Minutes of the 84th Meeting of the ISOLDE Collaboration Committee

held on March 19th 2019

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

Excused: K. Riisager, M. Pfützner (replaced by C. Mazzocchi)

Absent:

Invited: I. Martel Bravo, J. P. Ramos

(P.T. = Part Time attendance)

The meeting starts at 09:00 h

1. Introductory remarks

The ISCC chairperson, B. Blank, opens the meeting and informs the committee that C. Mazzocchi replaces M. Pfützner as the Poland representative at this meeting.

2. Approval of the Minutes of the last meeting of November 6th, 2018

The minutes from the previous meeting are approved.

3. Status of HIE-ISOLDE shutdown work – *E. Siesling*

The presentation begins with a summary of the status of the REX Low Energy maintenance planned during LS2 followed by an explanation of the three different REX EBIS electron gun alternatives: a new immersed gun solution, a new MEDeGUN Brillouin gun solution, use of the present cathode for the time being. The committee is told that, according to F. Wenander, the design and construction of the first two alternatives would be time consuming but EBIS can run with the existing configuration so it shouldn't be a problem to have the REX Low Energy part up and running for the 2020 commissioning and development run.

E. Siesling then summarises the consolidation and maintenance work carried out on the REX Linac RF so far during LS2. Then the committee is informed that the project to install 3 new diagnostic boxes and an additional steerer between the REX separator and the HIE-ISOLDE LINAC is progressing well and on course for the installation to take place in early 2020.

The presentation then turns to the repair of the HIE-ISOLDE cryomodule CM4. After ISOLDE winter physics finished at the end of 2018, the HIE SC Linac was warmed and then dismantling took place in January. On March 14th the cryomodule was transported to the cleanroom in SM18 where the repairs will take place; it is expected to be returned to the ISOLDE hall in January 2020 with

recommissioning planned for April next year. The committee is told that, in the future, it should be possible to take out and repair another HIE-ISOLDE cavity during a normal winter shutdown.

E. Siesling then summarises the status of the other LS2 HIE-ISOLDE installation work as well as the cryogenic system maintenance that will be carried out in 2019 ensuring the cryoplant is operational before April 2020. The committee is told that a new chiller is being installed in the HIE-ISOLDE CV system giving 25% more cooling power for building 508 so that air-conditioning and ventilation in this building will be upgraded in order to meet the user laboratories requirements and have circulation of fresh air on the first floor.

The teams involved in this work are thanked by E. Siesling for their hard work in ensuring that all LS2 tasks are on track.

4. Status of ISOLDE (front-end) shutdown work – *R. Catherall*

The committee is told that this is the first time that 2 Frontends will be removed during one shutdown period and that progress is good although some issues have arisen which are then summarised. The first order of machined parts from a company in Pakistan was not to specifications and had poor surface finishing while the repeat order did meet specifications but damage due to poor packaging had to be corrected by CERN. Unfortunately mistakes made by the CERN cleaning service resulted in the corrosion of the chambers that then had to be rectified. Also a number of both major and minor modifications have had to be made during the construction process such as the installation of 3 gas lines to the target, 2 RF connectors on each Frontend and a new chamber at the back of the Frontend as well as the replacement of all cabling in the faraday cages. The committee is then shown the design of the new extraction electrode movement that was carried out in collaboration with SPES and has been another major modification for the new Frontends.

R. Catherall informs the committee that the main assembly of the HRS Frontend is now finished with the internal alignment completed. Auxiliary parts and cabling should be ready by the end of March so that testing at Off-line 2 can start in April. It is commented that the production of the next Frontend is expected to be faster as all parts are either ordered or duplicated and no more delays are expected.

The detailed planning required for the removal of the current Frontends, including the high load of administrative work, is presented and the committee told that the old HRS Frontend has now been successfully extracted from the Faraday cage. Work on removing the GPS frontend will start soon. It is stated that, in the past, Frontends have normally been replaced after 5 years but the present devices have been in use for 7/8 years.

In parallel to this work a new HT modulator has been installed on the GPS, the old tape station has been removed from the CA0 beamline and the refurbishment of the Off-line 1 separator is on-going.

5. Highlights from the 2018 running period – *K. Johnston*

The 2018 injector accelerator schedule is shown and the committee is informed that protons were available to ISOLDE for a period of 217 days from 9th April to 12th November 2018. From 9th July, after 90 days of Low Energy physics, HIE-ISOLDE experiments were interchanged with low energy runs and, to allow for the best use of the machine, some experiments ran in parallel/invisible mode.

