew, Queen Mary University of London, UK***

Treasurer: ***Dr Hubertus Luetkens, PSI, Switzerland***

Acting secretary: ***Dr Peter Baker, ISIS, UK***

If you have comments on any aspect of the ISMS, please contact a committee member.

The International Society for μ SR Spectroscopy

c/o Peter Baker (Acting Secretary), ISIS Facility, STFC Rutherford Appleton Laboratory,
Harwell Oxford, OX11 0QX, UK. Email: peter.baker@stfc.ac.uk Web: <http://musr.org>



The 13th International Conference on **Muon Spin Rotation, Relaxation and Resonance**

Invited Speakers

Radu Coldea	University of Oxford, UK
Claude-Henri Delmas	Institut de Chimie de la Matière Condensée de Bordeaux, France
Dirk Johrendt	Ludwig-Maximilians-Universität München, Germany
Marc-Henri Julien	Laboratoire National des Champs Magnétiques Intenses, Grenoble - France
Manfred Fiebig	ETH Zurich, Switzerland
Allan MacDonald	The University of Texas at Austin, USA
Hidenori Takagi	Max-Planck Institute for Solid State Research, Dresden – Germany and University of Tokyo, Japan
Jean-Marc Triscone	University of Geneva, Switzerland

Local Organising Committee

Alex Amato
Christopher Baines
Rustem Khasanov
Hubertus Luetkens
Thomas Prokscha
Zaher Salman
Robert Scheuermann
Andreas Suter

Isolde Fuchs
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Conference Chair

Elvezio Morenzoni PSI, Switzerland
Christian Bernhard University of Fribourg, Switzerland

Honorary Conference Chair

Hugo Keller University of Zurich, Switzerland

Grindelwald, Switzerland

1–6 June 2014 | www.psi.ch/musr2014

The Executive Committee of the International Society for μ SR Spectroscopy

is pleased to announce the call for nominations for

The 2014 ISMS Yamazaki Prize for μ SR Science

The \$3000 prize is made available by the ISMS every three years to any scientist for outstanding, sustained work in μ SR science with long-term impact on scientific and/or technical μ SR applications. The 2014 prize will be awarded at a special ceremony session of the International Conference on μ SR, to be held in Grindelwald, Switzerland, in June 2014.

Nominations for the prize will be considered by the executive committee of the ISMS who may consult with experts outside the μ SR community.

Nominations may be submitted by scientists as individuals or on behalf of a group. To establish a high standard it is necessary that the committee receive nominations that demonstrate a sustained, long-term impact on particular fields of science using μ SR and/or on substantial development of innovative μ SR-related techniques, technologies, or theories. Nominations should include a cover letter describing the motivation for the award, a brief curriculum vitae of the nominee, and a short list of major, relevant publications. At least two additional supporting letters of recommendation should be included. Nominations will be treated in confidence and will be acknowledged, but no further communication from the selection committee will be sent.

Nominations should be sent before 28 February 2014 to the Chair of the Selection Committee:

Prof. Stephen Blundell,
Oxford University Department of Physics,
Clarendon Laboratory,
Parks Road,
OX1 3PU
United Kingdom
Email: s.blundell@physics.ox.ac.uk



Previous winners of the Yamazaki Prize: Jess Brewer (2011), Elvezio Morenzoni (2008), and Yasutomo Uemura (2005).

Solicitation of Candidates for Election to the Executive Committee of The International Society for μ SR Spectroscopy (ISMS)

Deadline for Nominations: 11 March 2014

ISMS Executive Committee Officers are elected by ISMS members every three years. The election occurs before each International Conference on Muon Spin Rotation, Relaxation and Resonance, and the results are announced at the Conference.

We would therefore like to invite candidates to stand for election to the ISMS Executive Committee. The Officers to be elected are: President-Elect, Vice President (Asia), Vice President (Americas), Vice President (Europe and Africa), and Treasurer.

