16th April 2012

7th FAIR Machine Advisory Committee held at FZ Jülich on 2-3 April 2012

Present: G. Bisoffi, K. Burkmann-Gehrlein, L. Evans (chairman), W. Fischer, P. Lebrun, L. Miralles, L. Rossi, H. Schmickler, T. Taylor, K. Wittenburg.

Excused: R. Bhandari, N. Dikansky.

General remarks

The Committee wishes to thank FZ Jülich for hosting this meeting of the MAC and for the hospitality and support given. As usual, the Committee was impressed by the quality of the presentations. The agenda of the meeting is appended.

This is a very important year for the FAIR Project when the majority of contracts, both in-kind and through industrial tender will be placed. The Committee observes that there is a serious shortage of manpower, particularly at GSI, for the proper oversight of procurement and technical follow-up of these contracts. This problem must be addressed with urgency by the Management.

The Committee wishes to emphasise the need for a complete set of project management tools, in particular change control, EDMS, EVM and Schedule Tracking. Some of these tools are already in place; others still need to be implemented. In line with these observations, the MAC would like to get periodic status reports from the sub-project leaders at reasonable intervals such that problems can be detected early and remedial action taken.

SIS 100

The status of the procurement of equipment for SIS 100 was presented. The contract for the production of the dipoles has been placed and the detailed design is proceeding. The strategy for cold testing of these magnets has been defined and the procedure for procurement of the cryogenics plant and feed boxes is underway. The Committee is however is concerned that the time and resources allocated to the procurement of the

1.5 kW cryoplant and associated equipment for the test station appear very tight. Special austenitic steel for the vacuum chambers has been procured from CERN.

The Committee was informed that negotiations with JINR Dubna for the production of the quadrupole doublets, which are considerably more complicated than the dipoles, are close to conclusion. This will include the cold tests of the doublets, relieving GSI of this additional workload. However, the Committee was informed that JINR will not take responsibility for the design of these elements, which is different from the one adopted for their Nucleotron. Whilst the Committee reaffirms its full endorsement of the GSI design with the elements aligned on a common beam in a single cryostat, it feels that an effort should be made to convince JINR of the soundness of the design and promote a spirit of partnership by including JINR Dubna personnel in the detailed design reviews.

The MAC wishes to remind the project management that a spares policy should be established early enough to allow spares production in the wake of the series production contracts. To this end it should be foreseen that options for further supply of spares are included in the contracts for series production in order to guarantee prices.

The Committee was presented with the layout of the fast beam dump and interlock system. The technical implementation of the accelerators cycling sequence and beam permits looks like a sound proposal, but as soon as available implementation details need to be presented. In particular the handling and protection of critical settings will be an issue.

For the general strategy of machine protection the committee voices its concern. Based on the impressions of an individual (SIS18 experience) there are no complete tracking studies or other investigations of dynamic effects done. As a result, the beam dump system is not designed as a failsafe system. The MAC suggests that the necessary studies are launched and as soon as available a machine protection review gets organized.

The SIS 100 radiofrequency systems were presented. The technical specifications, work package descriptions and assignment of project leaders seem to be well under control. However, issues still remain concerning financing, in-kind contributions and adequate personnel for contract follow-up.

The Committee was presented with a new simulation of the fast and slow extraction systems. The newly optimized slow extraction requires 5 less resonance sextupoles than previously foreseen, saving space and money. In addition it was shown that the octupoles can be used to compensate for amplitude-dependent tune shift, improving the

extraction efficiency. During the discussion it was noted that no skew quadrupoles are foreseen. The committee recommends that this decision should be reviewed. Some of the slots vacated by sextupoles could be filled by skew quadrupoles to better control the coupling.

HESR

The Committee was presented with the status, schedule and quality assurance plan for the HESR, to be provided as an in-kind contribution by FZ Jülich. The MAC was impressed by the degree of organization of the project and is confident that it is on track. Contracts for procurement of components have been prepared but for the moment are blocked by issues concerning VAT.

Cryogenics

P Lebrun gave a summary of the review of FAIR cryogenics carried out on 27-28 February as requested by the MAC in its previous meeting. The MAC is pleased to hear that a number of issues brought up in the review, including S-FRS design pressures, cooling scheme and layout of the distribution lines are being addressed before technical specifications are finalized. The review was satisfied that the cooling schemes for SIS 100, with many passively balanced parallel cooling circuits is technically sound but could be improved by the addition of control valves. The cost/benefit of this modification should be reviewed by the project.

S-FRS

M Winkler gave a status report on the Super Fragmentation Separator. Technical specifications for the multiplets are now being modified in the light of the cryogenic review and tendering for these components will be launched in summer. For the superconducting dipoles, there is interest from France and Russia to form collaboration. It is important that these negotiations are concluded rapidly so that these components do not fall behind schedule. For the radiation-hard room temperature dipoles, an offer has been received from BINP Novosibirsk.

The Committee was pleased to learn that an agreement has now been signed with CERN for the cold-testing of all S-FRS superconducting magnets.

