



*Draft Minutes of the 81st Meeting of the ISOLDE Collaboration Committee
held on February 6th 2018*

Present: A. Andreyev (replacing D. Doherty) (P.T.), K. Bharuth-Ram, B. Blank, R. Catherall, J. Cederkall, H. Fynbo, S. Gilardoni (P.T.), K. Johnston, Y. Kadi, A. Lagoyannis (via Vidyo) N. Marginean, A. Nannini, G. Neyens, J. Pakarinen (replacing P. Greenlees), M. Pfützner, L. Schweikhard, N. Severijns, O. Tengblad (via Vidyo), G. Tveten (replacing S. Siem)

Excused: K. Bharuth-Ram, D. Doherty, P. Greenlees, K. Riisager, S. Siem, M. Venhart

Invited: E. Siesling, P. Reiter, S. Rothe

(P.T. = Part Time attendance)

The meeting starts at 09:00 h

1. Introductory remarks

The ISCC chairperson, B. Blank, opens the meeting and excuses the committee members who are unable to attend the meeting.

2. Approval of the Minutes of the last meeting of November 7th, 2017

The minutes from the previous meeting are approved.

3. Status of the HIE-ISOLDE installation and shut down work – E. Siesling

The main activities of Phase 2b of the HIE-ISOLDE project are summarised. E. Siesling explains which installation work took place during December 2017 and January this year in order to prepare for the installation of the fourth cryomodule (CM4), which was successfully transported from SM18 on January 23rd. The installation work that has taken place in the tunnel since the arrival of CM4 is summarised and the status of the CM4 installation is presented. The cryomodule is installed and aligned but both vacuum and cryogenic installation work have been delayed due the unavailability of the required manpower who are working on other machines at CERN. While the starting date of vacuum installation work being moved from 29th January to 19th February does not affect other CM4 activities, they are affected by the starting date of cryogenic work being delayed until 12th February. This is because other CM4 top-plate work cannot begin until the cryogenic work has been finished. However, due to sufficient margin in the planning, the milestones for cryo cooldown, CM4 and beam commissioning can be kept unchanged.

The committee is informed that maintenance of the cryoplant is ongoing and should be ready for cool down by March 23rd. The repair of the Cryogenics Distribution System by CRIOTEC is also underway and on schedule. It has become clear to the cryogenics group that HIE-ISOLDE Phase 3 will not only require consolidation of the cryoplant but also of the CDS; the cost of which would be borne by CRIOTEC.

E. Siesling briefly summarises the REX RF maintenance and repair that is taking place and on track as well as the ISS installation status at XT02. It is clarified that the operation of ISS is carried out by the ISS collaboration but the responsibility of its installation was taken into the HIE-ISOLDE project.

The planning for the remaining activities of Phase 2 are presented and the committee informed that the start of HIE-ISOLDE physics is still foreseen for July 9th 2018.

B. Blank congratulates E. Siesling and his colleagues for the work completed so far and for keeping to the schedule to allow physics to start on time.

4. YETS (Year End Technical Stop) Activities at ISOLDE – *R. Catherall*

R. Catherall begins by summarising the power supply consolidation work that is taking place in the ISOLDE hall. GPS and REX power converters are being replaced and a new 60kV HT power supply and modulator, mainly for use with the HRS, is being installed. It is planned to install a second new HT power supply and modulator during the 2021/2022 end of year shutdown.

The committee is reminded of the radiation issues that occurred during the 94Rb run that took place in September 2017. After several radiation alarms in the hall were activated, a radiation survey found a number of hotspots. A proposal to continue running with the hall in lock down was rejected by CERN so the run was completed at a proton intensity of 0.2 μA . A working group has outlined a proposal for future high intensity operation that would change the ISOLDE hall from “Simple controlled area” to “Limited Stay controlled Area” for the duration of the experiment. This would mean that Users, who would be informed as far in advance as possible, can still enter the hall but only for a limited amount of time and they must avoid hotspots. The proposal is being refined before it is presented to the PS-CSAP (PS-Complex Safety Advisory Panel) for approval.

