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## FAIR Joint Core Team (FJCT)

### *Status of the FAIR Project*

Boris Sharkov (FJCT)

Dear FAIR colleagues,

With this report I have the pleasure to extensively report on the latest developments within the FAIR project.

First of all I take the opportunity to inform you about the official governmental decision on the Russian participation in FAIR, signed by Premier Minister Vladimir Putin on February 27, 2010. With an official status as of March 5, 2010, this decision clears the way for the "State Atomic Energy Corporation - ROSATOM" to become the Shareholder in the future FAIR GmbH. This information has officially been given also to the German Federal Ministry of Education and Science (BMBF) and to the President of the Helmholtz Association, Prof. Jürgen Mlynek.

This news constitutes the end of a slight uncertainty whether the project can count on the amount of € 178 Million of Russian money, which had been announced by the Russian government already in the year 2008. The worldwide financial crisis made it necessary for the Russian partners to look into the matter again and to re-evaluate their long-term research commitment and the distribution of their respective overall budget.

Besides this important milestone for the financing of FAIR, there is also a lot more information I would like to report on:

#### **FAIR Founding Documents**

Let me continue with the procedure of signing the FAIR Convention, a precondition to have founded the company "FAIR GmbH". The German Federal Ministry of Education and Science (BMBF) lately informed us that the German Foreign Office has completely taken over the process of translation and signature of the FAIR founding documents. The following activities have already been done or will be undertaken soon:

- The Foreign Offices of France, Russia and Spain officially sent back their translations of the FAIR founding documents to the German Foreign Office (FO).
- analysis of the comments made by the three partners and resolution of any remaining questions via bilateral contacts,
- the final acceptance by the German FO of the five language versions of the founding documents (English, French, German, Spanish, Russian),
- the final endorsement of the documents by ISC
- initialling of the FAIR founding documents during a cross-checking conference

Provided that there are no further unexpected delays on part of the German and foreign authorities a prudent estimate for signature of the Convention is late summer/early autumn 2010. I would like to point out that our German ministry is doing their utmost to speed up the process where they can and I would like to thank them for these efforts.

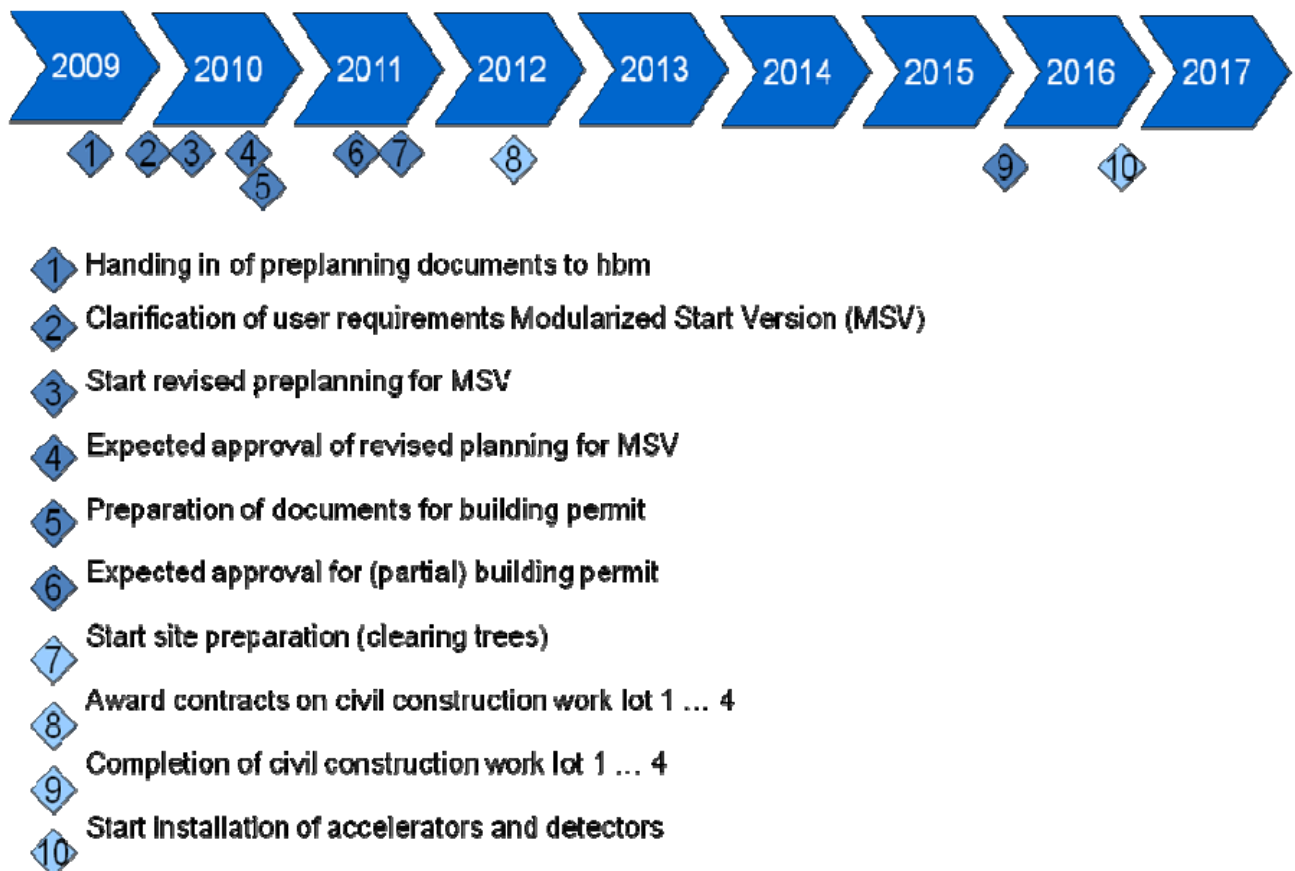
## Status of FAIR Site & Buildings (Civil Construction)

