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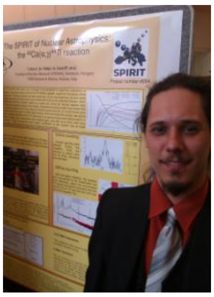
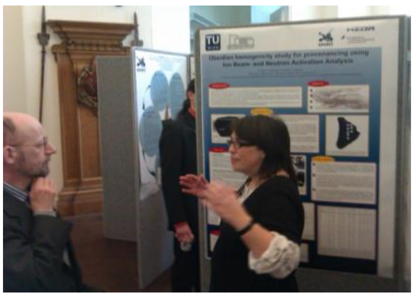
SPIRIT MIDTERM REVIEW MEETING MARCH 9-11, 2011
FARNHAM CASTLE, SURREY

The Surrey Ion Beam Centre hosted the Midterm Review and User Meeting for SPIRIT at Farnham Castle from 9-11 March 2011. The meeting helped celebrate the first two years of the project with presentations detailing the successful provision of resources to users across the EU as well as providing details of the many important developments arising from joint research activities. Sixty-six participants attended, including the EU reviewer Prof. Dr. Winfried Petry.

The week began with several internal SPIRIT meetings, including the Transnational Access Activity Board, Joint Research Activity Board, Networking Activity Board, SPIRIT Management Board, and the Project Steering Team meeting. The Midterm Review Meeting took place on the morning of March 10th with an opening presentation from Wolfhard Moeller on the management and budget of the SPIRIT project. This was followed by a presentation from Andreas Kolitsch on transnational access and then Philippe Moretto delivered a presentation about the joint research activities for SPIRIT. Karen Kirkby presented the many networking activities taking place within SPIRIT and this was followed by an overall discussion dedicated to planning SPIRIT II. An External Board Meeting was held in parallel with a User Selection Panel Meeting. All delegates were then divided into four groups to participate in the SPIRIT Foresight Study, which was structured as an interactive discussion facilitated by group leaders from Surrey. Tours of the castle were offered and a banquet with live music was held in the castle's main dining hall. The final day of the meeting was devoted to the User Workshop. Nine early stage researchers participating in the JRA's presented their work and ten users gave talks about their projects with a further thirteen posters of user projects presented.





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SPIRIT EVENTS

Tutorials

Ion Beam Surface Analysis Tutorial
ETHZ, Zurich, 21-22 June 2011

This tutorial covered the **basic principles of MeV ion beam analysis**. Participants were introduced to **RBS** (Rutherford Backscattering Spectrometry), **ERDA** (Elastic Recoil Detection Analysis) and **PIXE** (Particle Induced X-ray Emission) for surface and thin layer analysis. It included **hands-on** laboratory practice and data analysis.

The tutorial targeted potential users of ion beam analysis techniques in a wide range of research disciplines and young students in ion beam physics. It was open to the European research community. A full report on the tutorial will be given in the next SPIRIT newsletter.

High Resolution Depth Profiling Methods and Applications
UPMC, Paris, 25-26 June 2011

This third Spirit Tutorial follows on rapidly from the second Spirit Tutorial to be held in Zurich 20/21 June 2011. Participants coming from a long distance will be able easily to include the two tutorials in a single voyage. The tutorial also precedes HRDP6, the 6th International Workshop on High Resolution Depth Profiling (this is the 2nd SPIRIT Workshop).

The Tutorial, aimed at early career researchers and at established researchers wishing to learn more about high resolution depth profiling techniques, will provide lectures on basic pulse height spectroscopy, narrow resonance profiling, high resolution magnetic and electrostatic detectors, surface structure determination with MEIS, high resolution standard RBS, and high resolution ERDA. A hands-on session involving a Narrow Resonance Profiling measurement with the SAFIR facility and analysis of the obtained data is also planned.

Because the Tutorial immediately precedes HRDP6, a number of lectures will be given by eminent scientists present in Paris for HRDP6, and participation in the Tutorial will be a good buildup for those wishing to extend their stay by participation in the scientific sessions of HRDP6.

Registration costs are €100 for students and €250 for all others. They include lunches and coffee breaks, and participation in the HRDP6 Welcome Cocktails on the evening of Sunday 26 June.

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Workshops for New Users

High Resolution Depth Profiling Methods and Applications
UPMC, Paris, 27/30 June 2011

The purpose of the workshop is to provide a fertile forum for exchange of ideas, discussion of problems and presentation of new results in the field of Low and Medium Energy Ion Scattering, Rutherford Backscattering Spectrometry and Elastic Recoil Energy Analysis with sub-nanometric depth resolution, Narrow Nuclear Resonance profiling and Secondary Ion Mass Spectrometry, as well as surface and interface structure determinations using ion beams. Contributions are also solicited from related fields that have an impact on, or that can be impacted by, the topics above. The Workshop is concerned with both development of the underlying methodology, including fundamental ion-solid interactions, and applications of high resolution depth profiling in areas such as nano-technology, semiconductor device development, surface and interface characterization at the atomic scale, and study of thin film growth processes. Both theoretical and experimental contributions are welcomed. The workshop follows five highly successful workshops held in Abingdon (UK - 2000), Kyungju (Korea - 2002), Bar Harbor (USA - 2005), Radebeul (Germany - 2007) and Kyoto (Japan - 2009). The meeting will consist of invited lectures, and contributed oral and poster contributions, with opportunities for early career researchers and doctoral students to present their work.

For more information visit http://hrdp6.ent.upmc.fr/en/

A further Workshop is to be held in 2012 in Lisbon on Ion Beams as a Tool for Nanotechnology

Transnational Access (TNA)

The following talks and posters were presented at the Farnham Castle Midterm Review Meeting as a representation of the TNA activities within SPIRIT:

TALKS

1. Marcel Toulemonde, GANIL Caen, France
   Mechanism of electronic sputtering in ionic crystals

2. Marko Karlusic, RBI Zagreb, Croatia
   Channeling RBS mesurements of swift heavy ion tracks in the $SrTiO_3$

3. Robert Ritter, TU Vienna, Austria
   Systematic studies of ion-induced defects on Polymethylmetacrylate (PMMA) and HOPG surfaces