The President-Elect and Treasurer are elected by all of the members of the ISMS; the three Vice Presidents are elected by members from their respective regions only. The Secretary and Webmaster are appointed by the President.

Any person who is a member of ISMS who wishes to run for office should submit a Candidate's Statement to Peter Baker (ISMS Acting-Secretary, peter.baker@stfc.ac.uk) before 11 March 2014. The candidate's statement should consist of:

- Your background (< 75 words)
- Education and current professional position
- Research interests and role of μ SR in your research
- Your vision for the ISMS (< 150 words)
- What are your goals for the ISMS?
- How will you personally contribute?

These statements will then be made available to ISMS members, and a ballot will be held. Service on the Executive Committee is both a privilege and an honour. You will be rewarded with an opportunity to shape the future directions of the Society and to serve the cause of making μ SR Spectroscopy healthy worldwide. Please contact one of the existing Committee members if you would like further information.

The present ISMS Executive Committee thanks you very much for your interest.

Stephen Blundell

An exciting new web portal for the muon community

The Neutron and Muon I3 (nmi3.eu), funded by the European Union under Framework Programme 7, has recently setup companion websites to act as portals for scientists using these techniques. The aim of these sites is to provide the respective communities with a central resource for the latest news about facilities and research worldwide, while also offering an introduction to the techniques to inform and encourage new users. A prototype of the muon site is now available at www01.muonsources.org (the neutron site is live at neutronsources.org). We're still adding content, but to help us develop the site in a way that best serves the muon community we'd appreciate your feedback. Ideas as to how the community might support the website to keep content current would also be welcome. Comments can be sent to us at info@muonsources.org.

Jamie Peck and Steve Cottrell (ISIS)

News from PSI

In 2013, the requests for beamtime at μS reached an all-time high with a total of 233 proposals. Alongside the very dense user program several instruments have been upgraded with the aim of improving their reliability and overall performance or to extend the accessible parameter space for μSR experiments.



The new High field And Low temperature μSR facility, named HAL-9500 in reminiscence of Arthur C. Clarke's Space Odyssey series, has successfully passed the final testing stage and saw its first experiments in 2013. From 2014 on the instrument with a maximum field of 9.5 Tesla, a time resolution of 60 ps, a 90° spin rotation and a base temperature of 20 mK is available to the worldwide user community.

After major reconstruction and enlargement, the PiE1 area simultaneously accommodates the DOLLY spectrometer and a particle physics experiment. Besides the obvious advantages of this permanent installation for the instrument performance, more experimental days can be provided for μSR users. To increase the available temperature range a ^3He (Heliox) insert has recently been delivered from Oxford Instruments for measurements down to 300 mK inside the existing ^4He Variox system. Furthermore, first cryogenic tests

have been done with a dilution fridge (Kelvinox) insert to elucidate the possibility to use DOLLY at temperatures down to 50 mK.

The low energy muon (LEM) beam line worked reliably with its new spin rotator in 2013. This allows continuous rotation of the initial muon spin direction between 0° and 180° with respect to the muon momentum and also shortens the time of flight between the trigger detector and the sample and eliminates unwanted charged particles from the LEM beam. With the LEM spectrometer it is now possible to illuminate the sample with light and simultaneously perform μSR or resistivity measurements. The new setup utilizes LEDs providing a light intensity of up to 100 mW/cm^2 at the sample with a wavelength of 405 nm. It is of special advantage that the probing depth of the low energy muons perfectly matches the attenuation length of the used light. An external stimulus like light now allows using LEM to study unconventional electronic states of matter out-of-equilibrium.

The GPS spectrometer is currently being rebuilt using Geiger-mode Avalanche Photodiodes (G-APD) coupled to plastic scintillators. This allows a much more compact design than the traditionally used photomultipliers leaving space for more complex sample environments. The G-APDs that can operate in magnetic fields are already in use at the high field instrument HAL-9500 and the two LEM spectrometers. For the future, it is foreseen to successively upgrade all PSI spectrometers with this modern technology.