The 2018 RILIS team is presented: V. Fedosseev (Staff), B. Marsh (Staff), S. Wilkins (Fellow), C. Buitrago (Fellow) and K. Chrysalidis (PhD Student), with support given by PNPI and the LARISSA group in Mainz. R. Catherall then briefly summarises the RILIS equipment upgrades during the end of year shutdown as well as the developments that are planned before the start of physics in April 2018. Tests of CERN LIST, VADLIS and laser-induced molecular break-up are ongoing at the Offline 1 setup as well as work on high-resistance LIS cavities and trials for RILIS@MEDICIS. The committee is told that significant investment is still required to equip the RILIS laser laboratory at Offline 2 that is essential for the many long-standing RILIS development goals presented to the GUI (Group for the Upgrade of ISOLDE).

R. Catherall tells the committee that a new telescopic camera has been installed in the target area which will help with diagnostics reducing the need to enter the radioactive area. The ongoing robot and Montrac testing is summarised as well as the Frontend maintenance.

The MEDICIS facility is designed so that new isotopes can be delivered to partner biomedical institutes where they synthesize new drugs and test them for precision imaging or treatment. The committee is informed that the first isotopes were produced in the ISOLDE HRS beam dump and separated in the MEDICIS laboratory during commissioning in December 2017. The work planned at MEDICIS during the end of year shutdown is summarised.

The 2018 start up planning is presented and the committee told that, for the first time ever, ISOLDE will not be ready for physics when protons become available. This is due to the water not being turned on until February 26th. The start of physics is presently planned for April 9th.

R. Catherall then presents the overall three-year planning for the EN-STI-RBS section that includes the construction of the Nano Lab, MEDICIS operation, the LIEBE project, the 60kV HT upgrade and the completion of the new tapestation as well the alignment of beamlines in the experimental hall, front end exchange and the general operation of ISOLDE. The cost and risk analysis of the Nano Lab

is due to be completed by the end of February and it's hoped to start construction in September 2018 with the civil engineering being finished by June 2019. However, three months will still be required for ventilation coupling and minor civil engineering work during the last quarter of 2020 so the laboratory should be ready for use at the beginning of 2021.

ISOLDE Offline-2 is a new broad-purpose laboratory for machine development studies and the committee is informed that the laboratory infrastructure is 90% completed while the separator section is 80% complete with commissioning underway; the first beam before the magnet has been achieved.

5. Presentation of the activities of the GUI group: Target test plans for 2018 – *S. Rothe*

The current members of the Target and Ion Source Development (TISD) team are presented as S. Rothe, T. Stora, D. Leimbach, J. Ballof, F. Boix Pamies, Y. Martinez and J.P. Ramos who, along with the members of the RILIS team, also take care of research and development for ion source and beam manipulation (ISBM).

The status of the LIEBE target project is then presented. The target has been assembled and tests were carried out at Offline-1 during which a leak was found when the ion source was heated to 1600°C. This meant that the target could not be installed last year and online tests scheduled for the end of the 2017 had to be cancelled. S. Rothe explains the work that has been done to analyse and fix the leak; dedicated pieces are being manufactured which should increase the sealing pressure. The plan for LIEBE in 2018 is presented with the target ready for installation on GPS at the end of October.

S. Rothe briefly summarises the status of the upgraded Laser Ion Source (LIST), which is required for the proposal to measure the super-allowed branching ratio of ^{22}Mg , and the p2n converter project. The concept for a dedicated development unit for molecular beams is presented. It is hoped that this would give a better understanding of molecular formation as well as improve reliability of existing beams and tailor new beams.

The target and ion source development planned during 2018 is presented which, as well as the projects mentioned above, includes RILIS offline work, $\text{M}(\text{CO})_x$ formation at the MEDICIS irradiation point, RILIS two-photon spectroscopy online, Si yields and VADLIS version 1.5 online use.

6. GANDALPH @ CRIS: first proposal of layout – *S. Rothe*

The Gothenburg Anion Detector for Affinity measurements by Laser PHotodetachment (GANDALPH) has been used successfully at the GLM but this limits the available beams to mostly halogens and chalcogens. S. Rothe explains that the future of GANDALPH requires another method of producing negative ions such as double charge exchange that is available at CRIS. A preliminary proposal to construct a platform above CRIS to house the laser barrack is presented. It is hoped this would address air quality and temperature stability issues as well as safety considerations.

Due to the early stage of this proposal, the committee invites the GANDALPH team to present a more detailed proposal at the next meeting including input from the in-house technical team and the other collaborations that may be affected by this setup.