K. Johnston presents an overview of the experiments that took place on both the GPS and HRS in 2018 and tells the committee that the last few weeks of physics were very dense with several switches between setups and beamlines which was made even more challenging when a quadrapole on the GPS broke making steering difficult. He then summarises the range of radioactive beams produced for HIE ISOLDE experiments during the year and the very successful winter physics programme which ran up to the beginning of December.

The committee is informed that, after LS2, the new CERN Accelerator Scheduling master tool (ASM) will be used to produce the ISOLDE schedule and, as an example, presents how the 2018 schedule would have looked in ASM.

K. Johnston summarises the physics highlights from the end of 2018 including the results from the Thorium clock letter of intent (LOI198), the preliminary results obtained by WISArD and the excellent RaF run at CRIS, the results from which have generated a lot of interest.

The distribution of delivered shifts in 2018 between the different experimental setups at ISOLDE and the type of physics involved are presented, with 30% of shifts delivered to HIE experiments. These distributions are compared with similar analysis from 2016 and 2017. In 2018 the record number of 532 shifts were delivered; R. Catherall and G. Neyens thank everyone involved in achieving this.

After showing an overview of the number of shifts remaining for the different experimental setups, K. Johnston explains that instead of an INTC meeting taking place in February 2019, a call was made for status reports from those who wish to retain their remaining shifts. By the deadline of 15th March, requests to retain 776.5 out of the 1023 presently active had been received. Some more of these may be released after collaboration meetings take place during 2019. The status reports will be assessed at the INTC meetings in July and November this year as well as at detailed TAC meetings throughout 2019. The INTC intends to accept new proposals in early 2020.

The committee is informed that interaction with MEDICIS during 2018 was constructive. There was no serious impact on the ISOLDE physics programme and the irradiation possibilities for winter physics were a great boost for ISOLDE as a whole. The possibility of non-medical isotope collections after LS2 could also be beneficial to the facility.

K. Johnston tells the committee that the two technicians, partially supported by the collaboration and available to assist users with mechanical work for experiments, have a provided a good service during 2018. They have carried out work for MIRACLS, IDS, HIE-ISOLDE, VITO, biophysics and others. As the technicians will have less direct work for experiments during 2019 they will be asked to redirected to other tasks such as ensuring the conformity of the workshop in building 508, helping with the REX EBIS upgrade and taking care of safety matters in the hall.

Finally, the committee is informed that there will be no regular hands-on safety training sessions in 2019 except during the period when summer students are at CERN. K. Johnston explains that he has been given permission to give special hands-on courses for users who need to access the ISOLDE hall during LS2, which should avoid difficulties of having to reserve the trainer months in advance.

6. Results from tests with the new P2N convertor – *J.P. Ramos*

It is explained that collaboration with TRIUMF and SCK-CEN began in order to design two different p2n converters, one for TRIUMF ISAC and the other to improve the current converter design at ISOLDE. The history of the design concept is summarised with the main ideas being to use a thick converter in order to reduce the “proton cone” and a shifted short target to avoid the proton scattering zone. A simple prototype was designed and tested which provided low yields with very high purity but the target oven could not reach the desired 2000°C. The optimisation of the converter could take two possible directions; the first would be to avoid the scattering protons as much as possible to provide a low proton flux while the second would be to have the converter as close as possible to the 2000°C target for a high neutron flux.

The committee is told that, up until March 2018, 53 INTC proposals had mentioned the p2n-converter making it very relevant for ISOLDE so a project board was set up to manage the project. After showing the committee analysis of the preferred solution and explaining that the project board had decided that it would be better to aim for high intensity instead of high purity, the final design concept

of the p2n converter is presented. The concept uses Sigratherm (graphite foam) as thermal shielding in order to allow the target oven to reach 2000℃.

The offline developments made during construction of the target are briefly summarised as well as the results from the first online test runs. The Cs and Rb yields achieved were high and matched predictions while In, Ga and Zn were only run at low temperatures; the target oven needs additional development. It is explained that the MR-ToF was important in obtaining these results as it was used to characterise contamination. Data from the use of the first high power target at ISOLDE is shown and it is noted that temperature would need to be adjusted if the beam intensity changes.

J.P. Ramos tells the committee that, in the future, the plan is to produce a modular target which is personalised for the user and to use ThC2 with a converter material for Cu, Ni, Fe and Co beams.

7. News from the ISOLDE group – *G. Neyens*

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

- **Associate:** Deyan Yordanov (February to July 2019)

- **Staff Members:** Stephan Malbrunot-Ettenbauer (ERC MIRACLS) (February 2017 to January 2021), Karl Johnston (Physics Coordinator) (October 2015 to September 2022), Gerda Neyens (Physics Group Leader) (June 2017 to June 2020).

