



# International Society for $\mu$ SR Spectroscopy

Newsletter No. 10 - December 2010

## *Greetings from the President of ISMS*

Welcome to the final e-Newsletter of the current decade. The ISMS Executive Committee met earlier this year in Tokai, Japan and adopted a number of new initiatives. I would like to draw your attention to some of these, and to also request your participation in a few important Society issues.

- We have launched a new and improved **ISMS website**. The new website is still under construction, with much content still to be added, but over time it will greatly surpass the old website in usefulness. At this time we would like all users of the  $\mu$ SR technique, even registered ISMS members, to go to the new website at <http://tcmms.ca/ISMS/> and create a new account. This will help us to generate an up-to-date membership list and will provide you access to password-protected material that we will be posting on the website. Please help us to increase our worldwide membership by signing up.
- In this issue we are pleased to announce the first **ISMS Top Paper of the Year Award**. Please join the Executive Committee in congratulating Hubertus Luetkens and his colleagues on their seminal work on the iron pnictide  $\text{LaO}_{1-x}\text{F}_x\text{FeAs}$  published in the journal Nature Materials. Please see a summary of this work on page 3.
- We invite nominations for the prestigious **Yamazaki Prize**, to be awarded at the upcoming International  $\mu$ SR Conference in Cancun, Mexico, May 16-20, 2011. The deadline for nominations is February 28, 2011. Please see page 4 for details on the nomination process. Previous winners of the Yamazaki Prize were Professor Yasutomo Uemura (2005) and Professor Elvezio Morenzoni (2008).
- It is time to elect a new **ISMS Executive Committee**, who will take over from the existing committee following the International  $\mu$ SR Conference in 2011. The current President-Elect, Professor Stephen Blundell of Oxford University, will become the new President. Nominations are sought for a new President-Elect, three regional Vice Presidents and Treasurer. Please take the time to nominate qualified persons that you know. Self-nominations are also welcome. See page 5 for further details.
- ISMS now has a **student reporter**. His name is Paul Themens from Mount Allison University, Canada. Paul will be providing a student's perspective on  $\mu$ SR activities and achievements as a regular feature in forthcoming ISMS e-Newsletters. Welcome aboard Paul!
- I hope that most of you are planning to attend the **12th International  $\mu$ SR Conference** in May 2011 ( $\mu$ SR2011). As co-chair of the conference I can say we are working hard to make the conference affordable and memorable. Here I just like to mention that we are in the midst of negotiating lower room rates than originally posted on the conference website at <http://muSR2011.triumf.ca>. Since many conference expenses are absorbed into the negotiated rates, attendees must book rooms at the conference rate to avoid paying an elevated registration fee.
- As we look forward to getting together at  $\mu$ SR2011, it is time to launch the bidding process for the next  $\mu$ SR conference in 2014. Anyone interested in hosting  **$\mu$ SR2014** should notify me of their intent to present a formal bid at  $\mu$ SR2011, when the location of the next conference will be announced.

**Jeff Sonier**

The International Society for  $\mu$ SR Spectroscopy

c/o Philip King (Secretary), ISIS Facility, STFC Rutherford Appleton Laboratory, Chilton, Oxfordshire, OX11 0QX, UK. email: [philip.king@stfc.ac.uk](mailto:philip.king@stfc.ac.uk). Web: <http://tcmms.ca/ISMS/>



**Cancun, Mexico**  
**May 16 - 20, 2011**

[muSR2011.triumf.ca](http://muSR2011.triumf.ca)



# 12<sup>th</sup> International Conference on Muon Spin Rotation, Relaxation and Resonance

## Invited Speakers

Martin Brandt (Walter Schottky Institut)  
Pencheng Dai (University of Tennessee)  
Michel Gingras (University of Waterloo)  
Danny Leznoff (Simon Fraser University)  
Arturo Menchaca Rocha  
(National Autonomous University of Mexico)  
Andrew Millis (Columbia University)  
Shin-ichi Orimo (Tohoku University)

## Local Organizing Committee

S. Kreitzman  
(TRIUMF)  
K. Ghandi  
(Mount Allison University)  
W.A. MacFarlane  
(University of British Columbia)  
G.D. Morris  
(TRIUMF)

## Conference Co-Chairs

J.E. Sonier  
(Simon Fraser University)  
G.M. Luke  
(McMaster University)

## Honorary Chair

J.H. Brewer  
(University of British Columbia)