4. Roxana Bugoi, NIPNE Bucharest, Romania
   IBA Analysis of Byzantine Glass Bracelets found in Nufaru, Romania

5. Gabor Santa, KFKI Budapest, Hungary
   Proton Beam Analysis of Late Bronze Age metals from Southern Hungary

6. Giacomo Ceccone, JRC Ispra, Italy
   Quantification of Cobalt Ferrite nanoparticles distribution in Balb3T3 mouse fibroblasts

7. Oczan Gundogdu, Kocaeli University, Turkey
   First Extensive and Systematic Analysis of Osteoarthritic Human Bone Cartilage

8. Nuno Barradas, ITN Sacavem, Portugal
   Visible light response photocatalytic materials based on TiO_2 *grown DC-reactive magnetron sputtering - N content*

9. Andres Redondo, Univ. Autonoma Madrid, Spain
   Nitrogen doping of TiO_2 *thin films grown by pulsed magnetron sputtering*

10. Rui Martins, ITN Sacavem, Portugal
    Ni-Ti Surface Modification by plasma immersion ion implantation

POSTERS

1. Francesco S. Romolo, Institut de Police Scientifique et de Criminologie, University of Lausanne, Switzerland
   Gunshot residue study with PIXE

2. F. Eder, Atominstitut, Vienna, Austria
   Obsidian homogeneity study for provenancing using Ion Beam and Neutron Activation Analysis IBA

3. M. Milosavljević, VINČA Institute of Nuclear Sciences, Belgrade
   Ion beam modification and analysis of multilayered metal and ceramic nanocomposites

4. Roxana Bugoi, National Institute for Nuclear Physics and Engineering, Romania
   Byzantine Glass Bracelets Investigations Using External IBA

5. Silvia Calusi, INFN, Florence, Italy
   Ionoluminescence analysis of quartz for forensics applications

6. T. Szucs, Institute of Nuclear Research (ATOMKI), Debrecen, Hungary
   The SPIRIT of Nuclear Astrophysics: the ^{40}Ca (α, γ) ^{44}Ti reaction

7. P. Nekvindova and B. Svecova, Department of Inorganic Chemistry, Faculty of Chemical Technology, Institute of Chemical Technology, Prague
   Ion implantation into silicate glasses for photonics devices

8. Johannes H. Sterba, University of Technology, Vienna, Austria
   µ-spot analysis of experimental ceramics

9. M. Karlusic, Institute Ruder Boskovic, Zagreb
   Channeling RBS measurements of swift heavy ion tracks in the $SrTiO_3$

10. Abhishek BhargavaIon, Centre for Innovation Competence, Virtuhcon Group "Multiphase Systems"
    Nuclear techniques (STIM and PIXE) for coal characterization

11. A. Caciolli, INFN, Padua, Italy
    The SPIRIT of nuclear astrophysics: Study of $Ti_{15}N$ targets for nuclear astrophysics with high-Z ERD

12. Zbigniew Werner, Andrej Soltan Institute for Nuclear Studies, Poland
    Lattice location of manganese atoms implanted into silicon and plasma-pulse annealed

Some of these are summarized below.

Gunshot residue study with PIXE, SUR

Transnational access has been granted to researchers from the University of Lausanne to analyse gunshot residue (GSR) in Surrey using ion beam analysis techniques. GSR consists of particles produced as a result of the high temperature, high-pressure reactions immediately after a gun has been fired. The detection of gunshot residue on a suspect can prove to be vital evidence for investigators of crimes involving firearms. The technique currently used for the analysis of GSR is SEM-EDX, but this lacks sensitivity to trace elements compared to PIXE due to the very low Bremsstrahlung induced by protons.

Installation of a channel electron multiplier (CEM) in the microbeam chamber at Surrey has paved the way for non-destructive relocation of GSR particles already analysed by SEM-EDX, allowing direct comparative analysis. The detection of additional elements such as Ti, Cr, Mn, Fe and Ni using PIXE has given increased power of discrimination between sources of heavy metal-free GSR over SEM-EDX analysis alone.

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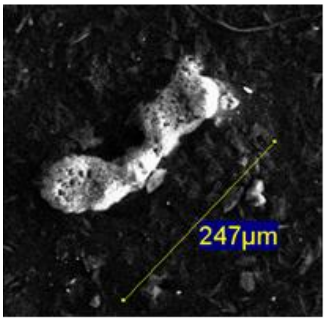
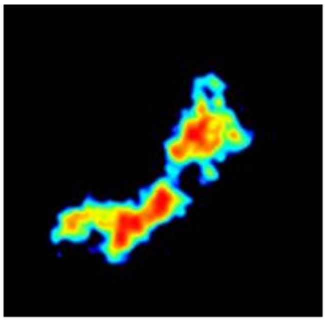


SEM image of GSR



Si X-ray map of relocated particle

Looking ahead, the sodium content of GSR will be investigated. Sodium is currently not on the internationally accepted ASTM list of admissible elements in GSR. The ability to map sodium using microbeam PIGE to show that the sodium signal originates from the particle and not the substrate could change the way in which GSR evidence is evaluated in future criminal cases.

Obsidian homogeneity study for provenancing using Ion Beam- and Neutron Activation Analysis IBA, HZDR

The volcanic glass obsidian was one of the most appreciated materials of prehistoric people for cutting tools and has been found at many sites, far away from any natural source. Reliable provenancing can provide evidence of trading routes and contacts and information about exchange patterns and mobility of prehistoric people.

F. Eder from the Atominstitut in Vienna conducted experiments in HZDR to provenance volcanic glass obsidian using IBA. This investigation is part of a joint project to apply selected analytical methods, in particular IBA, INAA and Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry (LA-ICP-MS). They hope to detect a maximum of compositional differences between easily available samples of natural obsidian sources in Europe. This should help researchers to decide the least destructive analytical method for the analysis of a specific archaeological artefact, on a case by case basis.

Provenancing by means of its highly specific chemical composition: the “chemical fingerprint”. Combined external Ion Beam Analysis (IBA), consisting of Proton Induced X-ray Emission (PIXE), Proton Induced Gamma-ray Emission (PIGE) and Rutherford Backscattering Spectrometry (RBS), are frequently used because of their high sensitivity and the non-destructive beam mode. Instrumental Neutron Activation Analysis (INAA) has shown to be the method of choice to obtain additional information because it offers the determination of a complementary set of elements not detectable with IBA.