Alan Drew

News from ISIS

First muons at ISIS were produced on a single beam line and spectrometer at around 11am on 23rd March 1987. Since then the muon facilities have grown to 7 experimental areas producing over 1000 publications and used by hundreds of researchers! In order to celebrate this, and in recognition of Steve Cox's contribution to muon research at ISIS, we held a meeting in September 2012. More information and links to the proceedings can be found on

<http://www.isis.stfc.ac.uk/groups/muons/meetings/frontiers-of-muon-spectroscopy--symposium-and-user-meeting14533.html>.



In order for ISIS to produce muons for the next 25 years we are upgrading the primary ISIS muon beamline. This will include replacement of all the beamline quadrupole magnets – many of which are over 40 years old - together with other components. This will keep the ISIS muon beamlines up and running for many more years. We have

redesigned the muon optics by replacing doublets with triplets and moving our first triplet closer to the muon target. This new design should give an increase in flux of at least two. The quadrupoles are currently in manufacture and are due for delivery in Spring 2014, with installation completed in 2015.

A training school for the next generation of muon researchers will be held in May 2014 with registration now open at the website below. The course will include a variety of lectures and workshops on the muon techniques given by experienced researchers, and also the chance to perform muon experiments:

<http://www.isis.stfc.ac.uk/groups/muons/muon-training-school/muon-spectroscopy-training-school7869.html>.

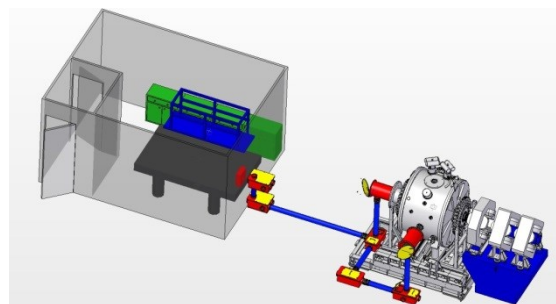
Since the last newsletter, we have upgraded EMu. The number of detectors has been increased to 96 and, together with the new detector electronics, the data rate is now 100+ MeV/hr. The new electronics developed for EMu have been rolled out on HiFi and MuSR, which has improved their performance by a factor of 2.



The development of codes running under the Mantid framework for the analysis of muon data continues. An interface focused on time domain analysis is now included as part of the Mantid distribution and is available on all the instruments. Developments are planned to augment the capabilities of this interface over the coming months, introducing batch fitting of datasets, simultaneous fitting of multiple groups, and runs with shared parameters, and including modules for Fourier/Maximum Entropy analysis.

And finally, Dr Alan Drew (Queen Mary University, London) has funding to develop research into photo-excited MuSR at ISIS. This European Research Council funded project, named MuSES, involves installing a high-power laser system on HiFi. Understanding

the fundamental physics of photo-excited states using muons will be the priority. However, the project will also apply the technique to different organic materials to understand electron dynamics, including excitonic and biological processes. In December 2013, we had our successful 'first light' simultaneously with muons in the HiFi instrument.

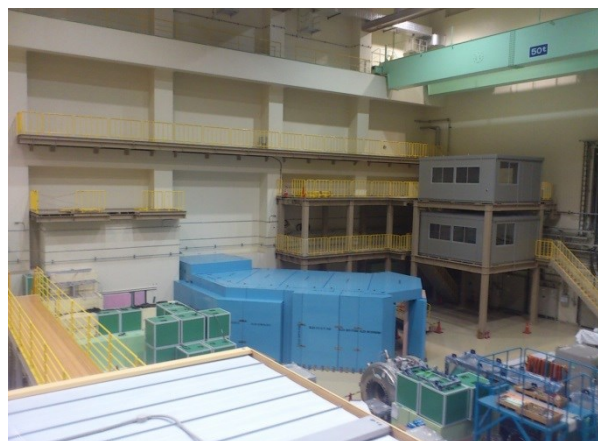


Alan Drew

News from J-PARC

We are constructing a new surface muon beamline dedicated to the material sciences, the so called S-Line. Although we are planning to ultimately construct four experimental areas, S1, S2, S3, and S4, we are funded for the construction of the beamline up to the S1 area during this fiscal year. It consists of large acceptance quadrupole triplet magnets made of mineral insulation cables (MIC) as a front-end in the vicinity of the muon target, four sets of normal quadrupole triplet magnets and three sets of bending magnets and an electrical kicker system, associated with a set of ± 250 kV DC separator.