The documents for the civil-construction planning of the full FAIR project were handed over to the "Hessisches Bau Management" (HBM) in September 2009 for review. These planning stages followed the German "ZBau" procedure and all steps were in agreement with the original decision of the FAIR International Steering Committee (ISC) to prepare the Civil Construction (CC) planning for the full project right from the beginning.

Shortly after the approval of the "Green Paper" and thus the FAIR Modularized Start Version (see NL No. 14) by ISC in October 2009 representatives from all authorities involved in the FAIR site and building issues agreed to follow a fast process in reviewing and approving the revised civil construction needed for the FAIR modules 0 - 3. Since then the FAIR CC group has been preparing revised contracts for the architects and engineering companies. In parallel, the new hall for APPA experiments (now part of FAIR module 1) was prepared to include the users' requirements for the BioMat, SPARC, WDM and HEDGeHOB collaborations.

All necessary steps mentioned above have sequentially to be carried out according to the German regulations, with more than a dozen external authorities involved.

The following diagram displays the envisaged roadmap for obtaining the FAIR Site & Buildings permit, focussing on the appropriate steps in the upcoming two years (dark blue items):



In spite of some unwelcome delays in the schedule for civil construction there are, however, some very promising developments to be mentioned:

- As already mentioned, the colleagues from Russia, France and Spain completed the translations and their respective Foreign Offices sent them to the German FO.
- An external consultant has been hired to assist the FAIR JCT to finalise structuring the FAIR GmbH.
- Colleagues from the FAIR JCT and GSI are mutually developing the business management contracts, investigating optimum solutions for the interface definition.
- The work to raise additional funds continues.
- Efforts by the FAIR JCT also focused on raising the level of in-kind contributions for the accelerator up to 100 % by starting individual negotiations with the FAIR Partners Countries and the participating institutions.
- Discussions about the technical and organisational matters concerning the construction of the accelerators and the experiment related accelerator infrastructure have been intensified within the last months and the major challenges have been identified.
- Preparations for the dedicated Memorandum of Understanding between collaborations are ongoing.
- After its incorporation FAIR GmbH will get full rights to act as recipient of cash contributions from international partners and to then start the tender procedures for civil construction and the series production of accelerator components.

In summary I hope to have given a clear picture of how the FAIR project is currently progressing, which the latest achievements are and where difficulties have to be overcome. I am confident that latest developments reveal a clear status of the project and that the above roadmap demonstrates a reliable time schedule.

I am looking forward to providing you with further good news as soon as possible.

