Minutes

Date	***LNL, 04-Nov-19 05-Nov-19***
Meeting Topic	***LNL Users General Assembly***
Participants	
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AGENDA:

First day, 04-11-2019

1. Welcome and News from the User Board.
2. News from LNL Director.
3. News from acceleration division
4. Status of SPES project
5. Status of European projects (ENSAR2 and future)
   Coffee Break
6. Education and Outreach @ LNL
7. TAP coordinator
8. AN/CN coordinator
9. Open Discussion

Second day, 05-11-2019

1. AGATA@LNL
2. Gas Target project
3. Coffee Break
4. Users' new requests:
   a. Development of rare-earth beams for precision Coulomb excitation studies
   b. A radioactive source for the SPES tape station
   c. Development of stable cadmium beams at LNL for low-energy Coulomb excitation studies
   d. Multi-nucleon transfer for 186W+238U – request for a 186W at the Tandem-ALPI accelerator facility of LNL
   e. Beta- and Gamma Vibrations in Deformed Rare-Earth Nuclei – To Be or Not To Be?
   f. 11B tandem beams for the JUNO experiment
5. questions on the Users' new requests
6. Feedback from beam development
7. General discussion.

8. Overview of the SIRAD - INFN activities
9. DEI activities at SIRAD, CN, and micro-beam
10. SIRAD activities by the Cassino group on power electronic devices
11. Nuclear Physics and Nuclear Astrophysics experiments at LNL small accelerators
12. Nuclear Physics and Nuclear Astrophysics experiments at VdG and tandem accelerators
13. Diamond sensors properties probed with small accelerator beams
14. CN n-TOF/BELINA activities
15. Open discussion

Topic 1: (see slides)

Welcome and News from User Board (UB).

The Chair of the LNL UB welcomed the LNL Users, reminded the role of the UB committee and introduced the new members of the committee, elected by the Users in May 2019. They have a mandate of 3 years. She also updated on the status of the LNL Users and **invited new users to subscribe.**

Meetings with the director and with the head of the LNL divisions were held regularly, with involvement in important decisions (PAC meeting, location of new set-ups).

The Chair of the LNL UB highlighted the discontinued use of the "End of experiment reports", suggesting that a new is currently under analysis by the committee.

Topic 2:

News from LNL Director

The situation of the personnel has improved thanks to the conversion of fixed-term contracts into permanent ones for a number of technologists. Technical positions are hard to cover owing to competition with local Veneto industry.

In general, the budget is OK even if there is no space for contingency.

The merging of the two advisory committees, PAC and USIP, has been presented: the PAC, historically scrutinizing proposals asking for beams delivered by the TAP complex, has been enlarged with the addition of two members, who will mainly give feedbacks on interdisciplinary activities and proposals aiming at using beams from the AN/CN complex.

The director informed the Users that the procedure for the election of the future LNL director have started, and that the local consultation will take place on Dec. 12th, while the election by the INFN board of directors will occur on 20th.

The director then reported on selected topics:

- he announced the decision made by the AGATA steering committee to move AGATA to LNL one year in advance, following the strong request coming from the community and seen by the great success of the dedicated workshop help in LNL in March 2019.
- the involvement in big international projects like IFMIF and ESS is paying off, and the Italian contribution is being recognized and appreciated.
- The need for a strong synergy with applications has been emphasized, with the example of the SPES-ITALRAC for the production of radioisotopes devoted to nuclear medicine applications.

Topic 3:

Accelerator Division Report

AN-CN complex, S. Canella

S.Canella reported on the difficult situation of the personnel running the AN/CN complex, consisting of 3 LNL employee + 2 technicians (from Uni. of PD). This limited personnel implies working in shifts mode, with beams available from 8:30-17:00 Mon-Fri. This has an impact on the stability of the beam and the recovery of the previous conditions at every restarting of the machines. A limited number of users has been trained in order to operate in the so-called self-service operation mode, thus being able to work at nights and weekends, but only in cases no change of beam conditions are required.