## Conference Support

J. Thomson (TRIUMF)  
[muSR2011@triumf.ca](mailto:muSR2011@triumf.ca)



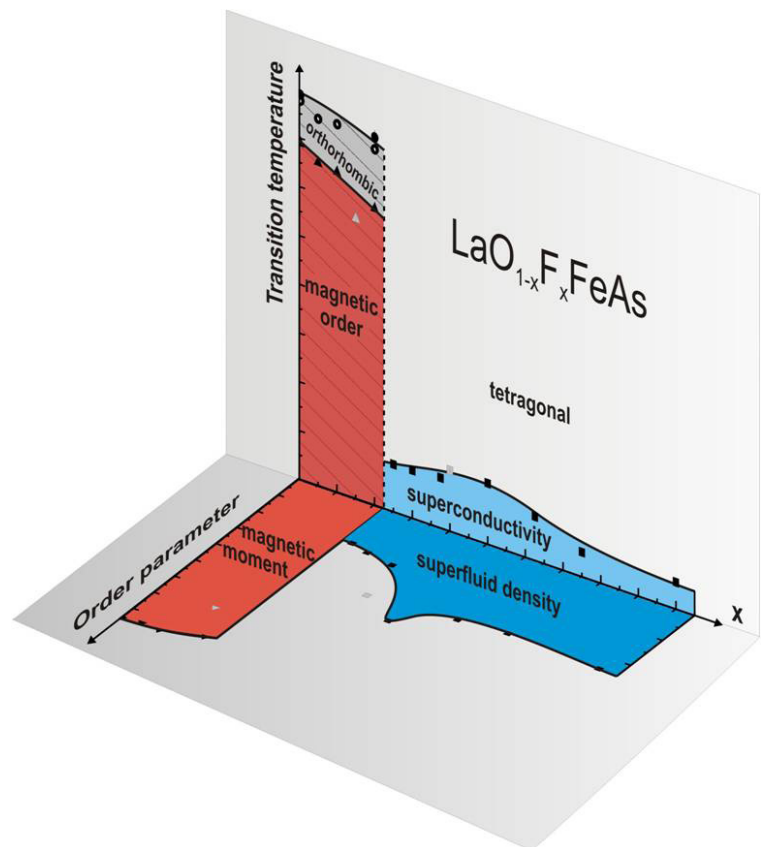
**The electronic phase diagram of the  $\text{LaO}_{1-x}\text{F}_x\text{FeAs}$  superconductor**

***Nature Materials 8 (4) (2009) 305-309***

*H. Luetkens, H.-H. Klauss, M. Kraken, F. J. Litterst, T. Dellmann, R. Klingeler, C. Hess, R. Khasanov, A. Amato, C. Baines, M. Kosmala, O. J. Schumann, M. Braden, J. Hamann-Borrero, N. Leps, A. Kondrat, G. Behr, J. Werner & B. Büchner*

*ISMS invited the primary author of the winning paper Hubertus Luetkens to summarize their work:*

The layered Iron pnictide superconductors discovered in early 2008 constitute the first large class of high temperature superconductors since the discovery of the high- $T_c$  cuprates in 1986. From the very beginning of research on these systems,  $\mu\text{SR}$  has contributed important information. It is widely recognized as one of the key techniques to probe fundamental magnetic and superconducting properties as well as to test for microscopic competition or coexistence of the magnetic and superconducting ground states. A remarkable parallel with other unconventional superconductors like high- $T_c$  cuprates, heavy fermions and organic superconductors can be drawn from the observation that superconductivity appears in close proximity to an antiferromagnetically ordered state. In the awarded paper, a detailed structural and electronic phase diagram of  $\text{LaO}_{1-x}\text{F}_x\text{FeAs}$ , the first family of iron pnictide superconductors, has been determined by means of X-ray scattering, muon spin relaxation and Mössbauer spectroscopy. Our goal was to identify the small moment itinerant spin density wave (SDW) state and the temperature and doping dependence of the magnetic and superconducting order parameters. In contrast to e.g. the cuprates we find a discontinuous first



order-like change of the Néel temperature, the superconducting transition temperature and the respective order parameters (see figure). Our results strongly questioned the relevance of quantum critical behaviour in iron pnictides. One of the long-term impacts is the observation of the very strong coupling of the structural orthorhombic distortion and the magnetic order both disappearing at the phase boundary to the superconducting state. This intimate relation is a direct consequence of the peculiar Fermi surface instability responsible for both phase transitions.

**The Executive Committee of the  
International Society for  $\mu$ SR Spectroscopy**

is pleased to announce the call for nominations for

**THE 2011 ISMS  
YAMAZAKI PRIZE FOR  $\mu$ SR SCIENCE**

The \$3000 prize is made available by the ISMS every three years to any scientist for outstanding, sustained work in  $\mu$ SR science with long-term impact on scientific and/or technical  $\mu$ SR applications. The 2011 prize will be awarded at a special ceremony session of the International Conference on  $\mu$ SR, to be held in Cancun, Mexico, in May 2011.