Yours sincerely,



Boris Sharkov  
Leader FAIR Joint Core Team

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### ***3<sup>rd</sup> meeting of the FAIR Machine Advisory Committee (MAC) at GSI***

Oliver Boine-Frankenheim (GSI)

February 10-12, 2010, the 3<sup>rd</sup> FAIR MAC meeting was held at GSI. The agenda focused on recent progress related to the SIS-100 magnet design, SIS-100 machine protection issues, the CR/HESR storage ring concept and to an antiproton beam accumulation scheme for the HESR.

The presentation of the SIS-100 dipole by Egbert Fischer covered the measurement results for the first straight full size prototype magnet. Important magnet parameters such as the AC losses and the magnet field errors well match the estimations. The next step will be constructing and testing a curved dipole with a single layer coil made of high current superconducting cable. This activity is fully endorsed by all MAC committee members. They also considered the purchase of a prototype an urgent issue. In addition, the committee requested a particle tracking campaign in order to verify the field errors being tolerable.

Peter Spiller presented machine protection measures for SIS-100: Uncontrolled beam losses could damage machine components, the protection of which is of particular concern in a superconducting machine where repair times are long. The presentations pointed out that the unavoidable residual beam loss at the septum wires during slow extraction in SIS-100 magnets requires special design considerations. The committee recommended to creating a special "machine protection working group" to analyse, coordinate and organize the various aspects of accelerator safety.

Markus Steck presented the new CR/HESR antiproton storage ring concept. A detailed study investigated various options of running the facility without the RESR ring. In the first step, with the construction of modules 0 - 3, an antiproton accumulation will be performed via barrier buckets and stochastic cooling in the HESR. The committee strongly supported this concept. Two presentations from Dieter Prasuhn und Hans Stockhorst (both FZ Jülich) covered the issue of the HESR accumulation scheme together with that of vacuum and beam stability.

Overall the committee acknowledged considerable progress that has been made in the FAIR project since the last meeting in July 2009. Appropriate steps have been taken to define a "start version", compatible with available funding without unacceptably compromising the discovery potential.

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## ***EU design study “DIRAC secondary beams” successfully completed and approved by the Commission***

Florian Weißbach (FJCT)

The design study “DIRAC secondary beams” was an R&D project towards FAIR, funded by the European Commission (EC) under the 6<sup>th</sup> Framework Programme (FP6) with 9 Million Euro. It contained work packages on PANDA, NUSTAR, HESR, and SIS100, covering e.g. detector components, magnet designs, beam cooling, NEG coating, targets, and beam dynamics, from feasibility studies via simulation tools to prototypes.

The project lasted four years, starting in February 2005. The Consortium around GSI consisted of 30 partners. The last Annual Report and the Final Report were submitted to the Commission in spring 2009 and subsequently the financial reporting was completed. The Commission accepted the reports in February 2010 and released the final payment which is now being distributed among the Consortium members.

The Consortium successfully achieved all milestones and deliverables such that the maximum EC budget of 9 Million Euro (contract number FP6 515873) could be fully claimed by the Consortium. The funding from the Commission constituted a crucial support to important R&D work for FAIR.

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## Status Reports from the Departments

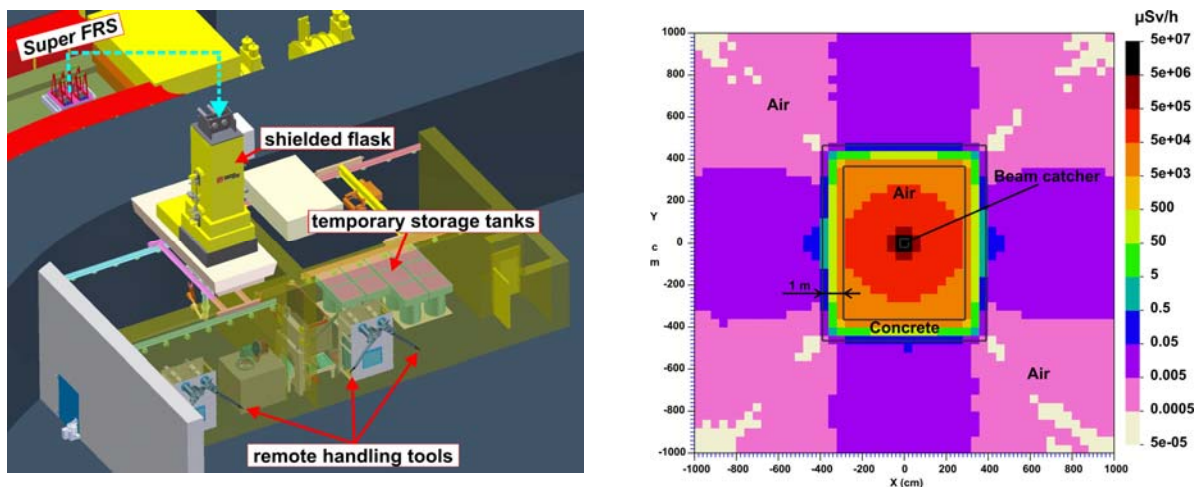
### *Radiation Protection for FAIR: Planning of the hot cell for maintenance*