7. Beam re-alignments: history – *G. Neyens*

At the ISCC meeting of 23rd October 2013, R. Catherall reported that a beam alignment survey had shown a 10mm vertical step in the centre of the beamline (CB0) while there was an overall vertical level difference of 17mm between the target ion source and ISOLTRAP. The discussions and actions related to this issue that are recorded in the minutes of ISCC meetings since then are summarised. Most recently, in November 2016, ISOLTRAP, being the experiment most affected by a realignment of the beamlines, presented the constraints and modifications that would be required and agreed to

take the necessary action if both manpower and financial support was provided for the modifications and beam realignment. R. Catherall had agreed that EN-STI-RBS would provide this support and so the committee then approved the realignment project. However, G. Neyens explains that, before the committee can make a final decision, the following information is required:

- The current transmission efficiency into the different ISOLDE beam lines
- The gain in terms of transmission to each of the experiments that would be produced by re-aligning the beam lines
- A detailed plan of how the re-alignment would take place including what needs to be done for both main and user beam lines, the estimated time and manpower required and the impact on users.

G. Neyens informs the committee that the permanent experiments at ISOLDE were asked to provide information about the transmission that they currently experience and goes on to summarise the feedback received from COLLAPS, CRIS, ISOLTRAP, IDS, NICOLE and VITO as well as the solid state experiments:

- All user groups report a transmission of greater than 80% and up to 100%
- None of the User groups are in favour of a realignment of the beam lines
- Several groups using HRS plus the RFQ report a transmission through the RFQ of between 50 and 70%
- Tuning at the switchyard towards IDS/NICOLE is difficult
- The mass factor of GPS is a problem
- The Autotune system is extremely important to all groups.

8. Beam re-alignments: detailed planning and risk analysis – R. Catherall

The results of the beam alignment survey that took place at the end of 2012 are summarised. R. Catherall then presents a risk analysis for both during the re-alignment process and after the alignment has taken place. The worst-case scenario would be that, after the realignment, it is impossible to attain previous transmission or any transmission at all. If the work takes place during LS2, the new alignment can only be tested with beam from September 2020, which is only six months before physics is due to start. This would give very little time to correct any problems.

A discussion takes place about how to proceed with this issue. The committee decides that the current alignment should be verified during LS2 to see if the situation has changed at all since 2012, which means it will not be possible to initiate the re-alignment work during LS2. It is also decided to start MADX simulations for the beamline to IDS, in order to investigate their transmission issues before expanding the simulations to other beamlines. Finally, the committee decides to postpone the discussion about whether or not to carry out the beam re-alignment during LS3 until after the current status has been verified.

9. Highlights of the running period. Schedule plans for 2018 – K. Johnston

The committee is told that, after a two-week extension of protons was negotiated, there were 224 days of physics at ISOLDE during 2017 and K. Johnston briefly summarises the problems encountered. The number of leaking targets was greatly reduced compared to the previous year however serious problems were experienced with the preparation of nano targets. It was a difficult year for laser Spectroscopy as a couple of runs failed or could not reach their goal due to beams not being produced. Certain issues experienced with the formation mechanisms for Se beams still need to be understood and an incorrect ion source caused difficulties after a proton stop. At the end of November the LIEBE target tests had to be cancelled and were replaced by a TISD run. The committee is told that HIE-

ISOLDE proved to be quite reliable during 2017 but was still a heavy load on the operators and local support especially for light and molecular beams.

Highlights from the 2017 physics run are then presented. These included the successful ^{132}Cd and noble gases runs by ISOLTRAP, the IDS study of neutron unbound single particle states in ^{133}Sn from the beta decay of ^{133}In as well as the laser spectroscopy of Bi isotopes carried out by Windmill and IDS teams. VITO had a successful year with the first NMR signals in liquids being achieved while the IS528 collaboration put their new collection chamber and separation system into use for medical physics; the new shielded fume cupboard, paid for by the EP department, is due to arrive in a few weeks. Solid state physics collaborations performed successful emission channelling experiments as well as PAC studies of isolated small Cd and Hg molecules.

The collaboration is told that the twelve HIE-ISOLDE experiments scheduled between July 7th and December 4th 2017 were mostly successful using beam energies from 4.4 to 8.1 MeV/u. K. Johnston briefly presents some of the coulomb excitation experiments which took place and the nuclear astrophysics run performed by the group from the University of Edinburgh as well as the measurements on ^{28}Mg using the new plunger chamber developed by IKP Köln.