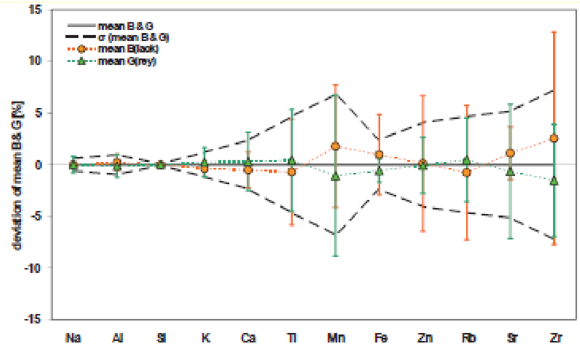


Figure 1: Element distribution in banded obsidian.

The results obtained by IBA of the cut obsidian sample from Hrafntinnuhryggur revealed no influence of the surface qualities. Furthermore, the comparison to literature data proves the reliability of the data obtained. The homogeneity of the specimen demonstrates its usefulness as an in-house reference material. Fig. 1 shows the average of the elemental concentrations in both the black and the grey bands of the sample MLO9 (Demenegakion, Milos) compared to the overall average. These concentrations were calculated from 8 (3 black, 5 grey) different spots measured with IBA. They lie within the standard deviation and no significant difference in the chemical composition between the black and the grey bands is detecable. The deviation of the results is only due to measurement uncertainties. The comparison of the chemical fingerprint of three obsidian samples from Demenegakion obtained by INAA and combined external IBA (i.e. simultaneous PIXE-PIGE) proves the complementarity of these analytical methods. Furthermore, a good agreement was found between these experimental results and corresponding PIXE literature data for other samples from the same obsidian source.

Ion beam modification and analysis of multilayered metal and ceramic nanocomposites, SUR

Researchers from VINČA Institute of Nuclear Sciences, Belgrade, Serbia and the Jožef Stefan Institute, Ljubljana, Slovenia are investigating radiation stability, structural and compositional modification, chemical interaction and new phase formation in multilayered thin film structures due to ion irradiation. This research aims to develop new radiation tolerant, tribological and bio-medical materials. For their experiment, metal or metal-nitride multilayers, deposited on (100) Si wafers, were irradiated with high dose Ar or Xe ions. Structural studies were done by RBS, TEM and HRTEM, XPS, XRD, nanohardness and electrical resistivity measurements were performed.

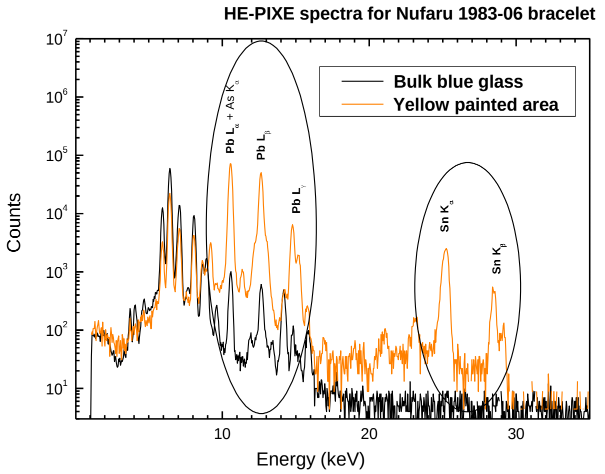
Their results gave the following conclusions:

- AlN/TiN multilayers remain stable for Ar dose up to 4×10^{16} ions/cm^2, when only an increase of the mean grain size 1 individual layer is detected. For extreme Ar doses and heavy Xe irradiation growth of individual AlN and TiN grains is highly pronounced, although new phases are not formed
- In case of (Al/Ti)x5/Si system:
  - significant ion beam mixing (IBM) effect at RT
  - highest IBM in the region of the projected ion range
  - increase of grain size, lamellar structure
  - at the highest ion dose gamma-AlTi and $AlTi_3$ phases appear
- In Ni/Ti multilayered system ion irradiation at RT induces intermixing and formation of amorphous Ni-Ti phase. Multiple interfaces enable direct study of the effect with respect to the ion range.

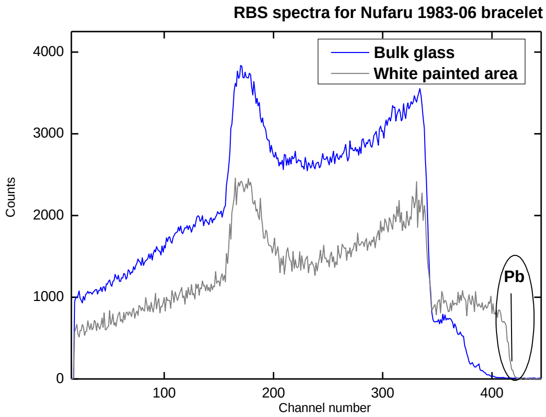
Byzantine Glass Bracelets Investigations Using External IBA, HZDR

Roxana Bugoi of the National Institute for Nuclear Physics and Engineering, Romania visited HZDR to determine the chemical composition of glass bracelet fragments excavated in Nufăru, a Byzantine site from Dobrogea (10th-13th century A.D.) This study also aimed to identify the pigments used for the decoration of glass fragments and colouring agents for the glass itself. Byzantine glass technology is a subject that has been relatively little studied up to now and this research is expected to help determine whether these bracelets were manufactured in imperial workshops located in Constantinople and/or Thessaloniki, and further imported to Dobrogea or whether they were locally made. The results have shown the analyzed glass bracelet fragments were of soda-lime-silica type with all fragments featuring very similar recipes. The determined compositions point towards the manufacturing of the bracelets using the same raw materials and similar working procedures.

From their potash and magnesia content, it was deduced that the bracelets belong to the mixed natron-plant ash type, a transitional type of glass that was typical for the 10th century A.D. Glass coloring was due to the presence of manganese (brown, black and violet), cobalt (blue) and iron (green) ions. Lead-tin yellow was identified as the pigment providing the yellow decorations, while lead white was responsible for the white superficial paint.