Georg Fehrenbacher (GSI)

Operation of FAIR is inevitably associated with the radioactive activation of components and targets where the primary beam interacts directly with materials. Activated components which have to be exchanged or maintained after an irradiation period (e.g. from the Super-FRS or the antiproton production area) cannot be handled by personnel directly. Therefore a working group was founded to define the technical layout of a hot cell for handling these components using so-called remote-handling methods. In addition, support of external specialists in nuclear technology was engaged.

For FAIR the use of the *hot cell technology* is planned with a function as follows: The component in question (e.g. the production target or the beam catcher) will be moved from the operation position into a shielded flask, which - on its part - will be moved to the roof position of the hot cell. The component within the flask will be lowered to the handling position in the hot cell, where it can be repaired or moved to the shielded position for radioactive decay (see fig. 1/left). Reparation of the components will be carried out by means of remote-controlled tools. The activated components, preliminary stored in the radioactive decay position, will be removed when the activity levels dropped below a certain prescribed limit. In the next step they will be transported to the residual and clearance building and stored there in specific decay areas for a longer period.

The shielding layout of the hot cell was developed on the basis of activation calculations for components of the Super-FRS and the antiproton production area. The calculated radionuclide distributions of the components were used as radiation sources for estimating the shielding of the transport flask, the hot cell and the storage container in the hot cell. An example for the shielding layout for the hot cell is given for a situation where an activated beam catcher of the Super-FRS is positioned in the centre of the hot cell (see fig. 1/right). The shielding wall thicknesses are sufficient to lower the dose rates outside the hot cell to a low level.



**Figure 1:** Layout of the Super-FRS facility with the hot cell and the decay area (left) Residual dose rates in- and outside the hot cell. The beam catcher is situated in the centre of the hot cell. The activity is computed for a realistic scenario of four periods of irradiation with a  $^{238}\text{U}$  beam of 1.5 GeV/u energy and an intensity of  $10^{12}$ /s over 90 days with subsequent cooling times of 3 days after each block. The assumed wall thickness is 1 meter (right)

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## FAIR Experiments

### *Board of FAIR Collaborations (BFC) constituted*

Peter Senger (GSI)

Representatives from the four scientific pillars of FAIR (APPA, CBM, NuSTAR and PANDA) met to discuss common issues arising from the upcoming foundation of FAIR. It was agreed to form the Board of FAIR Collaborations (BFC) to discuss FAIR experimental affairs and joint initiatives in regular meetings. The BFC should strengthen the scientific community within FAIR and help to coordinate research activities and funding issues. It was decided that two delegates represent each pillar in future meetings.

The picture shows the representatives at the constituting meeting on March 3, 2010 at GSI.



From left to right: Christoph Scheidenberger (NuSTAR), Juha Äystö (NuSTAR), Dieter H.H. Hoffmann (HEDgeHOB/APPA), Peter Senger (CBM), Yuri Zaitsev (CBM), Ulrich Wiedner (PANDA), Reiner Krücken (NuSTAR), Klaus Peters (PANDA), Marek Pajek (SPARC/APPA).  
photo: W. Niebur