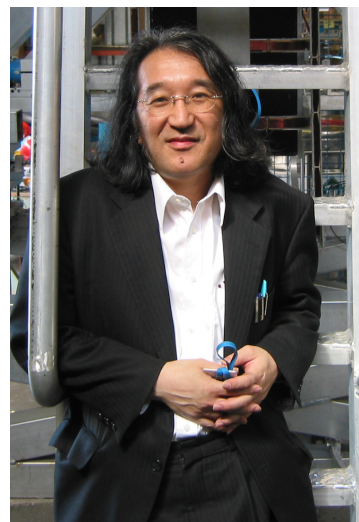
Nominations for the prize will be considered by the executive committee of the ISMS who may consult with experts outside the  $\mu$ SR community.

Nominations for the 2011 ISMS Toshimitsu Yamazaki Prize 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  $\mu$ SR and/or on substantial development of innovative  $\mu$ 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 2011 to  
the Chair of the Selection Committee:**

**Prof Jeff Sonier, President ISMS  
Department of Physics  
Simon Fraser University  
8888 University Drive  
Burnaby, British Columbia  
Canada V5A 1S6**

**Telephone: +49 778-782-4223  
Email: [jsonier@sfu.ca](mailto:jsonier@sfu.ca)**



*Prof. Yasutomo Uemura (above) was the winner of the first Yamazaki Prize awarded in 2005. The second prize, awarded in 2008, was given to Prof Elvezio Morenzoni (left).*





**Solicitation of Candidates for Election  
to the Executive Committee of  
The International Society for  $\mu$ SR Spectroscopy (ISMS)**

**Deadline for Nominations: 11 March 2011**

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 Philip King (ISMS Secretary, [philip.king@stfc.ac.uk](mailto:philip.king@stfc.ac.uk)) before 11 March 2011. The candidate's statement should consist of:

- o Your background (< 75 words):
- o Education and current professional position
- o Research interests and role of  $\mu$ SR in your research
- o Your vision for the ISMS (< 150 words)
- o What are your goals for the ISMS?
- o 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  $\mu$ 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.

Jeff Sonier

The present Executive is:

**President:** Prof. Jeff Sonier, Simon Fraser University, Canada

**President-elect:** Prof. Stephen Blundell, University of Oxford, UK

**Vice-president, Americas:** Prof. Khashayar Ghandi, Mount Allison, Canada

**Vice-president, Asia:** Dr. Wataru Higemoto, JAEA, Japan

**Vice-president, Europe, Africa:** Prof. Bob Cywinski, Huddersfield University, UK

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

**Webmaster:** Prof. Jess Brewer, UBC, Canada

**Secretary:** Dr. Philip King, ISIS, UK

## Brief news from the community

### From the RIKEN-RAL Muon Facility

This year marks the 20<sup>th</sup> anniversary of the first agreement between RIKEN (Japan) and ISIS for muon science. The agreement has seen the construction and operation of the RIKEN-RAL Muon Facility. In July, Prof Ryoji Noyori, Nobel Laureate and President of RIKEN, and Prof Keith Mason, STFC Chief Executive, signed an agreement to continue the collaboration until at least 2018. And a celebration of 20 years of muon science at the RIKEN-RAL facility was held, with Prof Ken Nagamine opening the event.



*Prof Ken Nagamine opening celebrations for 20 years of muon science at the RIKEN-RAL muon facility at ISIS.*

direction it sets an important milestone towards longitudinal field  $\mu$ SR measurements with low energy muons. Another application is for the ALC spectrometer, where the new technology allows for time-differential  $\mu$ SR measurements in transverse fields up to 5 T. The switchover from the standard high intensity time-integral mode with 2 million events per second to the time-differential mode is fast and nearly automated. In addition, the two different data acquisition modes can be conveniently controlled by a single graphical user interface.