In 2019 three sessions of maintenance have to be performed to fix the beam source, remove obsolete valves and improve console devices. AN2000 suffered serious problems owing to water cooling

The obsolescence of the machines has been remarked many times.

TAP complex, D.Bortolato

The beam delivery graphs have been shown, pointing to a limited use of the Tandem accelerator in the past few years, owing to unscheduled maintenance.

Tandem provided < 500 h in 2019, with a working voltage less than 12 MeV. Piave and ALPI complex provided efficiently beams in June-July but had to be stopped over the summer break due to an intervention on the power supply mainframe cabins.

Extraordinary maintenance of the Tandem comprised a purification for the SF6 gas, reaching values of purity close to 99%, plus the reconstruction of the laddertron. This long maintenance was also exploited to improve mechanical solutions and installation procedures.

A serious issue is the supply of C stripper foils, since the usual contractor is going to retire soon and has not left any knowledge of the procedure behind.

PIAVE and ALPI also underwent major upgrades in view of SPES, which implied the relocation of some elements.

ALPI cooling has started and will be operational in the beginning of 2020. Tandem is undergoing conditioning and beams are expected for two weeks in December, keeping the voltage below 13 MV. If these operations are successful it is foreseen to increase to voltages above 13 MV in the beginning of 2020.

A one-year stop is foreseen starting from August 2020 for SPES installations. This will be confirmed at a later stage after the MAC meeting in December.

Topic 4:

Status of SPES project

Delays in the delivery of first beams at SPES are foreseen, mainly caused by delays in the preparation of the infrastructures of the building and the heavy bureaucratic process needed for the tendering of each element. G. Prete asked the INFN president to be able to speed up this process, in order to be more effective and reduce delays. The budget has slightly raised from initial estimates, but new resources have been allocated by the management. The SPES project is also demanding manpower, since it is heavily relying on fixed term personnel.

The actual schedule foresees to deliver non-post-accelerated RIB by the end of 2021.

Topic 5:

Status of European projects (ENSAR2 and future)

LNL is part of the TRANSNATIONAL ACCESS PROGRAM within the ENSAR2 initiative, together with the twin laboratory LNS. ENSAR2 project is finishing in 02/2020, and an extension of 6 months will be asked.

51 projects were supported up to now (27 fundamental physic, 24 interdisciplinary) with 76% requests for TAP (53% GALILEO, 18% PRISMA, 15% PISOLO, 13% astrophysics), 17% for AN2000, 7% for CN beams. User from more than 20 countries (17 EU and 3 non-EU) were supported with the total of 1565 day/person.

The new project ERINS (coordinator A. Bracco) didn't pass in the first call, but there are chances that it can be approved in a later stage.

M.Cinausero reminded the need to acknowledge ENSAR2 in papers coming out from financed projects and to update the list of ENSAR2 projects.

It is reminded that**: eligible research teams need to have a spokesperson and most of the group coming from non-Italian institutions. Extra-European institutions may also apply. The request must be submitted together with the proposal.**

PAC members belonging to the User Selection Panel (ENSAR2) are A.Gargano and C.Fahlander.

Topic 6:

Education and Outreach @ LNL

The responsible for the CC3M, A. Gozzelino, remarked that the AN2000 and CN complex are useful playgorunds for high school students, with several activities ongoing, such as Rutherford backscattering experiments, developments of analysis programs, experiments related to cultural heritage and applied physics. The help of colleagues performing experiments at AN/CN complex has been acknowledge Activities for master students are also organized at the Tandem with the PISOLO set-up thanks to the help of G. Montagnoli, A. Stefanini.
The great demand for guided tours exceeds the availability of personnel dedicated to them, and in year 2019 around 4200 people took part in the tours. At present, given also the little number of guides no other request can be satisfied for year 2020, expect University.
As respect to the 3rd INFN mission, dedicated experimental measurements are performed during the year (around 20 days): Misura_CC3M@LNL one day every 3 months, residential stages for students (2 days in June), a national program dedicated to Italian high school teachers Programma INFN Docenti (Pid @LNL in February 2020, 6 days) and pre_ESOF event in collaboration with INFN Trieste for 16 European high school teachers (12-13 March 2020, 4 days).