The status of the ISOLDE Solenoidal Spectrometer is presented and the committee informed that, after a very tight schedule over the last two months, the shielding is now in place and ISS will be ready to take radioactive beam in 2018.

K. Johnston tells the committee that a total of 427 RIB shifts were delivered during 2017 with an average of 1.75 shifts per day which compares very favourably with previous years. The shift distribution between different areas of physics is presented with HIE-ISOLDE making up approximately 45% of the physics program. Machine use in 2017 is then compared to that in 2016; there was much less downtime in 2017, no lost weekends, fewer broken targets and a more efficient running strategy.

The committee is shown a summary of the shift backlog at ISOLDE which is spread over all types of experiment but the vast majority being for HIE-ISOLDE experiments. Another 15 new proposals have been submitted to the INTC requesting a total of 180 shifts; a strategy for re-evaluating remaining shifts will be discussed later this year.

K. Johnston then presents the CERN accelerator schedule for 2018 and informs the committee that protons will be available for physics at ISOLDE from April 9th to November 12th giving 217 days of physics. As in 2017 there will be a dedicated block of low energy experiments scheduled until July 9th when HIE-ISOLDE should be available and from then on HIE-ISOLDE and low energy experiments will be interleaved. Beam requests have been received and the first part of the schedule until the end of June should be published by early March. The schedule will be discussed at a technical advisory panel, which will take place a couple of weeks before experiment runs, in order to avoid any surprises in terms of targets, ion sources, machine parameters and recent developments.

The committee is informed that, after some insistence, the CERN hostel has reserved 10 rooms for ISOLDE shift workers from the middle of June until September. These rooms should be reserved using the booking form which will be sent to the spokespersons of scheduled experiments along with the application form for ENSAR2 TNA financial support which will again be available during 2018.

The safety training required for access to the ISOLDE hall is summarised and K. Johnston explains that a number of course cancellations at the end of 2017, due to the unavailability of the external trainer, caused some problems but discussions are underway to mitigate this in the future.

The committee hears that the CERN timeline has been updated with information about ISOLDE with two to four contributions from ISOLDE planned for the CERN Microcosm exhibition.

R. Catherall reminds the committee that the LIEBE target is related to and endorsed by the EU project EURISOL and over one million euros has already been invested in the target development. If the target is ready to be tested during 2018 it will block about four weeks on the GPS. As HIE-ISOLDE runs are a priority before LS2, the scheduling of the LIEBE tests will be discussed at the ISCC meeting in June.

10. AGATA at ISOLDE – *P. Reiter*

P. Reiter explains that the physics envisaged for HIE-ISOLDE at 10MeV/u gives rise to the need for greater detector efficiency and sensibility, which could be provided by AGATA (Advanced Gamma Tracking Array). The committee is shown how the performance with regard to energy resolution and detection sensitivity of AGATA compares to that of MINIBALL and a combination of the two. AGATA is a collaboration of about 40 institutes from 11 different countries and is endorsed by the NuPECC long range plan. A dedicated working group, chaired by M. Zielinska and involving members of the MINIBALL collaboration, has been set up by the AGATA collaboration to consider the physics case for bringing AGATA to ISOLDE.

AGATA has previously been installed at INFN and GSI, and is presently hosted by GANIL. P. Reiter informs the committee that letters of interest to host the detector for various periods between 2021 and 2028 have been received from GANIL-SPIRAL2, LNL-SPES, JYFL and FAIR NUSTAR as well as from ISOLDE. The two possible time windows for bringing AGATA to ISOLDE would be from May 2021 to November 2023, which is after LS2, or after LS3 from May 2026 to November 2028. R. Catherall tells the committee that all technical support has already been assigned tasks for the whole of LS2 so there would be no manpower available to help with the installation of AGATA during this shutdown period. In addition, LS3 will probably be shorter for injectors than for the LHC so installation of AGATA would overlap with the ISOLDE physics running period; this would be possible in parallel with low energy physics but a more detailed idea about the integration required would be needed before a decision could be made.