Yellow paintings on a bracelet surface produced by lead-tin yellow ($PbSnO_3$)



White paintings on the same bracelet surface produced by the use of lead white ($(PbCO_3)_2 \cdot Pb(OH)_2$)

Picture of the bracelet

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Ionoluminescence analysis of quartz for forensics applications, SUR

Silvia Calusi of INFN, Florence, Italy visited SUR and conducted an ionoluminescence analysis of quartz. Quartz is found in the form of small grains in most soils, and can be used as evidence in forensic investigations. Various properties of the grains, including the topography or the elemental composition, can be useful to assess the provenance of the grains and therefore test the validity of an alibi. Ion Beam Analyses can be used to assist with this task since these techniques are non-destructive and because of their excellent sensitivity to trace/light elements as well as their spatial resolution for mapping inclusions within the grains. In this work, the ability to distinguish the provenance of the grains by the luminescence emitted during irradiation (Ion Beam Induced Luminescence - IBIL) is evaluated. The IBIL technique can be used simultaneously with other IBA techniques, can give information on the crystalline structure, thus some luminescence features can be characteristic of the sample provenance.

Grains from four different locations were analysed:

1. Woburn, UK
2. Oswestry, UK
3. hypothetical deposition site, Australia
4. hypothetical murder site, Australia

At least 10 grains were analysed from each sample site. The grains were washed prior to analysis, placed on an adhesive carbon stub and analysed using a 2.5 MeV proton microbeam, with ~ 5 µm spot size and a current of ~3 nA. The stubs were mounted in the vacuum chamber and the light collected by means of an optical fiber (QP-1000-2-UV-BX) and directed to an USB cooled spectrometer (QE 65000 by Ocean Optics), see figure 1. The grains were located by means of the Si distribution map acquired by the PIXE detector.

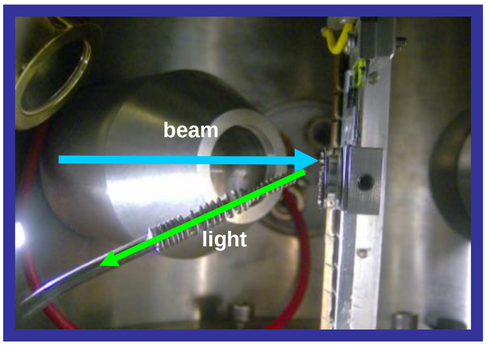


Figure 1 Sample mounted in the vacuum chamber, the optical fibre is positioned directly in front of the impact point of the beam over the sample.

Just looking at the features of the luminescence spectra we can just distinguish between the two Australian samples (3 and 4), which present quite different IBIL spectra (see Figure 2):

- Grains of sample 3 emit low intense luminescence and with slight different characteristics
- Grains of sample 4 emit more intense luminescence with two defined bands

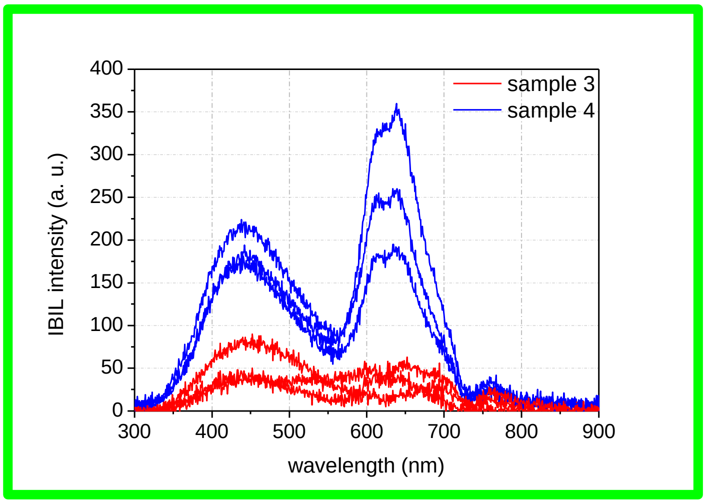


Figure 2 Luminescence spectra from the two Australian samples (3 and 4).

More accurate analyses of the spectra are in progress by using the Canonical Discriminant Functions method, first results are very promising for the distinction between all samples (see figure 3).

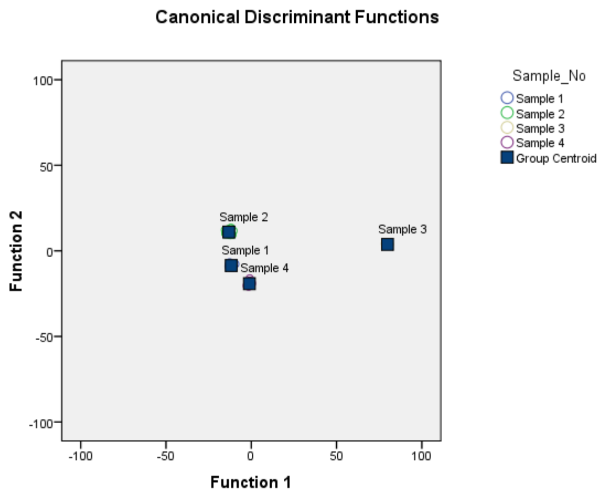


Figure 3 Results from the Canonical Discriminant Functions analysis applied to the luminescence spectra emitted from the grains of four different samples.

From these results we can conclude that IBIL technique can help in the assessment of the provenance of the quartz grains, when used contemporaneously to other Ion Beam Analysis techniques.

Ion implantation into silicate glasses for photonics devices, HZDR

P. Nekvindova and B. Svecova from the Department of Inorganic Chemistry, Faculty of Chemical Technology, Institute of Chemical Technology, Prague visited HZDR to develop photonics material. The research includes the preparation and characterization of thin optical films suitable as optical waveguides, optical lasers, amplifiers or sensors in the silicate glasses and crystalline materials like $LiNbO_3$ and Al_2O_3. In the year 2010, they focused mainly on the silver ion-implantation into various types of silicate glasses. Silicate glasses containing silver have promising optical properties for photonic applications, such as planar optical waveguides or all-optical switches. The main goal of this project was, with help of different techniques, to study (oxidation) states and behaviour of the incorporated silver with special regards to the application in photonics devices.

Concentration depth profiles of Ag^+ ions were measured by various methods: Rutherford Backscattering Spectroscopy (RBS), X-ray Photoelectron Spectroscopy (XPS), and Electron Microprobe Analysis (EMA). The measured data were compared to the data simulated by SRIM 2008. Waveguiding properties of fabricated samples were measured by a Metricon Prism Coupler at different wavelengths. Formation of nanoparticles induced by the post-implantation annealing of the samples, done around transformation temperature of the used glasses for 5 hours, was investigated by Transmission Electron Microscope Analysis (TEM) and UV-VIS absorption spectroscopy. Non-linear optical properties were measured by Z-scan technique at Vienna University of Technology.

