



The Standing Group for the Upgrade of ISOLDE

Draft-Minutes 5th November 2010

Chairman: [Yorick Blumenfeld](#)

Scientific secretary: **R. Catherall (for T. Stora)**

Present: J. Billowes, Y. Blumenfeld, M. Kowalska, J. Vollaire, F. Wenander, R. Losito, K. Hanke, P. Butler, P. Van Duppen, M. Garcia Borge

Excused: J. Lettry, M. Huyse, Y. Kadi, K. Blaum, T. Stora,

Agenda

1. Welcome to new members
2. Approval of the minutes of last meeting
3. Revision of SGUI mandate (with respect to new HIE ISOLDE committees)
4. Developments in 2010 (Richard Catherall reporting for Thierry Stora)
5. Priorities for target and ion source development (Magda Kowalska & Richard Catherall)
6. Production of long lived beams (Fredrik Wenander)
7. New robot handling system. (Richard Catherall)
8. AOB
9. Next meeting

1. Welcome to new members (YB)

After a round table introduction of each member of the group, Y. Blumenfeld welcomes the following new members:

Magdalena Kowalska replacing Alex Herlert as ISOLDE Physics Coordinator

Joachim Vollaire representing Radiation Protection and RP issues for new projects

Klaus Hanke as responsible for Booster and ISOLDE operations and the Booster upgrade.

Y. Blumenfeld thanks the outgoing members Roland Garoby, Alexander Herlert, Thomas Otto and Patricia Roussel-Chomaz for their excellent service in the group.

2. Approval of the minutes of the last meeting (YB)

The minutes were approved

3. Revision of SGUI mandate with respect to HIE-ISOLDE Committees (YB)

After a general discussion, it was decided that the mandate of the SGUI will be to address the short-term upgrades of the ISOLDE Facility excluding the HIE-ISOLDE project and to set priorities for future beam development.

The frequency of the meeting shall be twice per year, coinciding with the fall and summer meetings of the INTC. The next meeting will take place on the 7th July 2011.

4. Developments in 2010 (RC)

On behalf of T. Stora, R. Catherall presents results on developments throughout 2010 ([slides](#)). The main points presented include;

- The successful production of ^{140}Nd using RILIS. Nd beams can now be made available for physics. However, the first tests for the production of Sm beams were not conclusive and are on-going.
- The production of ^{12}Be using thin foils. The priority of this development was changed to ^{11}Be in order to provide beam to IS430.
- The High Density Uranium Carbide (HDUC) from Russia is currently being tested on-line as is the LIST ion source at the off-line separator.

5. Priorities for target and ion source development (MK and RC)

After discussion on possible developments presented by both T. Stora and members of the group, the following developments in order of priority were retained:

- The development of ^{30}Na beams matching the ISOLDE database yield
- The successful production of ^{72}Kr
- The production of ^8B beams. This development has taken more importance since 6 LoI's have been presented in the recent INTC meeting.
- Completion of the ^{142}Sm beam development

The group also proposed the following points:

- The development of ^9C beams should continue, however, the experiment should not be scheduled until tests have been validated on-line.
- In view of the recent success of the VADIS ion sources and new target materials, there is a clear need to redefine the potential of VADIS/target combinations for the planning of future experiments. It is therefore proposed to better characterize these systems by devoting sufficient time to carry out thorough target tests.

6. Production of long-lived beams. (FW)

F. Wenander presented the issues associated with the use of long-lived radioactive ion beams in the REX machine and outlined the consequences when opening the machine to atmosphere for interventions ([slides](#)). In collaboration with RP, procedures will be drafted and preparations made for the opening of the REX machine taking into account the worst possible scenario. The INTC will be provided with information from RP and the future technical committee describing the consequences for machine maintenance and chamber openings in case long-lived radioactive beams are accepted. If the procedures proposed by RP are accepted and followed, and the level of activity remains low, physics with long-lived radioactive beams may be done at REX. It was noted that the consequences will be limited for the opening of REX which occurs about 3 times per year but that MINIBALL will be most affected should the intervention times be long. Initially it was proposed to have a RP specialist assigned to MINIBALL to deal with this issue but taking note that the RP Expert course lasts for 2 weeks and that there is a regular rotation of MINIBALL supervisors, P. Van Duppen proposes to do an in situ test at the end of 2011 by implanting beams into MINIBALL and characterizing the risks when opening the chamber. Under these conditions, RP agreed to waive the need for a RP specialist in the short term.