P. Reiter briefly summarises the basic infrastructure needed from the host laboratory to house the AGATA array. This includes floor space, mechanics in the experimental hall and cooling infrastructure; the liquid nitrogen required would have to be provided by the host laboratory. Also services such as water cooling, air conditioning and detector laboratory equipment would be the responsibility of ISOLDE as well as the manpower to install, integrate and run the detector. A discussion follows and the committee asks for more detailed information from the AGATA collaboration about the manpower required and the level of manpower provided by previous host laboratories as well as the possibility of the AGATA collaboration itself providing long term on site support.

The committee clarifies that no specific amount of beamtime could be dedicated to AGATA and the experiments using the detector would have to pass through the usual INTC selection and scheduling procedure.

It is stated by the committee that, from a scientific point of view, bringing AGATA to ISOLDE would be very interesting. However, due to the lack of available manpower during LS2, it is decided that having AGATA at ISOLDE during the first proposed period from May 2021 to November 2023 is not possible. E. Siesling is asked to make a quick study to ensure that the integration of AGATA in the ISOLDE hall is feasible and the committee decides that CERN management should be informed about the idea to bring AGATA to CERN in order to enable the setting up of a working group to study the integration of the device. The project will be discussed again at the next ISCC meeting and B. Blank will represent ISOLDE at a meeting of the heads of laboratories involved in AGATA that will take place this month at GANIL.

11. EURISOL Distributed Facility (DF) – *G. Neyens*

The committee is informed that the EURISOL Steering committee meeting on the 17th of November 2017 was the kick off meeting for the working group leaders of the EURISOL DF initiative. The following working groups have to submit their reports by the end of March 2018:

- WG1 – Science and applications (Riccardo Raabe)
- WG2 – High power accelerator (Alberto Facco)
- WG3 – Beam handling, targets and ion sources (Maria Borge)
- WG4 – Spectrometers and detectors (Hervé Savajols)
- WG5 – EURISOL-DF relationships and legal structure (Angela Bracco & Marek Lewitowicz)

G. Neyens reminds the committee of the goals of the EURISOL DF initiative and sets out the future actions. The first draft of the full EURISOL DF proposal should be ready by May 2018 when lobbying of laboratory directors and funding agencies etc. will begin with the aim of getting the green light for the project from at least three countries by November 2018. With the final draft of the proposal ready by January 2019, consultation with the involved countries and community will take place from March to July 2019. The EURISOL DF project will then be submitted to ESFRI by 31st August 2019 with the goal of getting it on the ESFRI list in 2020. In order to prepare the application, input is requested about what each infrastructure wishes to enter as the upgrade of its facilities, in terms of both equipment and cost.

A discussion follows about the goals of the project in particular the proposal to have a single entry point for a significant fraction (up to 50%) of the radioactive ion beamtime dedicated at ISOLDE-CERN, SPIRAL2-GANIL and SPES-INFN for EURISOL DF experiments and distributed via the EURISOL DF Program Advisory Committee.

12. News from the ISOLDE Group – *G. Neyens*

The present manpower situation in the ISOLDE Physics Group is summarized by G. Neyens.

- **Associate:** Andrei Andreyev (July 2017 to June 2018), Joachim Cederkall (October 2017 to September 2018). **Deadline for new applications 16th March 2018.**
- **Staff Members:** Magda Kowalska (ERC betaDropNMR) (October 2015 to September 2018), Stephan Ettenbauer (ERC MIRACLES)(February 2017 to January 2021), Karl Johnston (Physics Coordinator)(October 2015 to September 2019), Gerda Neyens (Physics Group Leader) (June 2017 to June 2020)
- **User:** Jenny Weterings (User Support) (2002-)
- **Research Fellows:** Liam Gaffney –Miniball (October 2016 to September 2019), Vladimir Manea –ISOLTRAP (January 2016 to April 2018), Hanne Heylen – COLLAPS/VITO (October 2017 to September 2020), Ronald Garcia Ruiz – CRIS (January 2018 to December 2019).
- **Applied Fellows:** Andree Welker – HIFI Spectrometer/WISArD (August 2017 to July 2019), Stavroula Pallada –BetaDROPNMR (April 2017 to March 2019), Frank Wienholtz – MR-TOF-MS (January 2016 to December 2018), Joonas Konki – HIE-ISOLDE Experiments (March 2018 to February 2020), Simon Sels – MIRACLES (March 2018 to February 2020). **Deadline for new applications 5th March 2018.**
- **Doctoral Students:** Robert Harding (CERN-ERC Betadrop) (January 2017 to December 2018), Jonas Karthein (CERN via Gentner Doctoral Program) (November 2017 to October 2020), Varvara Lagaki (CERN-MIRACLES) (September 2017 to August 2020), Simon Lechner (CERN-MIRACLES) (September 2017 to August 2020), Jared Croese (CERN- EP-SME) (February 2018 to January 2021).