Help from LNL colleagues to run the guided tour and/or experimental third mission activities at AN2000/CN has been asked.

Topic 7:

TAP coordinator

M.Mazzocco presented the status of beam requests and beam delivery in 2019. Owing to the Tandem failure, the request of beam time presented to the last PAC meeting had to be modified, asking spokespersons whether they could convert their requests using beams delivered by the PIAVE+ALPI complex only. The original request of 191 days for nuclear physics and 19 days for applied physics was then reduced to 148+6 days. A high rejection factor of ~70% lead to the approval of 42 days in total. 7 of the proposals are waiting 2020 for the Tandem to reach the nominal voltage.
A backlog of ~95 days is accumulated up to now, which is expected to be exhausted by spring 2020.
The Tandem accelerator will restart operations in December 2019, restricting the use to local people in order to have a minor impact on case of delays or cancellations.
The next call for proposals will be circulated after assuring the operation of the Tandem, with the new PAC definition, as presented by the director. Proposals for experiments up to end of July 2020 will be discussed.

Topic 7:

AN/CN coordinator

V.Rigato insisted on the obsolescence of the AN/CN machines, and a project for a new proposed machine has been presented, addressing the possibility to couple the system to the 1+ beamline of SPES in order to expand the scope of the experimental program to be performed at LNL.
The expected budget for both infrastructure and machine has been outlined, amounting to nearly 10 M€.
A financing agency and detailed planning schedule for such project has not been identified yet.

General Discussion:

- **New PAC composition**:
  Criticism for this new PAC composition and burden of work it will face. The new operating mode of the PAC is unclear, in particular how the discussion of nuclear physics and applied physics proposals will be handled on the same footing. The Users will wait for the call and the first meeting to fully understand how the PAC will be handled.
- **Future of the AN/CN complex**:
  Again, the need to ask money for the new low-energy machine has been discussed, following very similar discussion as in previous meetings. It was proposed that the project has to find out possible partners (as for example different universities) and to be presented in more details (financial, personnel and technical aspects).
- **Delays on the SPES installations**
  It has been underlined that delays related to SPES are mainly due to infrastructure and administrative delays, rather than to specific technical and scientific developments. Concern is shared by many users regarding the possible loss of opportunities in case of significant delays in the timeline of the SPES project.
- **Future scheduling of beamtime and shutdowns:**
  The community insisted in the need for timely decisions about shutdown periods since this strongly affects various aspects, starting from the organization of maintenance and upgrades of experimental arrays down to fund requests. This also strongly affects agreements for travelling instrumentation to be brought to LNL, which need to be defined well in advance in order to prepare requested infrastructure.

Day 2, Morning Session

Topic 1:

AGATA@LNL:

R. Menegazzo presented the project to anticipate the arrival of AGATA at LNL in the second half of 2021. This has been agreed by the AGATA Steering Committee, the directors of the hosting laboratories directly involelved (LNL and GANIL) and the AGATA community, following a very successful workshop in March 2019.
The arrival of AGATA in an upgraded configuration with respect to the demonstrator phase hosted at LNL, will have an impact in terms of need for large computing infrastructure and a revison of the first experimental hall in the Tandem building. Details on this have been shown.
AGATA is planned to start the campaign measuring together with the PRISMA spectrometer, and then a stand-alone campaign is foreseen. All the Italian AGATA community is getting involved in the project, and the three main actors will be LNL,Padova and Milano.

Topic 2:

Gas Target project
A.Gottardo, leading scientist of a PRIN awarded project to build and install cryogenic targets at LNL, presented the scientific motivation and the timeline of the project. The targets will be built in order to be compliant with both AGATA and GALILEO experimental arrays.

Topic 3:

Users' new requests:
Several requests for beam developments and for new activities have been presented by the Users. For those who could not join the meeting G.B. made a short resume of the requests.