- **User:** Jenny Weterings (User Support) (2002-)

- **Research Fellows:** Hanne Heylen – COLLAPS/MIRACLS (October 2017 to September 2020), Ronald Garcia Ruiz – CRIS (January 2018 to December 2019). Deadline for new applications: for the Spring selection meeting applications had to be submitted by 4th March, for the Autumn round, the deadline is 2nd September (info can be found via: https://www.timeshighereducation.com/unijobs/listing/153723/senior-fellowship-programme/?LinkSource=PremiumListing.

- **Applied Fellows:** Stavroula Pallada –BetaDROPNMR (April 2017 to March 2019), Joonas Konki – HIE-ISOLDE Experiments (March 2018 to February 2020), Simon Sels – MIRACLS (April 2018 to March 2020), Dinko Atanasov – WISArD & Low Energy Experiments (April 2019 – March 2021) Deadline for new applications is the same as for Research Fellows, 2nd September 2019.

- **Doctoral Students:** Jonas Karthein (CERN via Gentner Doctoral Program) (November 2017 to October 2020), Varvara Lagaki (CERN-MIRACLS) (September 2017 to August 2020), Simon Lechner (CERN-MIRACLS) (September 2017 to August 2020), Jared Croese (CERN- EP-SME) (February 2018 to January 2021), Peter Plattner (CERN via Austrian Doctoral Program) (August 2018 to July 2021), Katarzyna Maria Dziubinska-Kuhn (CERN-ERC Betadrop) (October 2018 to September 2021), Karolina Kulesz (CERN-ERC Betadrop) (October 2018 to September 2021).

G. Neyens informs the committee that visits to ISOLDE have increased by a factor of 3 in the last 5 years due to the coordination of K. Lynch and, since the end of 2017, H. Heylen and the enthusiastic help of many local PhD and postdoctoral students as well as ISOLDE fellows. During 2018 there were 156 visits with a total of 1889 visitors, of which 55 were personal, 52 professional, 138 VIP and 1644 in groups. The distribution of these visitors by country is presented.

A quick overview of ISOLDE scientific outreach activities in 2018 is given with a number of articles appearing in the CERN courier, CERN News and CERN Accelerating News as well as a CERN press release about the shape-shifting character of Mercury isotopes in October 2018. An article about the ISOLDE workshop and Users Meeting also appeared in the CERN courier in January of this year. G. Neyens encourages everyone to get involved in providing information for such outreach activities and tells the committee which activities are presently planned for 2019. This includes an article about ISS

for the CERN Accelerating news and one about Hg shape staggering for the EP newsletter. ISOLDE will also participate in the CERN Open days from 14th to 15th September when more than 80,000 visitors are expected.

Finally, it is announced that this year's ISOLDE Workshop will take place at CERN from Wednesday 4th to Friday 6th December.

8. ISOLDE in ERINS / ESPP / EURISOL-DF – *G. Neyens*

The committee is informed that the ENSAR2 project will finish in March 2020, so a proposal for its successor ERINS (European Infrastructures for Nuclear Science) was submitted in March 2019. The coordinator of the project is A. Bracco and the proposal requests a total of 10MEuro with 50% for trans-national access (TA), 35 % for joint research activities (JRA) and the remaining 15% for network activities (NA). There are 10 facilities that would receive TA funding, including ISOLDE and a new joint multi-national facility (HU, ES and GR) denoted as DSD. A brief overview of the planned 9 JRAs and 6 NAs is presented as well as the relation between these work packages. In total there would be 34 beneficiaries of the ERINS project from 17 countries; a distribution of the requested ERINS budget between these countries is shown.

G. Neyens tells the committee that a meeting took place with E. Elsen, the Director for Research and Computing at CERN, on 18th January to discuss ISOLDE in EURISOL-DF. Strong support was expressed for a unified coherent European nuclear physics community science programme as it would give more visibility to the nuclear physics facilities, including ISOLDE@CERN, and to the community as a whole. However, there was no support for a 'common PAC' that decides on (some) beam time at ISOLDE. E. Elsen suggested that something should be started in a less formal way such as a common entry for proposals, which is foreseen within the ERINS project. Minutes of this meeting were discussed at the EURISOL Steering Committee meeting on 4th February and a reply to the questions posed by E. Elsen were sent to him on 19th February.