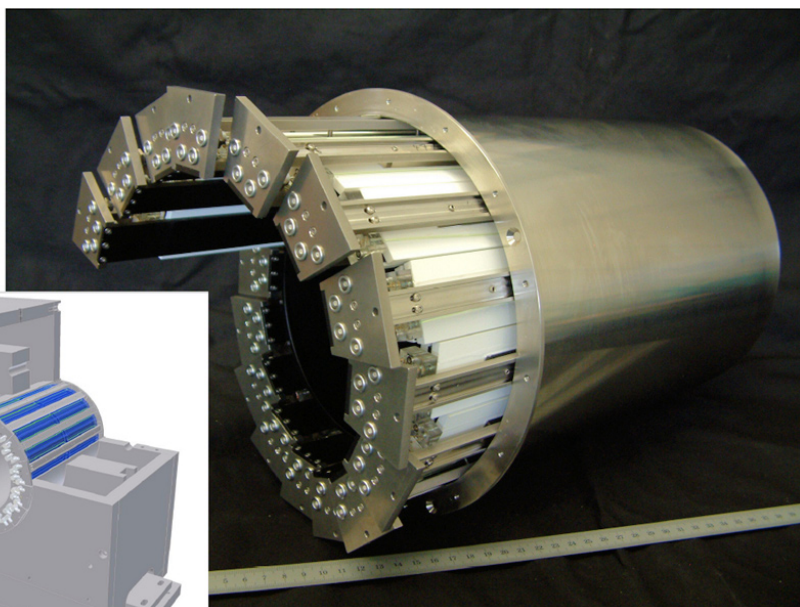
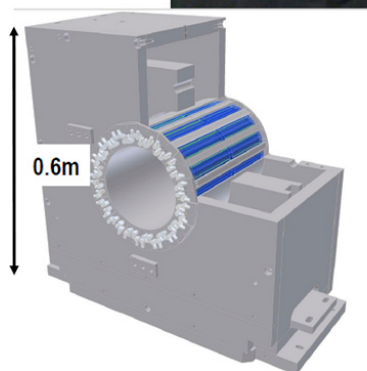
### From TRIUMF

TRIUMF is engaged in the installation of two surface muon optimized beamlines during the calendar year of 2011. The current M20 beamline will be replaced with a dual-leg beamline featuring an achromatic dual spin rotator and potentially simultaneous Muons On Request (MORE) into one of the legs. The M9A beam line is single-leg, but also shares the spin rotator design and MORE capability. Current planning is to complete M20 by July 2011, with the completion of M9A scheduled for the fall of 2011. This effectively means that for much of the Spring/Summer beam time schedule, only M15 and the high-momentum muon channel M9B will be operational. Unfortunately, this reduced capability comes in the wake of a record 38 submissions at the Molecular and Materials Science Experimental Evaluations Committee meeting held December 6-7, 2010 at TRIUMF.

### From PSI

A compact fast-timing detector consisting of a Geiger-mode Avalanche Photodiodes (G-APD) coupled to a plastic scintillator and read-out electronics has recently been developed and tested at PSI. The new detector system has an integrated time resolution better than 100 ps, allows for large granularity and works in high magnetic fields. Because of these characteristics the spectrometers of the high field instrument being built at PSI will be based on this technology.

The detector system has been also used to build a new low energy muon spectrometer which successfully started user operation in May 2010. With its increased detector granularity in the forward-backward



*Low energy muon spectrometer at PSI, based on Geiger-mode Avalanche Photodiodes (G-APD) coupled to plastic scintillators.*



## From ISIS

The new HiFi 5T spectrometer is working well at ISIS. A 'Muon High Field and User Meeting' was held at the facility in September. 30 attendees were able to discuss the new science that is possible using HiFi, and there were contributions from a wide range of science areas.

18 post-grad and post-doc researchers attended the ISIS Muon Training Course in May. The course consisted of lectures on the principles and applications of the muon technique, plus hands-on experience of running muon experiments.



*The ISIS High Field and User Meeting held in September.*

## From J-PARC

During December 2010, J-PARC's proton beam power came up to 200kW.

At J-PARC-MUSE, a construction of the superconducting beam channel for an intense ultra-slow muon beamline has been started.

Intense ultra-slow muons with an energy of  $>0.2\text{eV}$  will be delivered within a few years!



*Students at the ISIS muon training course loading a sample into a cryostat.*

## Muon Facility Contact Details

### ISIS

Contact: Philip King ([philip.king@stfc.ac.uk](mailto:philip.king@stfc.ac.uk))  
<http://www.isis.stfc.ac.uk/groups/muons>

### J-PARC

Contact: Yasuhiro Miyake ([ymiyake@post.kek.jp](mailto:ymiyake@post.kek.jp))  
<http://www.j-parc.jp/MatLife/en/index.html>

### PSI

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

### RIKEN-RAL

Contact: Tei Matsuzaki ([matsuzak@riken.jp](mailto:matsuzak@riken.jp))  
[http://riken.nd.rl.ac.uk/ral/ral\\_form.html](http://riken.nd.rl.ac.uk/ral/ral_form.html)

### TRIUMF

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

## Comments on this newsletter?

The ISMS newsletter will be distributed periodically to inform the  $\mu\text{SR}$  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 Secretary, Philip King, at [philip.king@stfc.ac.uk](mailto:philip.king@stfc.ac.uk) if you have suggestions.