Recently, we managed to complete installation of a power-supply station with fourth floors, two users' cabins, a dedicated cat's-walk, and beamline shield blocks. During



the shutdown period until the middle of February 2014, we are planning to complete the installation of the key components of the S-Line, for the beam commissioning in the coming summer.

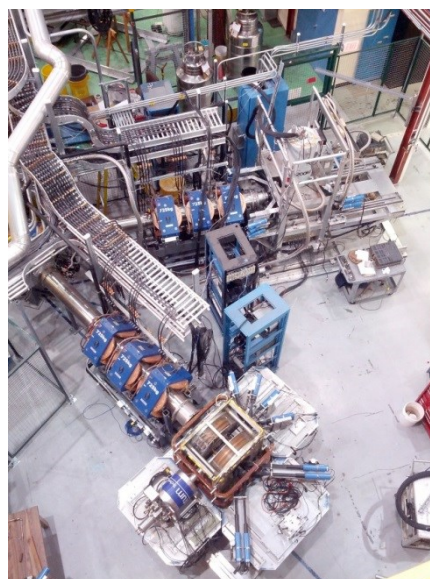
Kenji Kojima

News from TRIUMF

The new M20 surface muon beam line began operations in fall of 2012 and supported a full schedule of experiments in the summer and fall 2013 beam periods totalling 29 weeks. Beam can be directed to either of two end stations. The photo shows the high field Helios spectrometer on M20C and the general purpose low/zero-field spectrometer LAMPF on M20D. A fast electrostatic kicker currently being made will enable a muon-on-request capability driven by one of the experiments, with the other receiving the remaining beam. Dual spin rotators / separators in a non-dispersive optics arrangement have delivered muon beams with spin rotation from 5 to 90 degrees.

Beamline 1A (BL1A), the main proton driver beamline for the μ SR program as well as the future UltraCold Neutron (UCN) program, the 500MeV isotope production, and neutron irradiation facilities at TRIUMF is now 40 years old. TRIUMF recognizes the need to address deferred maintenance of BL1A and will devote substantial resources to engineering a long-term plan of staged refurbishment of BL1A, production targets and supporting systems.

The T2 production target (producing muons for both M20 and M9 beamlines) remains problematic. Age-related mechanical problems have shifted the target position such that the Indium seal that mates the M9 beamline to the vacuum cannot be made. As a result the M9 port was blanked off and both the inauguration of the newly installed M9A surface muon beamline and TRIUMF's long serving high momentum M9B counterpart have been suspended. The seal is in a high radiation area, making repair difficult, but a plan is in place to realign the front end of the M9 beamline in early 2015.



After a long hiatus, helium recycling at the TRIUMF CMMS facility has been restarted with the commissioning of a new liquefier in late 2013. The Linde L1610 Liquefier / compressor produces 10-15 L/hr and more than 60 L/hr with additional liquid nitrogen system. This system will provide sufficient Helium for the CMMS μ SR and β -NMR programme and, with the nitrogen cooling upgrade, for the new UCN facility as well.

A new high homogeneity 7 Tesla magnet is on order from American Magnetics for a new high field μ SR spectrometer.

The β -NMR programme continues to expand with new applications in polymers and ionic conductors. Plans are underway to substantially increase the magnetic field available at the low field β -NQR spectrometer and to implement a ^3He fridge at this end station. There is continues interest in higher temperatures as well and a high temperature UHV compatible oven is in design.

TRIUMF continues to dedicate much of its resources to the new high current superconducting electron linear accelerator

ARIEL.