Finally, G. Neyens informs the committee that the ISOLDE contribution to the ESPP was submitted on 17th December and is one of 160 documents submitted that have free access via https://indico.cern.ch/event/765096/contributions/ . ISOLDE is also strongly supported in documents submitted by various countries. The contribution from ISOLDE details the EPIC project (Exploiting the potential of ISOLDE at CERN) and contains the following 3 objectives:

- Profit from increased driver beam energy and intensity (2GeV, 4μA), thanks to the LIU (LHC Injector Upgrade) at CERN and improve the exploitation of the existing infrastructure
- Have multiple simultaneous beams for users
- Build a new storage ring for short-lived and heavy ions

G. Neyens then details what actions would be required to achieve these objectives. The next step in the ESPP preparation process is a meeting in Granada at which G. Neyens will be present and M. Lewitowicz will present the NuPECC Long Range Plan. The committee is told that, at a meeting with E. Elsen on 7th February to discuss the future of ISOLDE, it was decided to set-up a brain storming meeting with technical groups at CERN to see which parts of the EPIC project are achievable in the foreseeable future. This discussion could include the possibility of building a new experimental hall as the requests for space from new experiments is increasing.

9. Update of MOU annexes + Approval of the contributions/country – *G. Neyens*

The committee is reminded that the ISOLDE Collaboration MoU, presently valid from 1st January 2017 to 31st December 2019, is automatically renewed every 3 years but the annexes must be regularly updated. G. Neyens presents the changes to the annexes that are presently proposed; updates have so far been received from Finland, Belgium and the UK. Committee members are requested to

provide any required updates to the annexes by 1st June 2019 so that all modifications can be sent to the committee members a few weeks before the ISCC meeting on 1st July where it is hoped that final approval will be given.

It is explained that updates to the MoU annexes will reflect changes to the management structure at ISOLDE, in particular the appointment of E. Siesling as the ISOLDE Deputy Technical Coordinator (with special responsibility for HIE-ISOLDE). Modifications required due to the 'end' of the CERN HIE-ISOLDE Project in December 2018 will only be made after consultation with the EN Department Leader, R. Losito, and in such a way as to keep Phase 3 of the project alive even though it does not appear in any CERN MTP.

10. New experiments to come / location in ISOLDE hall – *K. Johnston*

The committee is told that the experiments/setups listed below will or may have to be accommodated in the ISOLDE hall in the foreseeable future:

- Puma (pending approval by INTC and SPSC)
- MIRACLS
- MRTOF(s)
- CRIS platform and upgrade (space for GANDALPH)
- Additional VITO parts
- A magnet for PAC studies
- Upgrade of the GLM/GHM area including a new collection chamber plus integration of a tape station

The current use of space in the ISOLDE hall is presented and K. Johnston explains that a "Class C" zone will be created at the GLM/GHM area in order to satisfy the Swiss OFSP and CERN HSE. It is planned to reconfigure the concrete blocks and add a door to allow for the removal of samples without exposing other users to the risk of contamination; design work will start in the second quarter of 2019. The installation of a new collection chamber and the integration of an additional fast tape station in this area will take place while retaining the possibility of installing travelling experiments such as a biophysics chamber, Windmill, Gandalph etc. In order to create more space in this area it may be necessary to reconfigure the stairs up to the RILIS platform.

The committee hears that bringing the PUMA device to ISOLDE, after it has trapped anti-protons at ELENA in the AD-hall at CERN, will bring with it many challenges such as beam quality, low energy implantation etc. and after being transported to ISOLDE by truck it would have to be craned into position. It is decided that a presentation from the PUMA collaboration would be required at an ISCC meeting in order to address such issues.

K. Johnston explains that space would have to be created in the hall in order to accommodate PUMA and other new setups. The NICOLE experiment has not taken beam since 2010 and will have to submit a status report to the upcoming INTC meeting so the committee decides to invite a representative of NICOLE to give a presentation at the meeting in July; the space presently taken up by NICOLE could be an option for the PUMA device or MIRACLS. Another option for the location of PUMA in the hall would be at LA1/LA2, however, if LA1 is kept for travelling devices, LA2 could be used for MIRACLS. The TAS/Lucretia setup currently has no approved experiments and technical modifications are needed for future running, while the space it uses could be used for new or expanding setups. O. Tengblad informs the committee that the TAS/Lucretia teams are currently working on an upgrade in Valencia and they are discussing further plans. The committee decides to invite a presentation about the status of TAS/Lucretia at the meeting on 1st July.

Regarding the upgrade of CRIS, K. Johnston tells the committee that it would be possible to add another level at the experiment but the impact on the surrounding setups would have to be studied.