7. New robot handling system. (RC)

R. Catherall presents the conceptual design of the new target handling robot system at ISOLDE. (slides). The main changes with respect to the existing system are:

- There will be one system for both separators
- The robot arm will be mounted on an autonomously guided vehicle
- The system will be stored externally to the target area
- There will be an independent back-up in the case of failure

The conception and details are still under investigation with an important emphasis on the inherent and operational safety for the equipment. Tests on auto-correction through remote visualization are presently on-going at Staubli. The planned installation is for 2013 and would ideally coincide with the long shutdown planned at CERN should it be postponed by one year.

8. AOB

The agenda of the next meeting will include a presentation by K. Hanke on the upgrade of the Booster to 2 GeV and a presentation by T. Giles on the Fast Tape Station status and measurements.

9. Next meeting

The next meeting is planned for the 7th July 2011

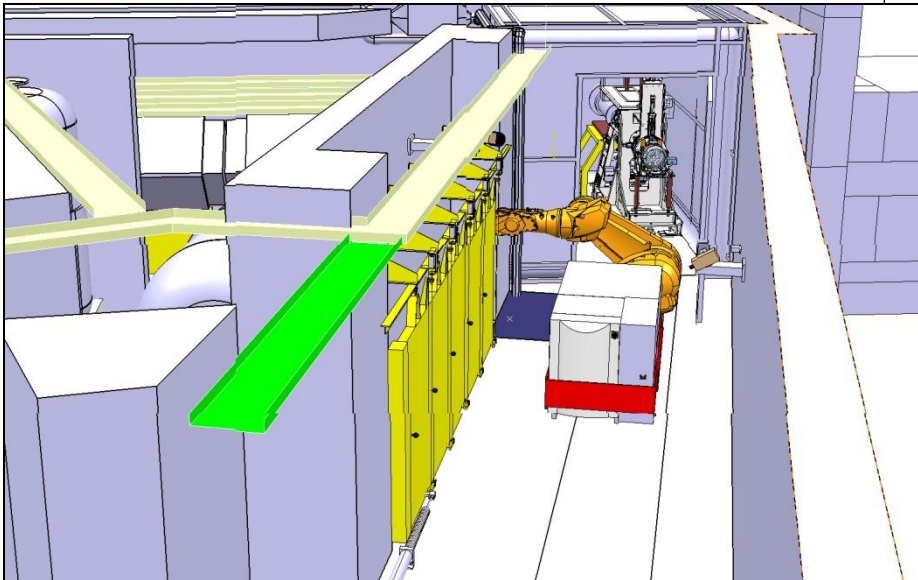
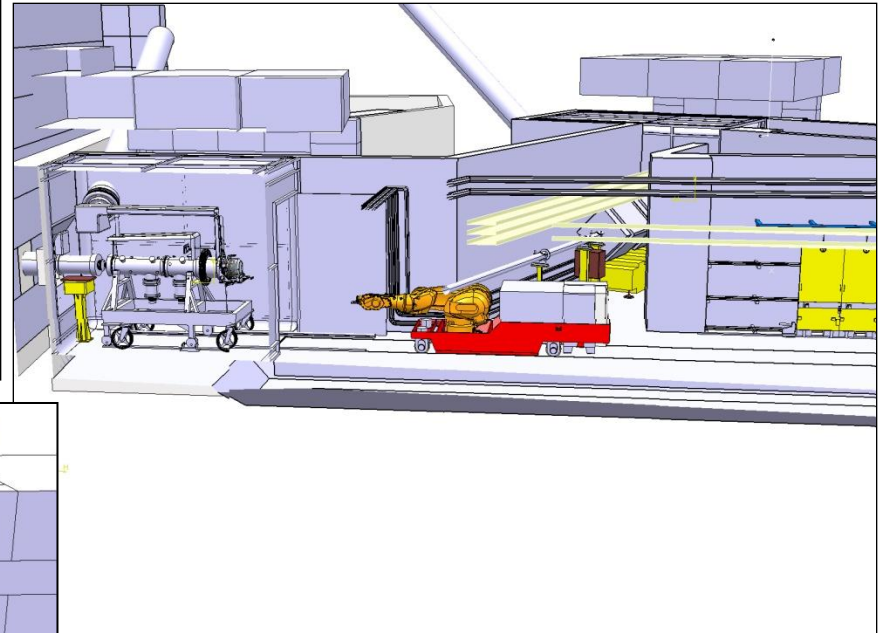
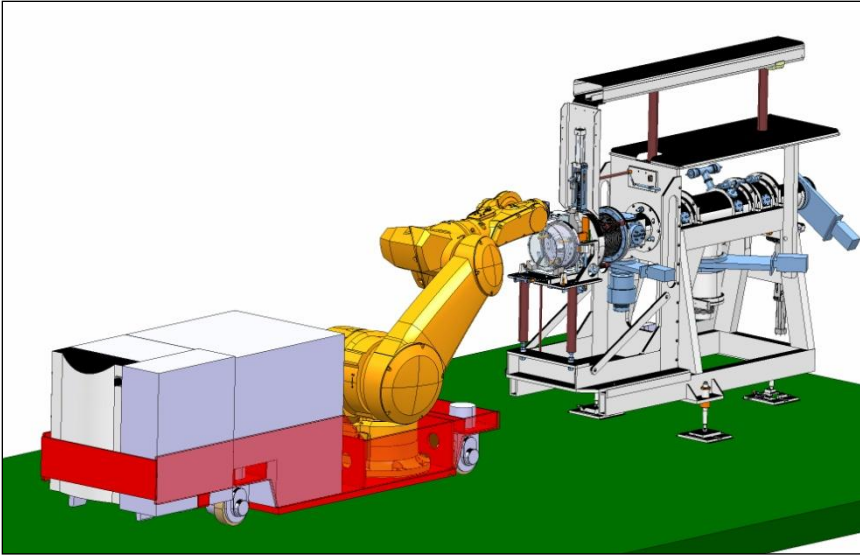
Minutes by Richard Catherall