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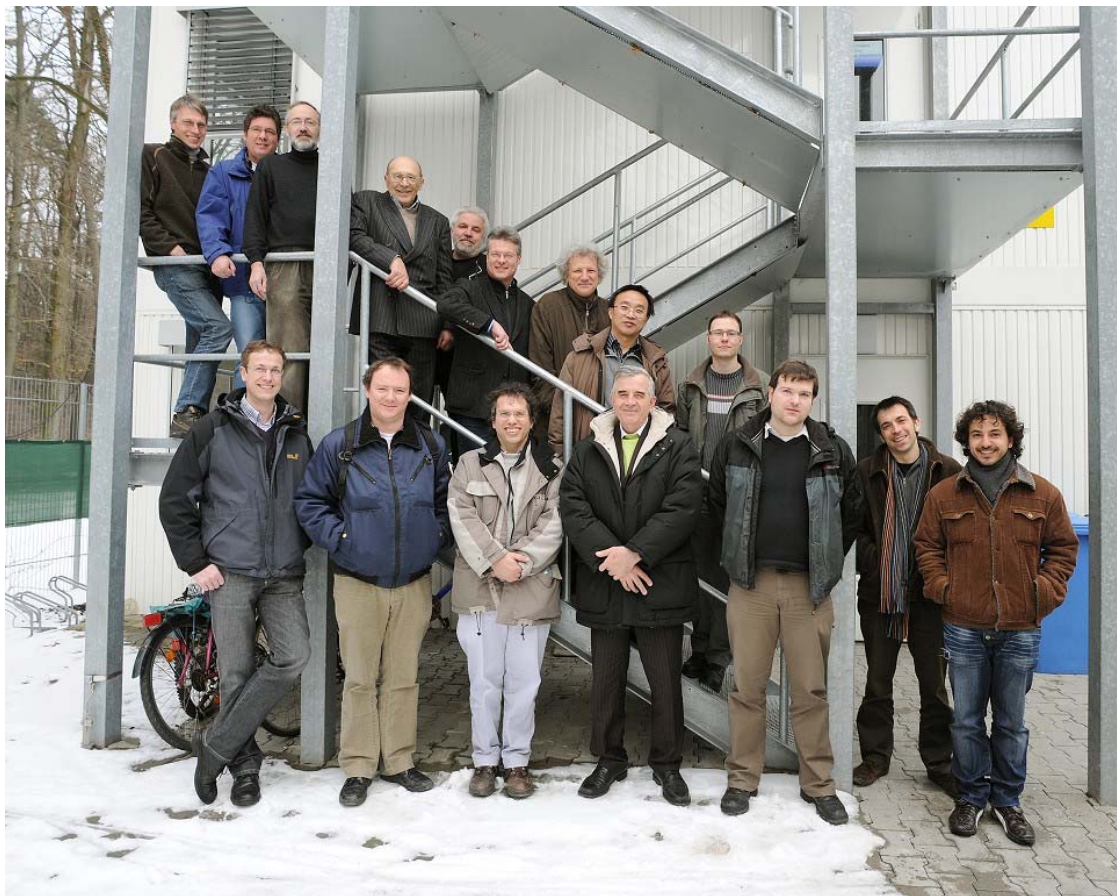


## ***Workshop on the development of ultra-light silicon tracking and vertex detection systems for CBM and PANDA***

Johann M. Heuser (GSI)

Large-area silicon detector systems for track reconstruction and micro-vertex detection are of central importance for precision hadron physics experiments such as CBM (Compressed Baryonic Matter) and PANDA (Antiproton Physics) at FAIR. A key requirement is ultra-low mass as prerequisite for high-resolution momentum measurements and the identification of rare short-lived decays. The exploration of novel technologies towards thin systems is the aim of the joint research activity "ULISI" (Ultra-light Silicon Detector Systems) taking place within the framework of the EU-FP7 Project "HadronPhysics2".

On February 17-18, 2010 participants in *ULISI* met at GSI for a common overview of the started developments.



*ULISI* workshop participants from INFN Torino, CNRS-IPHC Strasbourg, U Frankfurt, FZ Jülich, U Bonn, SE SRTIIE Kharkov, INR Kiev, CiS Erfurt and GSI. Photo: G. Otto

Three work packages were discussed: (I) an innovative microstrip tracking system with ultra-thin aluminum-polyimide cables (CBM Silicon Tracker), (II) an optimized hybrid pixel detector with low-power chip and thin epitaxial sensor (PANDA Micro Vertex Detector) and (III) an ultra-thin monolithic pixel detector embedded in polyimide flexible circuit board foils (CBM Micro Vertex Detector). The research benefits from synergies in several fields, including vertical integration and space technologies and their application to hadron and particle physics.