SUMMARY OF RESULTS:

- The as-implanted glasses went from yellowish to pink, which indicates the formation of various types of metal nanoparticles depending on the type of the implanted substrates and/or the type and conditions of the implantation
- The advantage of silver doping is that it allows a possibility of comparing the as-implanted glasses with layers fabricated by silver ion-exchange, where significant difference appeared between Ag concentration depth profiles and the presence of Ag nanoparticles
- The promising non-linear optical properties of the prepared thin layers were found to vary depending on the type of glasses used

µ-spot analysis of experimental ceramics, HZDR

Johannes H. Sterba of the University of Technology, Vienna, Austria has performed micro-spot analysis of experimental ceramics at HZDR. Provenancing of ancient ceramics is a highly important scientific tool for archaeological studies. In general, ceramics are not made from the original clay, as it can be found in deposits. To produce the needed physical properties in the finished product, the clay has to be either tempered by adding sands or biological materials or levigated, to remove the coarse fraction. Thus, the chemical composition of the finished ceramic differs from the composition of the original clay bed. To overcome this obfuscation, any information that can be gained about the temper used is useful. In a small series, several pieces of ceramic were produced from known clay and tempers and the resulting ceramics analysed by INAA. As many attempts to physically separate the temper from the clay matrix have failed, µ-spot analysis of temper inclusions were performed at the µ-PIXE (Microbeam Particle Induced X-Ray Emission) facility in Rossendorf and by LA-ICP-MS (Laser Ablation Inductively Coupled Plasma Mass Spectroscopy) in Aberystwyth. It could be shown that from a small number of measurements, a general impression of the temper used could be gained, showing if the temper consists mainly of quartz or other main components. With this information, dilution calculations can be greatly facilitated, and a close resemblance of the chemical composition of the clay matrix can be calculated.

Figure 1: Experimental ceramic tile used for spot measurements. The small black temper inclusions (basaltic sand) can clearly be distinguished from the clay matrix.

State-of-the-art provenancing of archaeological ceramics uses dilution calculations as introduced by Mommsen et al. (1988) and Beier et al. (1994). The main argument is that, since most tempers in use in ancient times (mainly quartz sands and organic fibres) are not visible to bulk analytical methods (i.e. INAA), they can be considered as a dilution because the temper only adds mass without changing the characteristic elemental composition of the original clay material. e applicability of this approach has been shown numerous times and only recently with the help of experimental ceramics (Sterba et al. 2009).

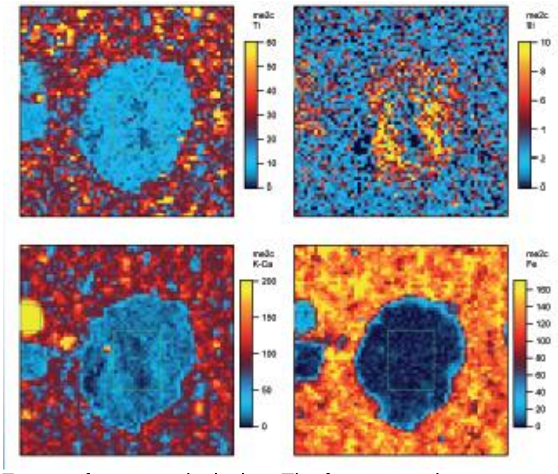


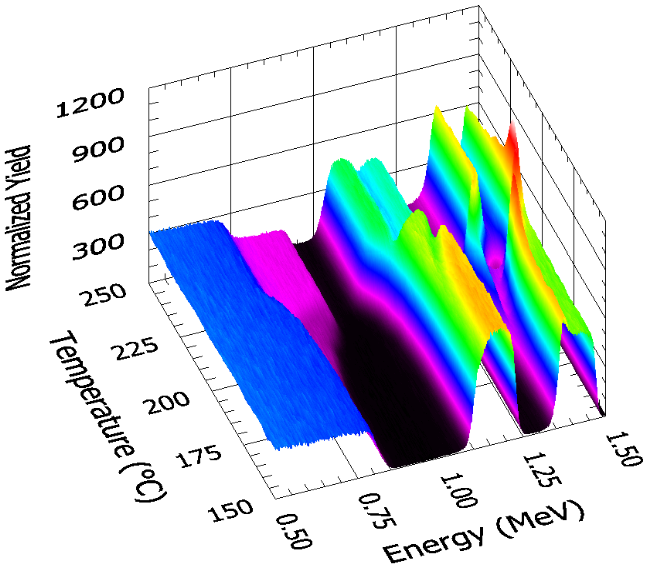
Figure 2: Typical μ-PIXE scan of a temper inclusion. The four maps show concentrations of four elements.

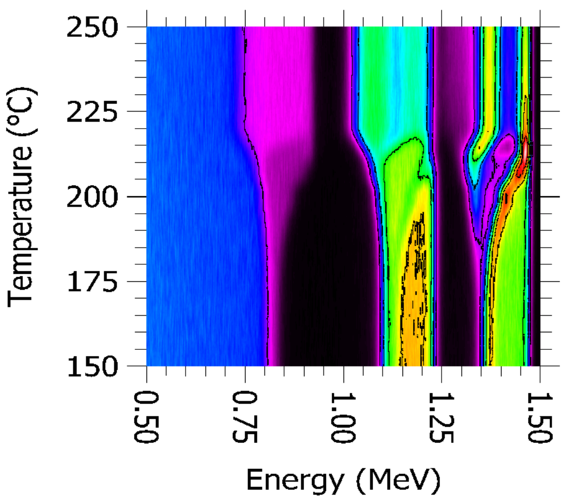
However, there are cases were the tempers in use do contribute to the overall composition significantly. Furthermore, information about the composition of the temper alone can provide valuable information for provenancing (i.e. Tschegg et al. 2008). With the help of μ-spot analysis of the temper inclusions, important information on the approximate composition of the temper can be gained in a non-destructive way. As a first step to use μ-spot analytical techniques, the comparability of different μ-spot methods and bulk analytical methods needs to be shown. The correlations of the three different methods used were analyzed to prove that a comparison is valid. The most important information for the dilution calculation is if the temper contributes significantly to the bulk composition. It was shown that the ratios of elements measured in the temper by μ-spot analysis with the bulk composition of the red shard. The quartz temper does not contribute to the bulk composition and can thus be safely factored out. The basaltic clay, however, significantly changes all measured elements. In the worst case, this information leads to a dilution calculation that has to ignore all elements with significant contributions. However the information gained could potentially also help in mathematically “removing“ the temper from the clay and show that, although different tempers were used, two sherds were made from the same clay bed.