Other space that could be incorporated into the area available for experiments is the old control room and the corner of the HIE-ISOLDE extension presently used as temporary storage. CERN HSE would like the toilets to be removed from the hall which would free up space for e.g. storage or a visitors gallery.

11. Financial situation– *G. Neyens*

An overview of the collaboration income and expenditure for 2018 is presented. Required fees from all member states have been received including all outstanding fees from Greece. The fee of 2500 Euros for 2017 has been received from CTN-ISTID in Portugal; invoices to the 3 other institutes that make up the Portuguese consortium joining as an institute member will be sent out in due course. The Bose institute in Kolkota will be invoiced appropriately once they have signed the institute membership agreement; due to their changes in management the document has not yet been signed.

A summary of the funding of the HIE-ISOLDE project up to the end of Phase 2 is shown. The repayment of the loan taken out by the collaboration for Phase 1 will be completed in 2020 and the last of the yearly 400kCHF payments for Phase 2 will be made in 2023. In total the ISOLDE collaboration will have contributed 7301 kCHF to the project (which is about 1/3 of the total cost, including the building).

G. Neyens then presents the estimated income and expenditure for 2019. It is proposed that 100 KCHF be made available to fund the second year of a CERN applied fellow position in order to complete the 30 keV MR-TOF project for ISOLDE and MIRACLS. This funding would only be required if the proposed ERINS project is not approved by the EU. The first year would be funded by ENSAR2 and MIRACLS. A discussion follows and the committee concludes that this project should be completed as close as possible to the beginning of beam time after LS2 in order for as many experiments as possible to profit from this equipment. The committee agrees to make the funds available for one year of an applied fellow position if ERINS does not go ahead.

12. The Isolde Superconducting Recoil Separator (ISRS) – *I. Martel Bravo*

The basic principles of recoil separators are briefly summarised as well as the need for such a device at HIE-ISOLDE as identified at the HiFi project workshop held in Lund, Sweden in March 2011. The specifications of a possible recoil separator at ISOLDE are shown as well as the traditional system design based on warm magnets. I. Martel Bravo then presents to the committee a proposal for a design study of a new recoil separator using superconducting magnets. The study would explore a new design concept using SC coils and RF cavities in order to produce a compact, efficient and high-selectivity recoil separator. It would include beam dynamics, mechanics, size, weight, efficiency, selectivity, construction and running costs. The committee is told that a proposal for an EU funding request is under discussion within the project's international collaboration, a PhD position at the University of Liverpool has already been advertised and a collaboration meeting/workshop is planned in Liverpool at the end of April/ beginning of May.

I. Martel Bravo requests renewed support from the ISCC for the HiFi project and the design study of the SC recoil fragment separator. The committee agrees that this would be an interesting project for physics at ISOLDE and encourages the design study and the workshop to go ahead. If requested, The ISOLDE Group Leader can issue a support letter for grant applications.

13. Contracts ISOLDE representatives (Coordinator, ISCC chair, Spokesperson) – *B. Blank*

The current end dates of the 5 managerial roles at ISOLDE are shown. The committee is told that the CERN research board is discussing whether to extend the current term of the INTC chairperson for a few months into 2020, to be able to finalize the revision of all backlog proposals. In order to have a smooth start-up after LS2 for the users, the CERN contract of the ISOLDE Physics Coordinator has

been extended until September 2022 (as suggested at the previous meeting). B. Blank goes on to inform the committee that R. Catherall has expressed his wish to leave on early retirement as of December 2020. Hence, G. Neyens has shown interest to extend her term as ISOLDE Group Leader and Collaboration Spokesperson to cover the start-up of the facility in spring 2021. She would be willing to take this position for one extra year, until June 2021. The committee unanimously agree to ask G. Neyens to request an extra year of absence from her institute and, following a positive response, to request a contract extension of one year from CERN.

As the 3 year mandate of the ISCC chairperson will end in December 2019, the committee approves the setting up of a search committee consisting of the present ISCC chairperson, the ISOLDE Group Leader and the INTC chairperson as well as one ISCC member; J. Cederkall is appointed as the fourth member of the committee. Potential candidates will be contacted by the search committee and if they are interested in the position this should be communicated to the ISCC Chairperson by 10th June. The election of the new chairperson will take place at the meeting of the ISCC on 1st July so that the successful candidate can attend the November meeting and take over as chair in 2020.

14. Dates of the next meeting

The dates of the remaining ISCC meetings in 2019 are **Monday 1st July and Tuesday 5th November**.

Meeting ends at 15:15

N.B. The overheads of the above presentations can be found via https://indico.cern.ch/event/801266/.