Further information on the research activity is available at

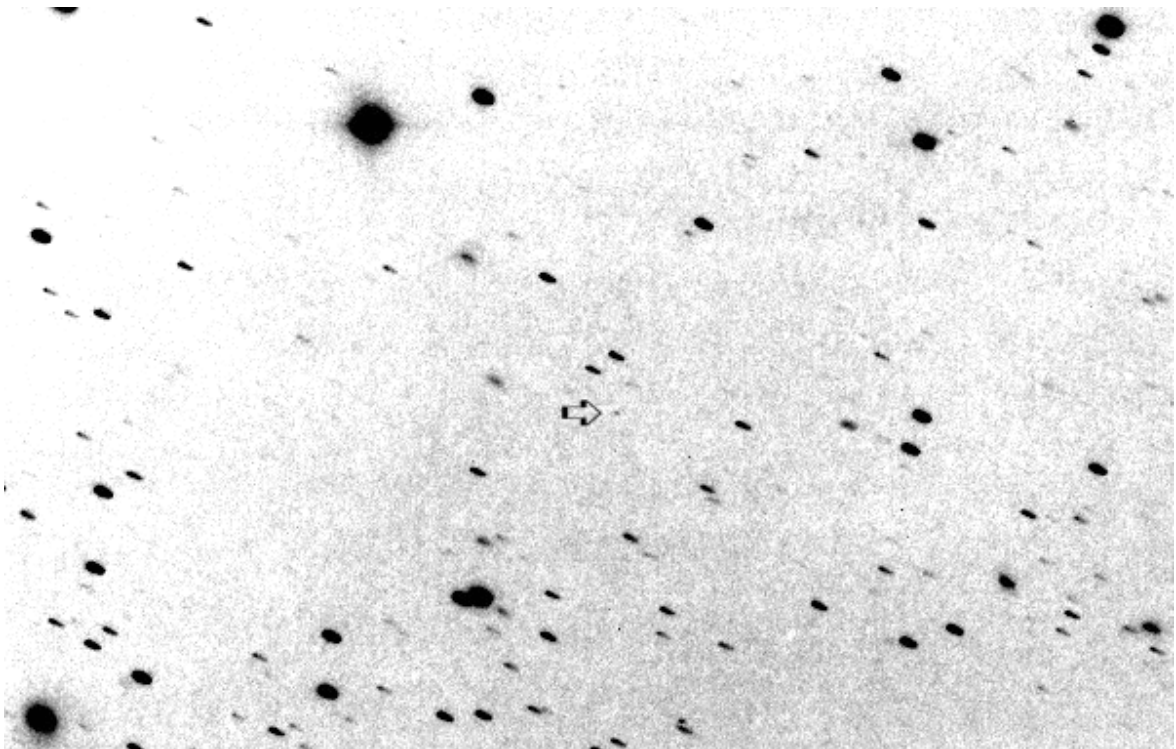
<http://ulisi-wiki.gsi.de>.

## FAIR Specials

### *FAIR eternalised in the Universe*

FAIR Joint Core Team

An asteroid which has been discovered in the year 2007 by the two astronomers Erwin Schwab und Rainer Kling in the [Taunus-Observatory](#) of the [Physical Society Frankfurt](#) has recently been named "FAIR". It took about 3 years for the asteroid No. 204873 to receive this name from the [Committee on Small Body Nomenclature \(CSBN\)](#) and it now recognises the global importance of the new science centre to-be near Darmstadt. During this period of time the [Minor Planet Center](#) in den USA carefully checked the properties and the exact location of the new small planet. With a diameter of about 1-2 kilometres it orbits between Mars and Jupiter in our solar system.



Asteroid FAIR among "colleagues"

Courtesy: E. Schwab/R. Kling, Taunus-Observatory of the Physical Society Frankfurt

To know more about asteroid "FAIR":

<http://ssd.jpl.nasa.gov/sbdb.cgi?sstr=204873;orb=1;cov=0;log=0;cad=0#elem>

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## ***7<sup>th</sup> SPARC Workshop and Collaboration Meeting, August 24-27, 2010, Lanzhou, China***

Reinhold Schuch (U Stockholm), and Thomas Stöhlker (GSI)

This symposium is organized by the **Stored Particles Atomic physics Research Collaboration (SPARC)** and the Institute of Modern Physics, Chinese Academy of Sciences (Lanzhou, China).