- J. Smallcombe proposes Coulomb excitation studies with rare-earth beams of even Gd species. The planned set-up is GALILEO+SPIDER, and the request is to have Gd beams with 4.5 MeV/A on 208Pb target.
- A. Saltarelli asks to the lab to purchase a radioactive source of 90Sr/90Y for the SPES tape station and ICES setup. The need for this source 90Sr/90Y source (about 2.5kEuro) refers to its beta-decay Qvalue window. It has a lifetime of about 27 years. Seeks for other possible Users.
- N. Marchini is asking for Cd beams for the Coulomb excitation studies with the GALILEO + SPIDER set-up and in future for AGATA + SPIDER. It is known that Cd beams have been produced only in few labs due to their toxicity.
- D. Ackermann is asking for possible development of a 186W beam to perform reaction studies on the 186W+238U, to study competitions between DIC, fission and multi-nucleon transfer reactions, using the PRISMA array.
- - C. Fahlander is proposing a Coulex study starting from 162Dy beam using the GALILEO + SPIDER setup.
- - H. Staiger, for the Juno collaboration, asks to install an existing equipment to produce neutrons to study performances of liquid scintillator detectors.

Topic 4:

Comments on Users requests:

For beam development A.Galata' replied to each request. As for the source it was remarked that the collaboration should be in charge of paying for the material, and that a formal request, describing the need, the set-up where it will be used and the time window should be sent to the Radiation Protection Office for feedbacks and approval.

Regarding the new activity from the Juno collaboration it has been remarked that they need to have the scientific approval by the PAC, but that it would be useful to organize a seminar and present their request and needs in advance.

Topic 5:

Feedback from beam development:

A. Galatà presented a careful analysis of the requests and underlined possible difficulties related to each specific beam. A list from easier to more difficult developments has been provided. He included in the evaluation also the long-standing 238U beam development.
The acceleration and source divisions are open to new developments and 1-2 species can be tested per year. However, owing to past experience when beams where requested and developed but never finally used, it has been asked that requests should be shared by several Users, thus justifying the efforts.
Here are the notes for the species requested by the Users:

152Gd, 186W: difficult to produce with the negative ion source, these are heavy beams with the high consumption of Tandem stripper foils; difficult to produce with the ERC source, produced only with low efficiency (enriched material needed) and performances not predictable.

238U – ECR source (by sputtering – metal rod), expected with 0.1 – 1 pnA with 6.9 MeV/A (or 7.8 MeV/A with additional CR21 +CR22), need for the specific authorization, possibility to use ADIGE injector → to continue the process of authorization, to perform test with Ta and sputtering.

14C – easily produced, problem with the implementation.

204Hg and Cd beams pose serious health risks due to toxicity, require specific health surveillance and definition and application of specific procedures for the source, pumps and operators. They are therefore not likely to be further investigated.

162Dy can be tested without specific considerations. Performances are expected to be good.

General Discussion:

A lively discussion followed the requests outlined by the contributions of the Users.

The User community thanks the acceleration division for its useful feedbacks. Following the possibility for beam development of 1-2 species per year, and given the need for optimization the number of requests by the Users, the UB decided to keep collecting the requests, and will discuss with the new director and the head of the acceleration division how to proceed in the future. Special priority in the discussion was given to the development of the U beams.

GB updated the Users on the ongoing process to ask permissions to use radioactive targets. A meeting was organized to discuss with the head of the radioprotection service the possibility to put forward such request and the documentation that the Users have to prepare. Minutes of this meeting are being prepared and will be circulated to people who have an interest. GB and AG are preparing a document for such request from the AGATA and GALILEO gamma spectroscopy community.