ISOLDE replacement robot

Status 3 Nov 2010

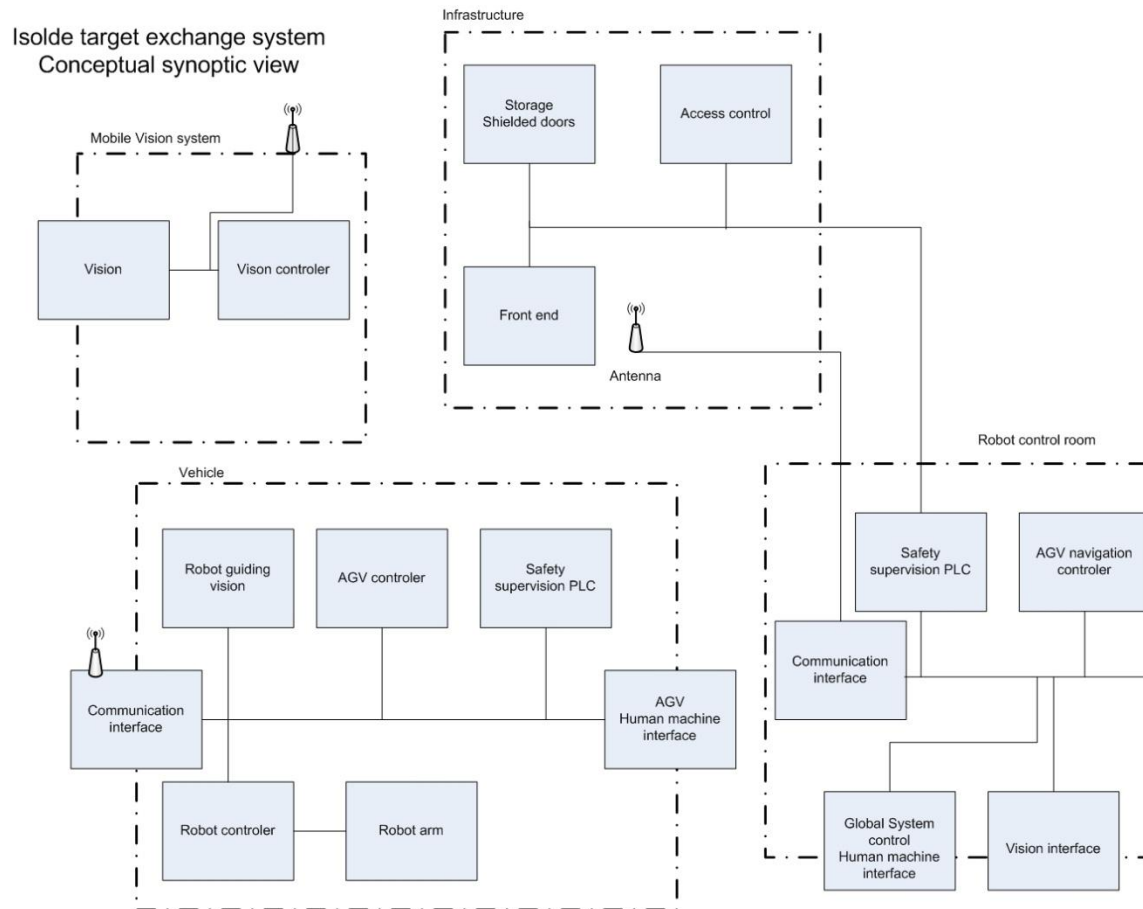
B Feral, J-L Grenard, K Kershaw EN-HE

Conceptual design - robot on AGV