The committee is informed that the EMIS 2018 conference website is now on-line, the call for abstracts has been launched and registration is now open. The deadline for abstracts to be submitted is

March 5th and early registration will end on 31st July. There are rooms reserved at the CERN hostel for the conference but the deadline for booking these rooms is 3rd July.

G. Neyens tells the committee that the next edition of the ISOLDE workshop will take place at CERN from Wednesday 5th to Friday 7th December 2018 and that the call has been made for articles for this year's ISOLDE Newsletter; the deadline is 28th February.

It is explained that CERN is pushing to have all publications from CERN activities in Open access and has negotiated with certain journals so that it can pay for all papers having at least one co-author with CERN affiliation. However different journals will have different restrictions for example, the agreement with Nucl. Inst. Meth. A and B does not include proceedings issues.

G. Neyens informs the committee that CERN has declared as a success the #MeetISOLDE campaign that was launched by the CERN Media team at the end of last year to coincide with the fifty years of radioactive beams at ISOLDE. This is principally due to the increase in mentions of CERN and ISOLDE on social media, the increase in views on the ISOLDE website and the increase in media coverage of CERN and ISOLDE in mainstream media.

13. ISOLDE MoU: update of the Annexes – G. Neyens

The committee is reminded of the following points regarding the ISOLDE Memorandum of Understanding:

- The MoU is valid for three years and then renewed automatically for a new period of three years.
- PhD theses and all publications arising from experiments at ISOLDE should be uploaded to the CERN Document Server (CDS).
- The information contained in the annexes to the MoU must be reviewed at least annually by the ISCC.
- The MoU may be amended at any time with the agreement of the ISCC.

G. Neyens presents the requested updates to Annexes 1, 2, 4, 5.2 and 13, which are approved by the committee. The annexes relating to the finance of the HIE-ISOLDE project will be updated for the next ISCC meeting. The committee is requested to send any required updates to the annexes of the MoU to G. Neyens and they will be presented to the ISCC once a year at the meeting in February.

14. Financial situation of the ISOLDE collaboration and HIE-ISOLDE repayment – G. Neyens

The committee is told that all membership contributions for 2017 have been received except for those from Spain and Greece. The fees for 2013, 2014, 2015 and 2016 from Greece are also still outstanding. A brief overview of collaboration expenditure 2017 is then presented as well as the account balance at the end of the year.

G. Neyens then shows the committee the estimated income and expenditure for 2018 that includes the HIE-ISOLDE project, two technicians (each at 25%) for user support and a slightly increased amount available for student support. The committee is reminded that the collaboration still has to pay back the HIE-ISOLDE loan to CERN at the rate of 140kCHF a year from 2016 to 2020 (5 years) as well as to continue to pay 400kCHF a year up to and including 2022, with a smaller amount required in 2023, in order cover the remaining costs of the HIE-ISOLDE project.

The committee is informed that Greece has a new representative in the ISCC, A. Lagoyannis from Democritos, but although C. Fountas promised to sign the MoU in 2017, this has not yet been done.

G. Neyens explains that the Portuguese institutes involved in experiments at ISOLDE plan to join together to pay 10kCHF a year to the collaboration without signing an agreement. They hope this will then help in negotiations with their national funding agencies in order to become a full member in the future.

The committee is told that an agreement is being prepared, with the help of the CERN legal service, for the BOSE Institute in Kolkota, India to become an “institute” member of the collaboration for a period of three years in preparation for India to become a full member.

15. A.O.B.

- Committee members are asked to remind their colleagues that the details of all publications and theses arising from experiments performed at ISOLDE must be uploaded to the CERN Document System, CDS.

16. Dates of the next meeting

The dates of the remaining ISCC meetings this year are **Tuesday 26th June** and **Tuesday 6th November**.

Meeting ends at 15:40

N.B. The overheads of the above presentations can be found via <http://indico.cern.ch/event/697483/>.