Day 2, Afternoon Session

Topic 8:

Overview of the SIRAD facility - INFN activities:

S. Mattiazzo illustrated the activity of SIRAD, an irradiation facility for radiation damage studies that started its activity in 2000. It is located in the experimental Hall1, equipped with a general-purpose irradiation chamber and an ion electron microscope. Several activities are carried out by local and external groups under the supervision of the group in Padova, mostly related to Si devices and detectors. Tests of SEE (single event effects) and TID (total ionizing dose) are performed with heavy ions (ranging from protons to Au ions); DDD (Displacement Damage Dose) usually with protons and Li. The activities need TANDEM beams with an operating voltage up to ~14MV.

Topic 9:

DEI activities at SIRAD, CN, and micro-beam:

The activity related to the research group RREACT has been detailed by M.Bagattin, active in the field of reliability of electronic components and systems, with a focus on radiation effects. Experiments are mainly performed at the SIRAD facility, but also using the AN/CN accelerator complex. This research has a strong scientific output and the collaboration aims at maintaining its role within the international radiation-effects community.

Topic 10:

SIRAD activities by the Cassino group on power electronic devices

F. Velardi presented the main results matured by the electronic group of Cassino in twenty years of experience in the field of the reliability of power electron devices to single event effects. The transit of a single ionizing particle in the active regions of the device favors the establishment of phenomena of very short duration due to which the component is electrically or thermally stressed to the point of suffering irreversible damage and, in many cases, the rupture. The author explained the evolution that led to the design of a unique and sophisticated experimental set-up and illustrated the radiation damages detected in the new generation power electron devices.

Topic 11:

Nuclear Physics and Nuclear Astrophysics experiments at LNL small accelerators

R. Depalo illustrated the activities related to measurements of astrophysical interest performed at the LNL AN/CN complex. Several techniques are applied, and measurements can complement the activities at other larger facilities, such as, for example, LUNA.
Interesting developments are also related to target production and characterization.
Technical problems related to the energy calibration and reliability of the beams delivered have been underlined.

Topic 12:

Nuclear Physics and Nuclear Astrophysics experiments at VdG and tandem accelerators

Also in this talk, D. dell'Aquila showed the large interconnections between experiments performed at Van der Graaf machines and those exploiting larger accelerators. Several properties can be attached, in particular in light systems, starting from quantum properties, nucleon-nucleon correlations, exotic configurations, halos, skins or clustering.

Topic 13:

Diamond sensors properties probed with small accelerator beams

F.Picollo described the activity of the DiaFab group on Ion Beam Lithography in Diamond leading to the construction and characterization of Diacell sensors, diamond based sensor for cellular radiobiology. The group is mainly exploiting the microbeam at the AN complex, and suggestions for increasing performances are being described.

Topic 14:

CN n-TOF/BELINA activitiesContributions from LNL Users:

CN BELINA facility was described in the talk by G.M.Hernandez. The facility shoots the pulsed proton beams from the CN on Li target to produce neutrons. Reliability and time stability of the beam pulses in terms of both energy and time properties are crucial for the successful production of the neutrons. The contribution of measurements at BELINA to solve the long-standing cosmological Lithium problema has been discussed.

General Discussion:

The second part of the afternoon was devoted to contributions by Users on selected topics, showing the variety and impact of the program pursued using the AN/CN accelerator complex and importance of applied studies. The variety of subjects, covering basic research in nuclear physics on aspects related to nuclear astrophysics and neutron cross section measurements, to applied physics for the characterization of materials and components, to the definition of new treatments for tumors.

Having shown the actual and future impact of the research performed using the so-called “small machines”, AN and CN, the discussion focused mainly on the need for a new system that could replace the existing ones, which are no longer reliable owing to aging of components.

Even if the community – and the director- agrees on the need for such an intervention, the amount of money needed for such operation cannot be asked to one single subject (i.e. INFN). A need for a diversification of the requests, applying to various calls, has been stressed.

JW underlined that SIRAD is a strategic facility for INFN research, helping also the program in HEP. Lately the machine suffered a reduction of beam requests owing, on the one side to the problems with the Tandem, and, on the other side, to lack of manpower. It has been suggested that SIRAD should become a facility run by LNL by dedicated personnel, rather than relying on the support of external experimental groups.

The works of the Annual Meeting finished at 18:30.