The following people represent the Organizing Committee:

- Xinwen Ma, Chair, IMP, CAS, Lanzhou
- Xiaolong Zhu, IMP, CAS, , Lanzhou
- Xiaohong Cai, IMP, CAS, Lanzhou
- Ximeng Chen, LZU, Lanzhou
- Chenzhong Dong, NWNNU, Lanzhou
- Dacheng Zhang, IMP, CAS, Lanzhou
- Guoqing Xiao, IMP, CAS, Lanzhou
- Thomas Stöhlker, GSI, Darmstadt
- Reinhold Schuch, Alba Nova, Stockholm University

The workshop will be at Lanzhou in China, on the campus of the Institute of Modern Physics, Chinese Academy of Sciences. The institute is located less than 2 kilometres from the Huanghe River (Yellow River), which runs across the city. The airport is 70 kilometres away from the city center and by car on the highway it takes about 50 minutes to reach the institute.

The SPARC collaboration has been formed to organize atomic physics experiments at FAIR in Darmstadt, Germany, and aims at joining expertise on atomic physics with highly charged ions on an international level.

This workshop will review the present status of the scientific, technical and financial issues of the SPARC collaboration and establish the forthcoming activities. Review talks with special emphasis on critical and super-critical atomic fields, ion-laser and ion-surface interactions will be presented along with recently proposed hot topics and new ideas for the research programs.

Conference topics in detail are

- Critical and super-critical atomic fields,
- ion-atom/molecule collisions at relativistic and non-relativistic velocities,
- HCI (highly charged ions) in traps and rings for spectroscopy,
- atoms/ions in intense laser fields,
- ion-matter interactions,
- laser–matter interaction,
- cross-link between atomic and nuclear physics,
- Laser spectroscopy

- Status of present/future heavy ion and storage ring facilities
- Novel instrumentation
- Organizational and financial issues

With regard to these topics we welcome any contribution for poster presentations and would like to encourage especially young researchers to join in. Abstracts of all accepted contributions (oral presentations and poster) will be published in the *Book of Abstracts* that will be distributed to all participants upon registration. The deadline for both, abstract submission and registration is June 1, 2010. Please address the organisers via the homepage and/or email:

<http://210.77.72.2/usr/yzwl1/sparc/sparc2010.htm>

[sparc2010@impcas.ac.cn](mailto:sparc2010@impcas.ac.cn)

The organisation has contract reservations at special rates at the neighbouring hotels listed in the webpage. All locations are in walking distance from the conference venue.

Finally please note, the the month of August is high tourist season, a fact which implies to make your reservation as early as possible.



The poster features a red background with a white line-art illustration of a traditional Chinese pagoda and a modern storage ring structure. The text is in yellow and white. At the bottom, there is a yellow gradient bar containing logos for SPARC, CAS, NSFC, and GSI.

**SPARC in Lanzhou**  
**24-27th, Aug. 2010**

Email: [sparc2010@impcas.ac.cn](mailto:sparc2010@impcas.ac.cn)  
[Http://210.77.72.2/usr/yzwl1/sparc/sparc2010.htm](http://210.77.72.2/usr/yzwl1/sparc/sparc2010.htm)  
Campus, Institute of Modern Physics, CAS  
Nanchang Rd 509, Lanzhou 730000, China

Organizing Committee: X. Ma, X. L. Zhu, X. Cai, X. M. Chen, C. Z. Dong, D. C. Zhang, G. Q. Xiao, T. Stöhlker, R. Schuch

Logos: **sparc**, CAS, NSFC, GSI

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## *Annual NuSTAR Meeting 2010 at GSI*

Jürgen Gerl (GSI)

GSI recently hosted the latest annual NuSTAR (Nuclear Structure, Astrophysics and Reactions) meeting, held from March 3-5, 2010. About 200 participants presented the latest research highlights of the successful on-going experimental programme at the GSI facilities. The strategy of the NuSTAR collaboration is to test, commission and employ detector systems, which are developed for their service at FAIR, as early as possible at the existing fragment separator (FRS) at GSI. During this operation already high-quality physics output is ensured, students and young scientists will be trained, and the capacity of the instrumentation will be continuously increased in order to then be prepared to smoothly step in to the physics at the Super-FRS at FAIR.