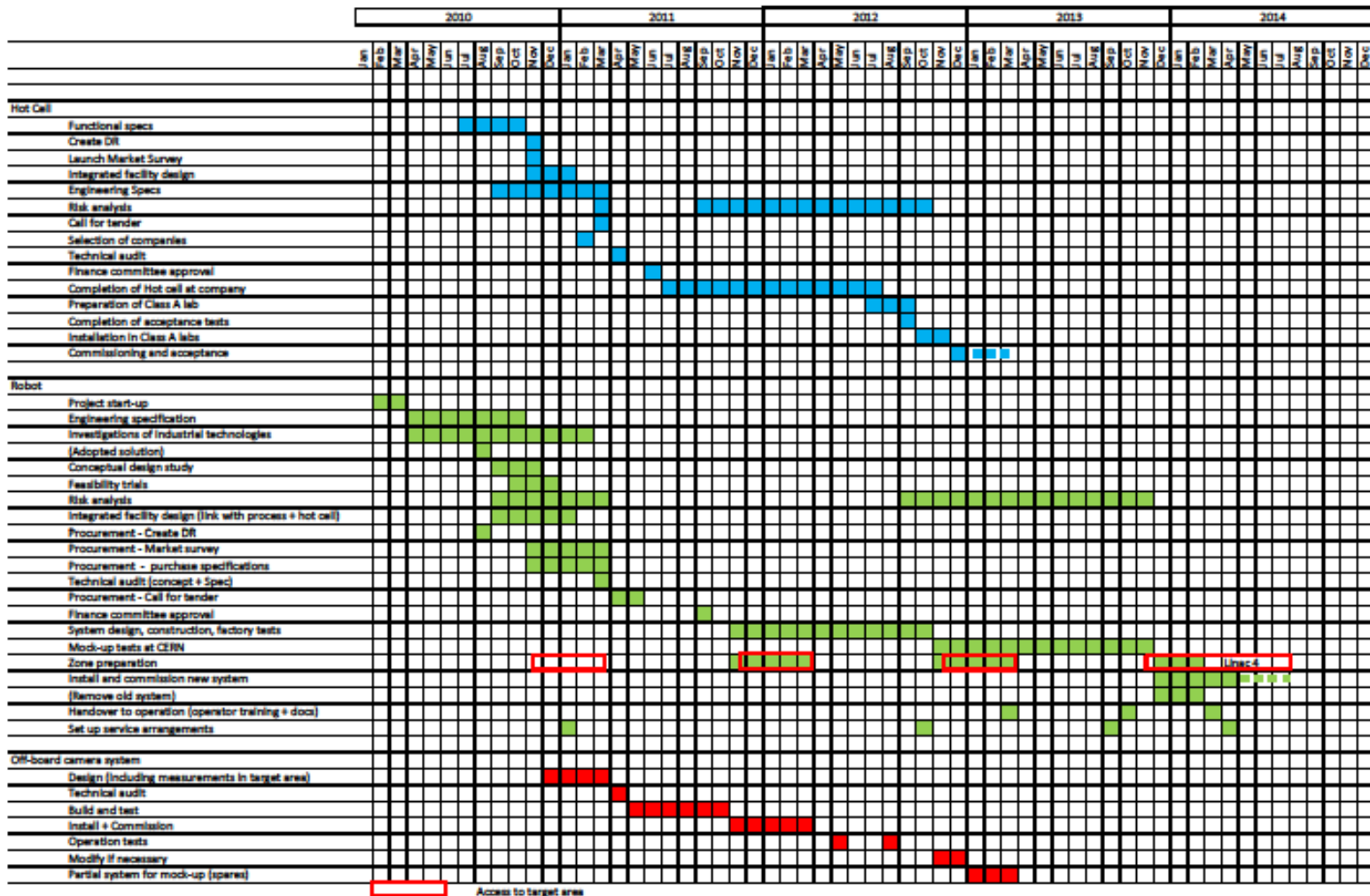


AGV parks outside target area during
ISOLDE operation
Trenches filled-in for better front end
exchange