JOINT RESEARCH ACTIVITIES (JRA)

In situ real-time RBS at KUL

A real-time, *in situ* RBS set-up has run its first tests at KUL. The solid-phase reaction of a sample with a thin Ni+7% Pt film deposited onto a Si<100> substrate has been monitored during a ramped annealing (ramp rate of 1°C/min) at temperatures ranging between 150°C and 500°C. The spectra were accumulated every minute by a ruggedized PIPS detector positioned at a scattering angle of 140°. The 3D plot shows the respective backscattering spectra which were accumulated as a function of temperature. For the sake of clarity, a 2D projection (in which the scattering yield is represented by a colour scale) is included as well. The spectra clearly indicate the progress of the reaction between the Ni-Pt film and the substrate. From these spectra, which can be analyzed by rapid data processing software based on artificial neural networks, the full reaction scheme, redistribution of the elements and the reaction kinetics can be deduced. Moreover, the continuous probing, i.e. the real-time approach, reduces the risk of overlooking transient but crucial stages to a minimum. Hence, this technique offers a time-efficient approach to study various kinds of kinetic phenomena in a quantitative way, e.g. growth kinetics during thin film reaction, elemental diffusion, damage recovery, etc.





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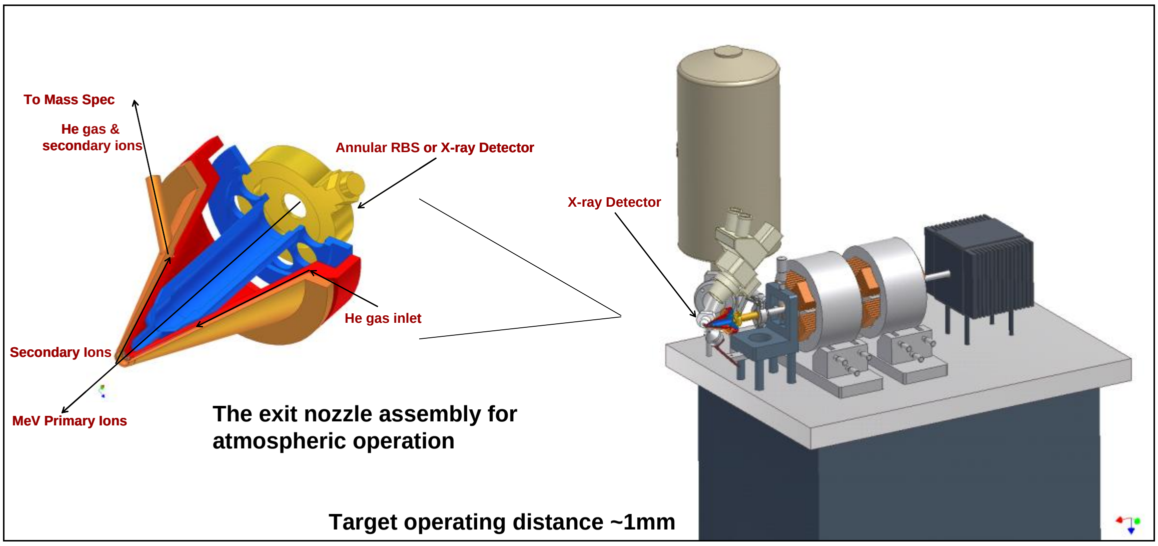
MeV SIMS project at Surrey given cash infusion by EPSRC: potentially bringing ambient pressure SIMS to reality

The Engineering and Physical Sciences Research Council (EPSRC) in the United Kingdom has awarded the Surrey Ion Beam Centre with a grant designed for “Promoting Cross-Disciplinary Research: Engineering and Physical Sciences and Economic and Social Sciences” for SUR’s continued work on Ambient Pressure Mass Spectrometry at the Sub Micron Scale (here is a link to EPSRC’s website providing details). Research into MeV SIMS as an Ion Beam Analysis technique began within work package 7 in SPIRIT and the technique has already yielded many impressive results, including the first simultaneous SIMS, PIXE, and RBS measurement of an organic sample.

EPSRC sees potential for exploiting this technique as an ambient pressure ionization method for desorbing molecular ions for mass spectrometry studies of samples that cannot be held under vacuum. Development of the ambient MeV SIMS equipment is scheduled to begin in July, 2011.



Proposed design for the extraction optics of the mass spectrometer

CDT-Lite project funded by EPSRC at Surrey

EPSRC has also funded a new Centre for Doctoral Training on the Application of Next Generation of Accelerators. This project will recruit 10 doctoral researchers per annum to research in this field and is shared between the University of Surrey, Strathclyde, Huddersfield and Queens University Belfast.

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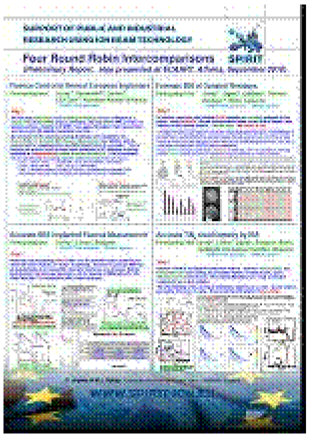
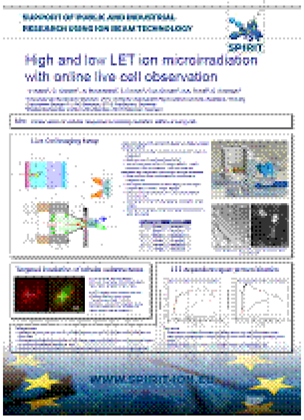
JRA and Networking posters presented at the SPIRIT midterm review
(click on link to download)