Radiation protection

G Fehrenbacher gave a presentation of the status of radioprotection studies needed for building approval. The Committee sympathised with the fact that frequent change requests are creating substantial extra load on the RP experts and recommends that the project management now takes a strong position in refusing further changes unless absolutely essential.

One particular issue concerning the tolerable radiation level for people working in the linac gallery at the junction with SIS 18 has not yet been resolved. In the opinion of the Committee, the shielding wall between the linac and SIS 18 should be dimensioned so that free access can be given to that zone. If this cannot be done, then access to the linac should be restricted during SIS-18 operation

As radiation protection has now been designed, oxygen deficiency hazards after a helium release should also be analysed since both can have implications for the building design, and can be in conflict. If oxygen deficiency hazards were mitigated through the rapid evacuation of air from the tunnel (through emergency fans and vents after an oxygen deficiency has been detected), the air escape path would also provide an escape path for radioisotopes. Larger fenced in areas may result around the air vents for example. Having no emergency fans and vents may require personnel to wear oxygen monitors and escape packs in certain areas, making work in these areas more complicated.

Manpower

Although the MAC generally restricts itself to technical issues, the question of manpower available at GSI for the correct follow-up of this ambitious project is a recurring problem. Adequate human resources (a small fraction of the cost of this project) are essential for the timely and successful execution of FAIR. The GSI and FAIR management must address this issue as a matter of urgency.

16th April 2012

Appendix 1

Agenda

Monday 02 April 2012

- 08:30 - 08:45 Welcome *15'*
  Speaker: Rudolf Maier (Forschungszentrum Jülich)

- 08:45 - 10:00 FAIR project status *1h15'*
  Speaker: Hans-Dieter Krämer (GSI Helmholtzzentrum für Schwerionenforschung GmbH(GSI))

  Material: Slides

- 10:00 - 11:00 Resource loaded schedule, recruitment at GSI *1h00'*
  Speaker: Oliver Kester (GSI Helmholtzzentrum für Schwerionenforschung GmbH(GSI))

- 11:00 - 11:30 Status of SIS-100 procurement *30'*
  Speaker: Peter Spiller (Gesellschaft für Schwerionenforschung mbH)

  Material: Slides

- 11:30 - 11:45 Update on the SIS-100 magnet testing strategy *15'*
  Speaker: Pierre Schnizer (GSI Helmholtzzentrum für Schwerionenforschung GmbH(GSI))

  Material: Slides

- 11:45 - 12:15 SIS-100 quadrupole modules: specs and procurement *30'*
  Speaker: Egbert Fischer (GSI)

  Material: Slides

- 12:15 - 12:30 SIS-100 interlock systems and machine protection *15'*
  Speaker: Jutta Fitzek (GSI)

  Material: Slides

- 12:30 - 14:00 Lunch in the Seecasino (for MAC members and speakers) (Seecasino)

- 14:00 - 14:45 SIS-100 rf systems: status, specs, procurement *45'*
  Speaker: Harald Klingbeil (Gesellschaft für Schwerionenforschung mbH)

  Material: Slides
- 14:45 - 15:15 SIS-100 fast and slow extraction *30'*
  Speaker: David Ondreka (GSI Helmholtzzentrum für Schwerionenforschung GmbH(GSI))

  Material: Slides
- 15:15 - 16:00 SIS-100 Injection/extraction systems *45'*
  Speaker: Udo Blell (Gesellschaft für Schwerionenforschung mbH)

  Material: Slides
- 16:00 - 17:15 HESR status, schedule and quality assurance *1h15'*
  Speaker: Raimund Tölle (Forschungszentrum Jülich)

  Material: Slides
- 17:15 - 18:30 Visit to COSY *1h15'* (COSY)
- 19:00 - 21:30 Dinner at the Faculty Club (for MAC members and speakers) (Faculty Club, Jülich)
- 21:30 - 21:31 - End of day 1-
  Location: building 07.1, room 312

Tuesday 03 April 2012

- 09:00 - 09:30 Summary of the Review on Cryogenics *30'*
  Speaker: Philippe LEBRUN (CERN)

  Material: Slides
- 09:30 - 10:00 Status of S-FRS procurement *30'*
  Speaker: Martin Winkler (GSI Helmholtzzentrum für Schwerionenforschung GmbH)

  Material: Slides
- 10:00 - 10:30 Update on the S-FRS magnet testing strategy *30'*

Speaker: Pierre Schnizer (GSI Helmholtzzentrum für Schwerionenforschung GmbH(GSI))

Material: Slides

- 10:30 - 11:00 Radiation protection at FAIR *30'*
  Speaker: Georg Fehrenbacher (GSI Helmholtzzentrum für Schwerionenforschung GmbH(GSI))

  Material: Slides

- 11:00 - 12:00 Closed session
  Location: building 07.1, room 311

- 12:00 - 12:30 Close out *30'*
  Speaker: all

- 12:30 - 13:30 Business Lunch (room 310) (building 07.1, room 310)
- 13:30 - 13:31 - End of the meeting -