Conceptual control system structure



ISOLDE REPLACEMENT ROBOT AND HOT CELL SCHEDULE



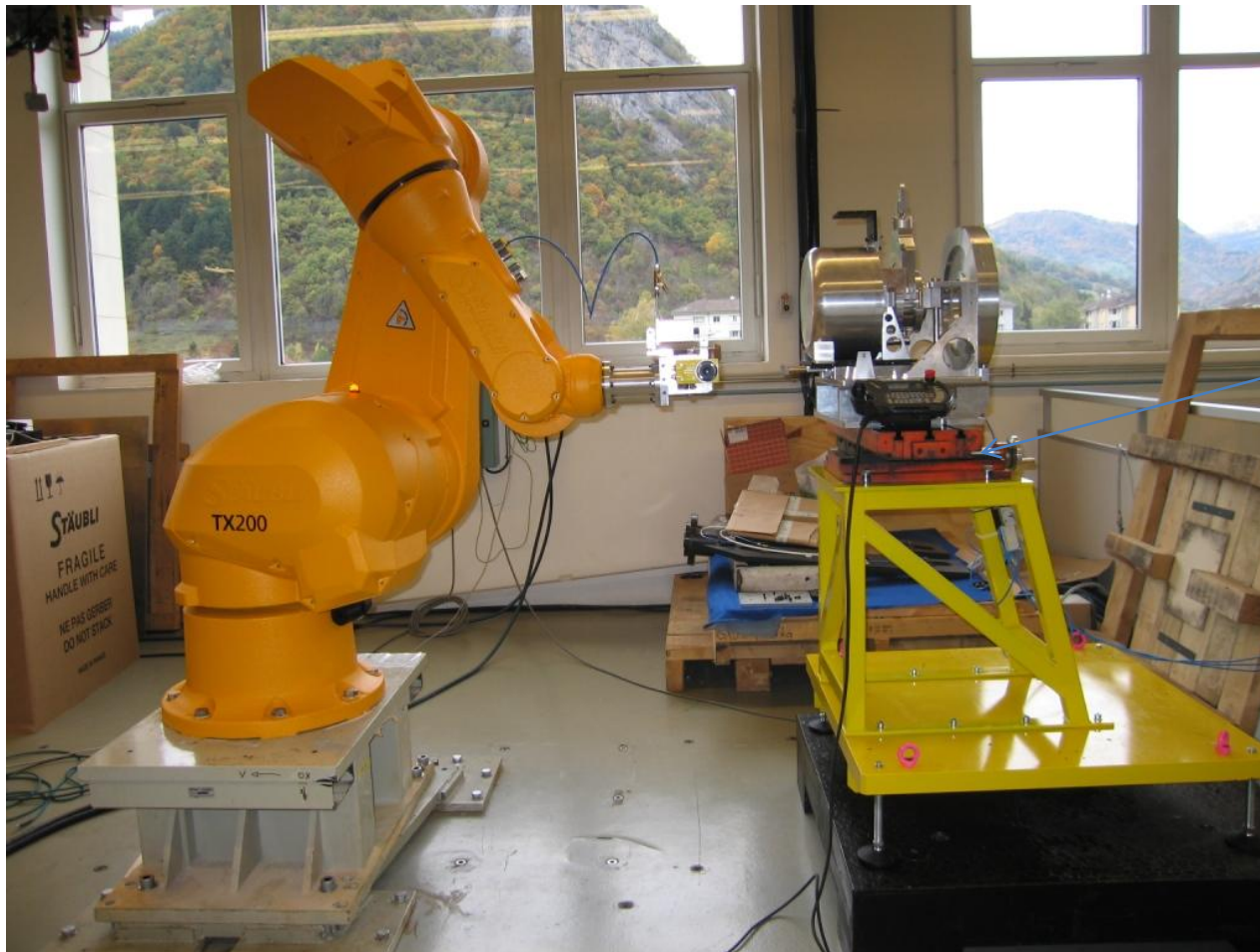
Ongoing tasks

- Conceptual design studies: checking feasibility of key elements of concept with risk analysis and feasibility trials – OK so far. (Radiation tolerant machine vision camera system supplier found)
- Robot system risk analysis including recovery scenarios in event of breakdown ongoing
- Feasibility trials
 - Position correction using vision system (done)
 - Error detection using joint current measurement (demonstrated)
 - Target handling for container trials (November)

Ongoing tasks continued

- Link with process and hot cell (design discussions + container proposal to be checked by practical robot trials in November)
- Procurement
 - DR issued
 - Market survey (draft issued – comments received. Consortium will not include robot manufacturers - need to identify more experienced integrators as potential project leaders before sending out Market Survey.)
- Off board camera system – conceptual ideas for rail-based system. Camera in target area during 2010-11 operation to assess radiation effects.

Trials of robot guidance using vision system to pick up target



Robot-mounted camera checks position of support before placing target.

Trials demonstrated correction for support movements of over 50mm

Report from the meeting about long-lived beams in REX

F. Wenander, SGUI Nov 2010

Until now:

- * Short lived elements ($t_{1/2} < \text{some 10 days}$).
- * Beams approved after activity analysis by
F. Wenander in collaboration with A. Dorsival.
- * REX interventions relatively quick (at least before).

Future:

- * Several proposals and large interest for, mainly heavy, elements with long-lived daughters in the decay chain.

Approved beams

- * ^{222}Ra and $^{222}\text{Rn} \rightarrow ^{210}\text{Pb}$ ($t_{1/2}=22 \text{ y}$)

Beams in yesterday's proposals

- * $^{208}\text{Rn} \rightarrow ^{208}\text{Po}$ ($t_{1/2}=2.9 \text{ y}$)
- * $^{203}\text{Fr} \rightarrow ^{195}\text{Au}$ ($t_{1/2}=180 \text{ days}$)

Expressed interest

- * ^7Be ($t_{1/2}=53.3 \text{ days}$)
- * ^{42}Ar ($t_{1/2}=33 \text{ y}$)
- * and several heavier beams

Thus:

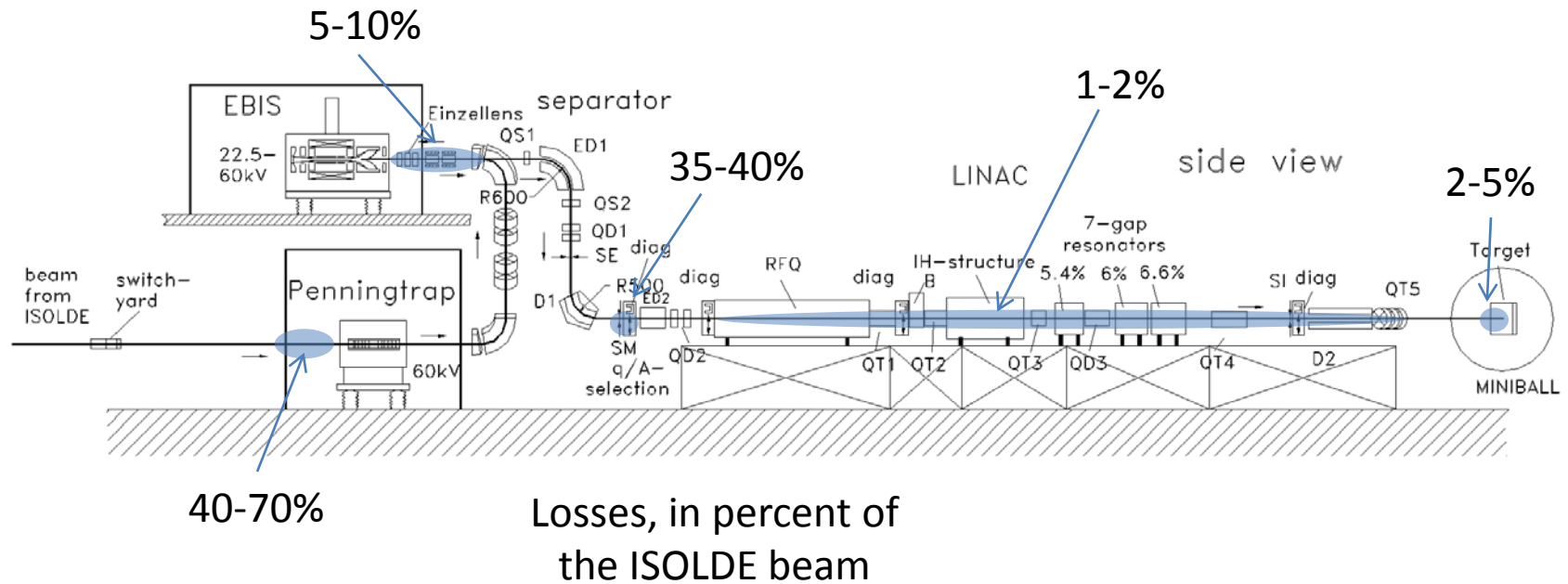
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|-------------------------|--|
| 1 st aspect | A. Dorsival et al. (RP) raised the question about formalization and policy for beam approvals. |
| 2 nd aspect: | REX responsables would like inform the users of the consequences, i.e. delays and longer intervention times. |

Meeting held 4/10-2010 with REX, ISOLDE and RP specialists

NB1. We did not address implications for detectors and data taking.

NB2. Short-lived isotopes with high activity were omitted in the discussion.

Hot spots in REX



Opening up / Interventions

Penning trap, every ~2 years, 1 week

EBIS 2-3 times a year, each opening 2-3 days

Alignment end of linac, 2 days a year

Beam diagnostics along the linac, 2 days a year

Pumps along the complete machine, greasing every 2 years

daytime, CERN staff

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Miniball experiment ~30 times a year

secondary targets on the target ladder, 1-2 h

beam dump modifications, 4 h

off-working hours, users

Remarks

- * Much focus on Miniball interventions outside working hours.
 - * For the GLM case RP trains and nominates a responsible person, for instance the solid-state coordinator, that surveys and controls the opening of the chamber outside working hours.
 - * REX-ISOLDE doesn't experience the problems with alpha-emitting daughters from radioactive ^{220}Rn and ^{222}Rn gas streaming from the primary target and separator as the in-between pumping speed is large. Thus, the contamination is only found in implanted form.
 - * The rule applied for beams taken to ISOLDE is that the integrated yield should be below 100^*LA/run .
- Q. REX responsible desired to know the exact consequence for maintenance in terms of protection, paper work and delays.
- A. Can't be given as experience on how implanted ions are released is missing.

Possible consequences of long-lived (alpha)-activity in REX

- The workers involved in the maintenance of REX might need to be reclassified in terms of radiological surveillance and undergo further dosimetry tests.
- A radiation work permit (RWP) to be filled out in advance (~2 days) of the opening might be necessary if the machine becomes contaminated.
- Complete surveillance by RP during the full intervention. Until now RP has only inspected the beam line at the moment of opening.
- Wear mask and protective clothing during the intervention.
- Install temporary air monitors and a tent surrounding the beam line to be opened.

In summary, the interventions *might* become more difficult to execute and *will* need a longer time of advance planning.