Throughout the week many of the well established working groups and technical collaborations discussed their recent developments, presented results and planned their next activities. In addition the prospect for cooperation on instrumentation development of common interest was discussed in a meeting with colleagues from the American FRIB project.



Participants of the NuSTAR meeting 2010

photo: G. Otto

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## 32<sup>nd</sup> PANDA Collaboration Meeting March 2010

Lars Schmitt (GSI)

From March 8-12, 2010 the 32<sup>nd</sup> PANDA Collaboration Meeting took place at GSI. About 180 participants from 33 institutes of 12 countries took part in the sessions.



Meeting participants

photo: G. Otto

The first two days of the week were filled with parallel sessions of the 15 different working groups within PANDA, covering various aspects of detector development, mechanical design, physics, and computing.

These were followed by three days of plenary sessions. In the opening, FAIR Director Prof. Boris Sharkov gave a status report on the FAIR project and Dr. Dieter Prasuhn (Jülich) reported on updates from the HESR accelerator. The main topics of the meeting were the discussion of physics requirements for a barrel time-of-flight detector in PANDA, the computing and analysis strategy of PANDA and studies for a future extension of HESR to an "Electron Nucleon Collider" by adding an electron ring.

Very much attention was given to a session where fresh physics simulation results were presented for four different PANDA physics topics with updates and more detailed studies performed after the completion of the PANDA Physics Performance Report in 2009.

Further PANDA meetings in 2010: June 14-18 in Stockholm, August 30-September 3 in Groningen and November 29 - December 3 again at GSI.

PANDA meetings in 2011: March 14-18 at GSI, June 6-10 at IHEP Protvino, September 5-9 and December 12-16 at GSI.

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## ***Physics with FAIR: Indian Perspective Meeting at VECC Kolkata, India on March 8 – 10, 2010***

Subhasis Chattopadhyay (VECC Kolkata)

Members of the Indian scientific community are steadily gearing up towards formulating details of their participation at FAIR. One very important aspect, being discussed in India, is that of human resources to be engaged in FAIR related activities. A dedicated meeting, sponsored by EU-FP7-programme, was held at VECC-Kolkata on March 8-10, 2010, where about 135 scientists and engineers from 35 institutions showed up. Also a large team from Germany, consisting of members from FAIR joint core team, CBM and NUSTAR collaborations, participated, together with the representatives of Indian funding agencies such as the Department of Atomic Energy (DAE) and the Department of Science and Technology (DST).



Meeting participants

photo: VECC

Dr. R. K. Bhandari, Director-VECC welcomed the delegates and also participated in the discussions. Dr. Y. S. Mayya, Managing Director of the Electronics Corporation of India Limited (ECIL), constituting the nodal Indian company in the FAIR-India collaboration, reviewed the technological capabilities of ECIL for FAIR. Dr. Bikash Sinha, Home Bhabha Professor, DAE, presented the keynote address. Peter Senger, Spokesperson of the CBM collaboration, and Reiner Krücken, former chairman of the NUSTAR collaboration, were among the delegates present in the meeting.

During the days detailed discussions were held on the status and challenges being faced by the Indian institutions with e. g. developing the LEB magnets, beam stopper, CBM muon chambers, PANDA luminosity monitor and various possible contributions to NUSTAR. With some developments here, considerable progress has already been made. Another key feature was an extensive discussion on the physics programmes to be addressed within the FAIR experiments. It was felt that the formation of the FAIR Company at the earliest would speed up further progress here. Therefore, the participants appreciated the official announcement on the Russian Prime Minister having signed the agreement on the Russian contribution to FAIR. The top scientific community agreed on holding such meetings more regularly.

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## FAIR Meetings and Events

### *FAIR calendar*

<https://www.gsi.de/gsitools/fair.shtml>

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## FAIR Links

[www.fair-center.org](http://www.fair-center.org)

[FAIR Green Paper](#)

[FAIR Baseline Technical Report](#)

[FAIR brochure](#)

[FAIR flyer](#)

[FAIR newsletter archive](#)

[FAIR in the CERN Courier](#)

[FAIR in Nuclear Physics](#)

[FAIR Memorandum of Understanding](#)

[FAIR Communiqué](#)

[How to reach the location](#)

[First steps on site](#)

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## Masthead

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