<http://www.triumf.ca/research-highlights/experimental-result/breakthroughs-ariel>.

Once operational, ARIEL will dramatically increase the amount of β -NMR beamtime available, possibly as early as 2017.

The TRIUMF Five Year Plan for 2015-2020 has been completed, and will soon be submitted to the government of Canada. It is publicly available and can be found here:

<http://www.triumf.ca/five-year-plan-2015-2020/the-report>

As part of the process, Canada's National Research Council recently formed an

International Peer Review Committee to study TRIUMF, including the TCMMS in Nov. 2013. A decision on the next 5 years of funding at TRIUMF is expected in March 2015.

The MMS Experiment Evaluation Committee met recently (Jan 13 & 14, 2014) and assessed 31 μ SR proposals (8 continuation, 23 new) and 6 β -NMR proposals (2 continuation, 4 new) for the coming year. The next call for proposals is expected to go out in the spring with a deadline for submissions in May. For more details consult:

<http://www.triumf.ca/experimental-program/call-for-submissions-agendas#MMS>

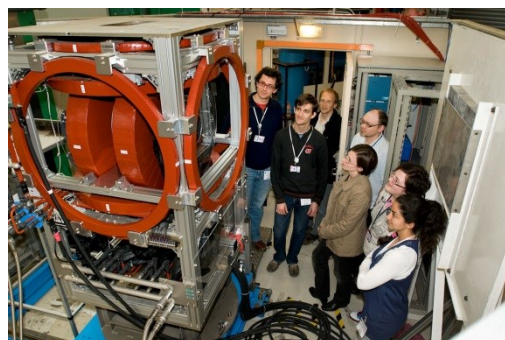
Andrew MacFarlane

News from RIKEN/RAL

The Argus μ SR spectrometer continues to produce excellent muon science, with a focus on organic and inorganic magnetism and superconductivity, with work also on laser stimulation pump-probe experiments using a dedicated laser system.

The Chronus spectrometer has been constructed at port 4 of the facility over the past few years to provide a flexible, open muon spectrometer with high count rate (the spectrometer consists of 600 detector elements to allow for high rates at a pulsed muon source). Chronus has recently been equipped with an ISIS data acquisition system which was commissioned in the last ISIS run cycle. We expect full experiments on the instrument in the near future. The photo shows students on the ISIS muon training course at the Chronus spectrometer.

The muon catalysed fusion programme at RIKEN-RAL has been very successful, producing a number of important results and



papers in the fundamental aspects of the muCF process. It has been one of the flagship experiments at RIKEN-RAL from the start of facility operations 20 years ago. However, it has recently been decided that further muCF experiments are unlikely to be carried out in the future at RIKEN-RAL, and plans are being produced to decommission the muCF tritium gas-handling system, making space for possible future experiments.

Access to the RIKEN-RAL muon facility can be obtained through the RIKEN programme advisory committee which holds periodic calls for proposals, or through the ISIS calls for proposals which happen every six months.

Philip King

Muon Facility Contact Details

ISIS

Contact: Adrian Hillier (adrian.hillier@stfc.ac.uk)
<http://www.isis.stfc.ac.uk/groups/muons>

J-PARC

Contact: Yasuhiro Miyake (yasuhiro.miyake@kek.jp)
<http://www.j-parc.jp/MatLife/en/index.html>