Suggested action list

1. Launch a database that keeps track of the beams and intensities taken. (RP)
2. Train and nominate a responsible person to survey the opening of the Miniball chamber. (RP)
3. If possible modify the Miniball target chamber so it can host more targets so fewer openings would be required. (Miniball collab)
4. Request the experiments to evaluate the minimum beam needed to obtain the desired physics results in order to minimize long-term consequences. (REX)
5. RP will provide a protocol that describes the measures that needs to be taken before opening a contaminated beam line. Based on this INTC can determine if the physics cases are strong enough to motivate the risk for complicated opening procedures. (RP)
6. The GANIL data describing the release of implanted alpha-emitters should be studied by RP and be used to predict the measures that are needed for opening a contaminated beam line. (RP)
7. RP will provide numbers to the safety files of each experiment on how much beam that can be accepted. (RP)

Conclusions

1. INTC will be provided with information from RP and the technical committee describing the consequences for machine maintenance and chamber openings in case long-lived radioactive beams are accepted.
2. REX will be prepared for the worst-case scenario in terms of measures that need to be taken for maintenance (e.g. air lock / tents around areas to be opened), although, based on the experience from ISOLDE, such measures are very unlikely.
3. If the procedures suggested during the meeting and the ones provided by RP are followed and, the activity is within the same limits as for the rest of ISOLDE (i.e. $<100 \cdot \text{LA}$), it gives the opportunity to perform physics also with long-lived radioactive beams.

T. Stora

Target and Ion Source Development (TISD)

EN-STI-RBS

TISD

- ◆ Priorities as set in the last meeting:
 - 142Sm and 140Nd and suppression of beam cont.
 - 12Be from thin Ta foils on frame
 - Tests of HD-UC if they are delivered to CERN
 - Tests of the LIST Trap



TISD

- ♦ ^{140}Nd beam from low work function cavity : tested, 50% in the beam. Physics can be scheduled.
 ^{142}Sm : Could not obtain Laser ionized Sm beam. Development ongoing.
- ♦ ^{12}Be from thin foils : priority (and target design) changed to focus on delivery of ^{11}Be for IS430: Used combined 6mu + 30mu Ta foils (record ^{11}Be yields over extended period)

TISD

- ♦ Tests of HD-UC : Ongoing! Good purity, stable operation (as of Thursday). Yields on similar tracks as those measured in PNPI. In addition, data on aging of target + operation at high temperature + extended range of isotopes will be collected



TISD

- ♦ Tests of LIST Trap : Assembled and commissioned with Ti foil target. Ga RILIS efficiency with Ti:Sa laser could not be completed. Mg beams ($A=22, 23, 27$), with drop in efficiency, and cleaning ($>1/1e5$) of Na or Al isobaric contaminants are foreseen.

TISD

- ✦ Incoming requests (from last INTCs, or beam not delivered in 2010, see presentation of Magda):
LoI 85 (Hf/Lu), LoI 86 (At by RILIS beams):
LoI86 already scheduled
- ✦ Unsuccessful scheduled experiments:
72Kr from YO-VD7 : $2e4/\mu C$, drop within $1e18$ proton: to be scheduled with 2 fresh units, operate at a lower Temperature.
9C from YO-VD7: Good yields seen for very short times: C. Seiffert (PhD student) will investigate release of CO vs O2 partial pressure in target unit.
- ✦ N-rich Au beams: no time given to measure the yields, and experiments will have difficulty to give a figure. Contaminants were also observed. As a result, n-rich Au beams are available, but we don't know at which intensity/purity.
- ✦ Contaminated rare earth beams: development possible (see item on $140Nd$!)

TISD

- ♦ In the pipeline (cont'd):
cleaning of ^{57}Fe from ^{57}Co
- ♦ ^{27}Al contaminants in ^{27}Mg beam: development possible.
- ♦ ^{73}As and ^{75}Se isobaric contaminants: developments possible.
- ♦ ^{30}Na beam: test to check proper unit possible.
- ♦ ^{28}Na beam (^{28}Al contam): development possible.
- ♦ ^{96}Kr : upgrade of ISOLDE for weak beams.

TISD

- 3 to 5 items must be selected in the proposed list of developments.
- Thank you for your consideration