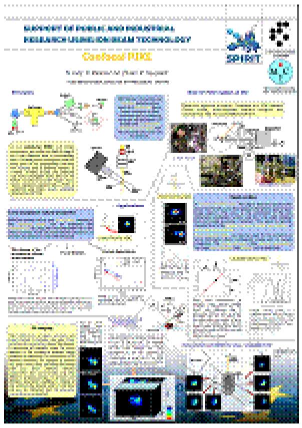

Networking

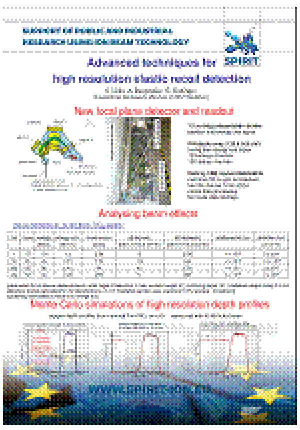

Quality Assurance

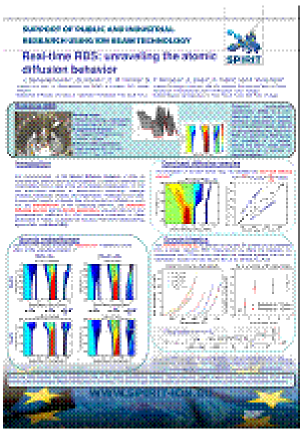

Round Robin

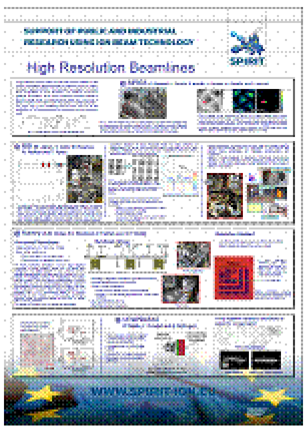

Damage of Si


High/Low LET on Cells


Confocal PIXE


High-Res Elastic Recoil


Real-Time RBS


High-Res Beamlines

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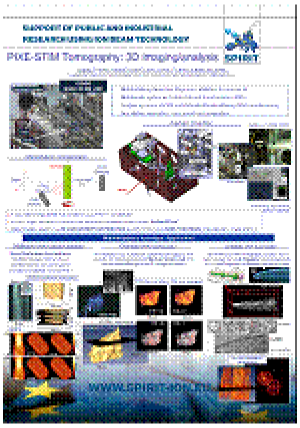
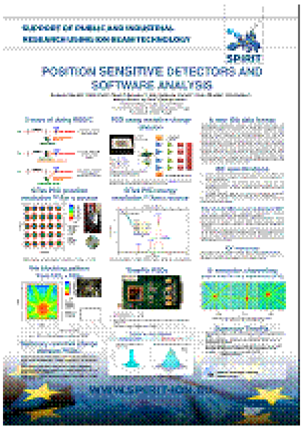
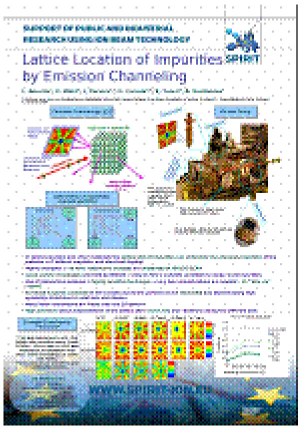


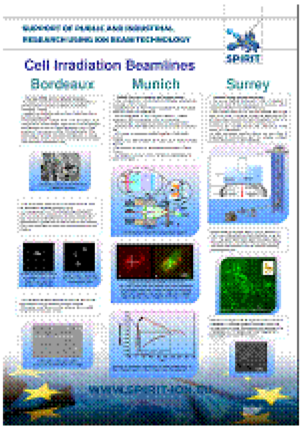
3D PIXE-STIM



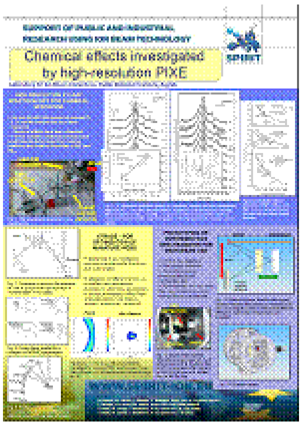
Position Sensitive



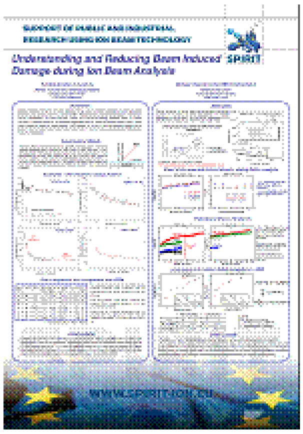
Emission Channelling



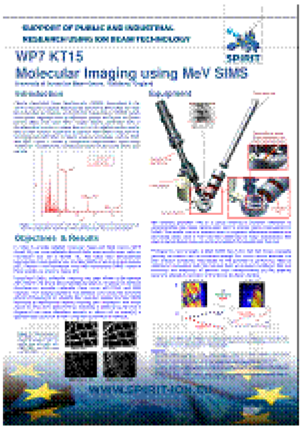
Cell Irradiation



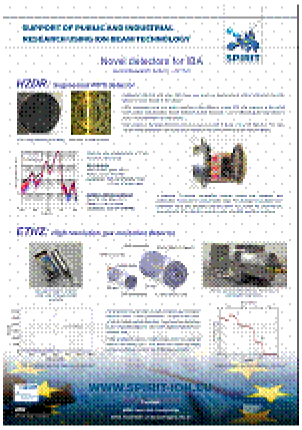
Chemical Effects PIXE



Reducing Beam Damage



MeV SIMS



Novel Detectors

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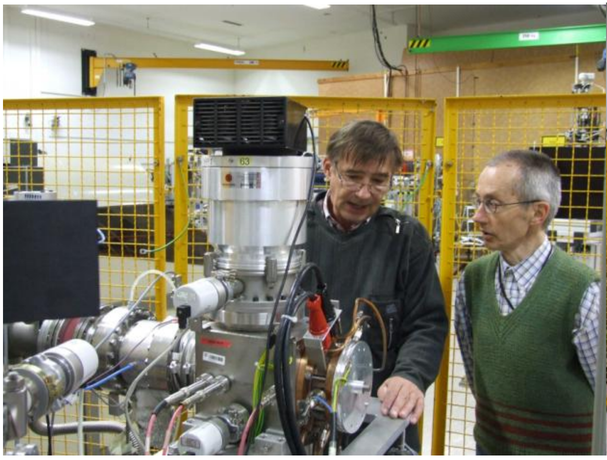
NETWORKING AND EVENTS

Foresight Review at the Midterm Review Meeting, Farnham Castle

The SPIRIT consortium will produce a Foresight Review setting out the opportunities and pathways towards developments and applications where ion beams can make real differences and offer enhanced capability over or in conjunction with other techniques. The preparation of the Foresight Review involved inputs from all of the SPIRIT partners participating in the Midterm Review Meeting at Farnham Castle.