PSI

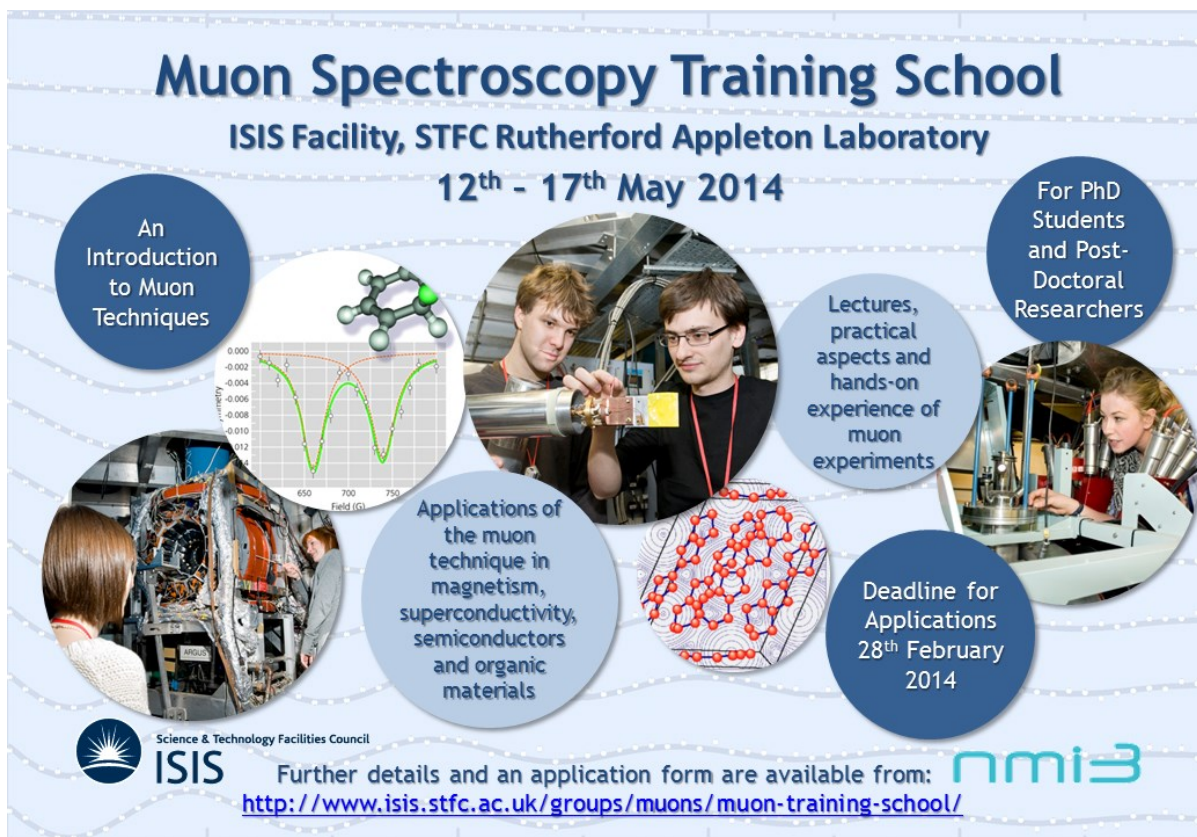
Contact: Elvezio Morenzoni (elvezio.morenzoni@psi.ch)
<http://lmu.web.psi.ch/>

RIKEN-RAL

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<http://riken.nd.rl.ac.uk/index.php>

TRIUMF

Contact: Syd Kreitzman (syd@triumf.ca)
<http://musr.triumf.ca/>



Muon Spectroscopy Training School
ISIS Facility, STFC Rutherford Appleton Laboratory
12th - 17th May 2014

An Introduction to Muon Techniques

For PhD Students and Post-Doctoral Researchers

Lectures, practical aspects and hands-on experience of muon experiments

Applications of the muon technique in magnetism, superconductivity, semiconductors and organic materials

Deadline for Applications 28th February 2014

Science & Technology Facilities Council
ISIS

Further details and an application form are available from: <http://www.isis.stfc.ac.uk/groups/muons/muon-training-school/>

nmi3

The poster features several circular images: a molecular structure, a graph of intensity vs. field, two researchers working with equipment, a person operating a machine, and a lattice structure.

Comments on this newsletter?

The ISMS newsletter will be distributed periodically to inform the μ SR community of ISMS activities, and to provide other information and news of interest to community members. We would welcome comments and thoughts on the content and distribution method – please email the Acting Secretary, Peter Baker, at peter.baker@stfc.ac.uk if you have suggestions.