In order to facilitate the discussion the delegates were divided into four expert groups. Each group focussed on a different aspect of ion beam technology: Group 1, the applications of ion beams to materials analysis; Group 2, the application of ion beams to materials modification through irradiation and implantation; Group 3, the instrumentation needs; and Group 4, considered new methods and better beams. The groups were asked to consider what they felt we would be doing with ion beams on a 10-20 year time scale, and what we will not be doing any more; what new developments will be needed to start now to make these things happen; what will competitive technologies be able to do. The results of these discussions were recorded and will be used to carry out the planning for the SPIRIT Foresight Studies, which is aimed at charting emerging and future needs of the ion beam community and its users. The Foresight Review will be discussed with the wider community and will be used to inform national EU policy and direction.

JSI Technician Exchange Visit to HZDR, Rossendorf



Zvonimir Grabnar (picture on the left, standing to the right of Andreas Vetter, HZDR) and Mirko Ribič (picture to the right), both technicians at JSI, visited Helmholtz-Zentrum Dresden-Rossendorf (HZDR) April 11 to 15 for the SPIRIT technician exchange program.

Under the dedicated guidance of their colleague Andreas Vetter from HZDR, they were introduced to the ion accelerator facilities in Rossendorf. Mr. Vetter explained a number of details relating to the maintenance of tandetron accelerators and particularly the ion sources. Among many “little secrets” of the ion sources, the lithium exchange canal heaters and thermocouple redesign at HZDR was explained to Mirko and Zvonimir. Charging of the canal with lithium metal in the form of thick wire segments instead of granules was demonstrated. This approach will reduce the number of required filling-melting cycles during the charging of the Li exchange canal currently required at JSI before an effective He beam production is achieved.

RBI Technician Exchange Visit to SIBC, Surrey

This April, SPIRIT’s technician exchange program sent Damir Spanja from RBI to visit SUR’s facilities. During his visit, Damir was exposed to Surrey’s laboratory practices. He was specifically exposed to the running of SUR’s tandem accelerator, source maintenance, and procedures used for implantation. The beautiful weather in England that week made Damir’s busy and informative week much more enjoyable. Thanks to the expert instruction of Dr. Vladimir Palitsin, Research Fellow at SUR, Damir can now return to his lab and apply his new found knowledge.

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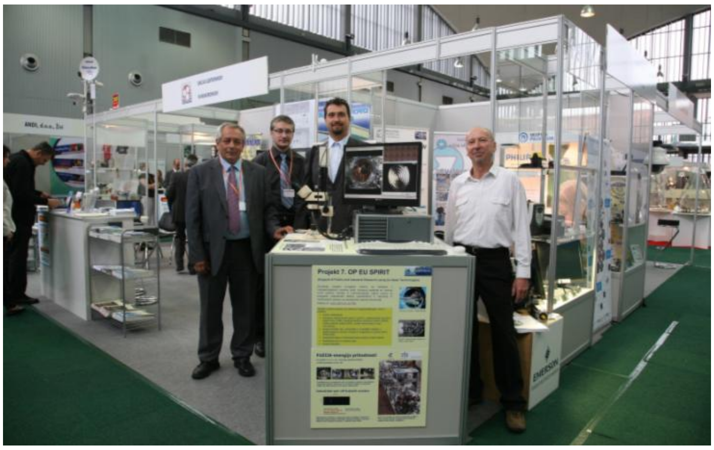
SPIRIT industry day at the LOS 2011 fair

Between the 2nd and 5th of June 2011, the Slovenian Chamber of Craft and Small Business together with the Ljubljana Exhibition and Convention Centre organized the first Ljubljana Craft and Small Business Fair (LOS). Several departments of the Jožef Stefan Institute were present at the event. Among them, the Microanalytical Centre presented ion beam technologies with an emphasis on the industrial applications and the user access opportunities within the SPIRIT consortium.

Zdravko, Nataša and Primož in front of the SPIRIT backdrop at LOS 2011 fair

On the first day, the Committee for science and technology of the Slovenian Chamber of Craft and Small Business organized a session with presentations from Institutes and Universities. Dr. Primož Pelicon introduced MIC and SPIRIT. The presentation and the exhibition drew the attention of many visitors. Some were attracted by the SPIRIT peppermint sweets as well as the microscope camera displaying a micromechanical object on a Si wafer produced by Proton Beam Writing; however, many came with serious questions about applications of fast ion beam technologies. There were approximately 450 exhibitors at the fair and with some 6000 visitors this proved to be an excellent opportunity for SPIRIT to advertise to new users.



The stand demonstrating Proton Beam Writing technology, fast ion technologies and SPIRIT at the Ljubljana Craft and Small Business Fair. From left: Janez Škrlec, president of the Board of Science and Technology at Slovenian Chamber of Craft and Small Business, Zdravko Siketić (Spirit postdoc at JSI), Primož Vavpetič (head of accelerator operation at JSI) and Zdravko Rupnik (automation engineer at JSI).

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JANNUS Laboratory Announcement

The JANNUS laboratory was officially created the 1st January 2011 and the official inauguration will be held the 27th June 2011 with the presence of Bernard Bigot, the Director of the French Energy Atomic Commission, Guy Couarraze, the President of the Paris-Sud (Orsay) University and M. Martino, Director of the National Institute for Nuclear Physics and Particle Physics at the CNRS.

PERSONNEL

Job Opportunity at

Visit http://www.spirit-ion.eu/Jobs.html for links to job opportunities in the SPIRIT community

New Project Manager for SPIRIT

After more than two years of dedicated service as SPIRIT Project Manager, Dr. Michael Zier (pictured above) of HZDR has taken a position in industry. Dr. Kay Potzger (pictured below) has been nominated by HZDR as Michael's successor. The entire SPIRIT community sends its heartfelt appreciation to Michael for his tireless efforts in making SPIRIT the success it is today.

Kay has been employed by HZDR since 2004. Kay spent his postdoc at the Hahn-Meitner-Institute Berlin (now HZB), Ion beam lab. For the past several years he has been the project group leader for interface magnetism at HZDR, and he has formerly been active in nuclear solid state physics.

SPIRITnews

A new arrival for SUR!!!

Congratulations to Melanie Bailey of the Surrey Ion Beam Centre for the successful delivery of Oliver!