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# Outcome of the fifth SPL collaboration meeting

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Keywords: Superconducting cavities, Cryomodule, High Power RF, Linac

**Summary**

The fifth SPL collaboration meeting [1] was hosted and organised at CERN. It took place at CERN from November 25 to November 26, 2010.

## 1. Introduction

The fifth SPL collaboration meeting was held at CERN with participation of many of the collaborating institutes (see Table 1). The organisation was in the style of a workshop, lasting 2 days with reports and summaries of the collaborators. The meeting closed with a tour of the recently completed LINAC4 building. The files of all the presentations are available on the Indico site of the event [1].

The meeting goals (Appendix A) were similar than the previous ones. There were no parallel sessions (see agenda in Appendix B) to give all participants a complete overview of the work since the 4$^{th}$ collaboration meeting [2], which was held together with the European Spallation Source in Lund. Fifty five participants had registered (see list in Appendix C). 6 plenary talks, 28 working group talks and a final discussion took place. The participation from US-labs was smaller this time because of the overlap with the Thanksgiving holidays in the US. The list of all participating institutes and their on-going SPL related activities is given in Table 1. Future SPL related events were announced at the meeting and are listed in Table 2.

The summaries of the Working Groups appear in the following.

**Table 1: Participating institutes**

| Institute | Activity | Working group |
|---|---|---|
| Cockcroft Institute | Study on phase locked magnetrons | WG1 |
| ESS Lund | Beam dynamics. Development of a klystron modulator for several 10s of Hz and several % duty cycle for the test of a short 4-cavity cryo-module at CERN. Collaboration on cryo-module design. | WG1,3,4 |
| CEA Saclay | Construction of high-beta SC cavities, He tanks and tuners, contribution to development and tests of low level RF and high power couplers | WG1,2,3 |

| | | |
|---|---|---|
| CNRS/IN2P3 Orsay | Design and construction of a beta=0.65 sc cavity, contribution to the design and construction of a prototype cryomodule | WG2,3 |
| FNAL | Collaboration on RF architecture, beam chopper, cryo-module design, beam dynamics and other subjects | WG1,2,3,4 |
| TEMF Uni. Darmstadt | Electromagnetic simulations of beam-coupler interaction | WG2 |
| Uni. Rostock | Electromagnetic simulations of HOM coupler | WG2,4 |
| BNL | Design and construction of beta=1 sc cavity | WG2 |
| TRIUMF | Construction of beta=0.65 sc cavity | WG2 |
| RHUL | Electromagnetic simulations of inter-cavity coupling, measurements on copper model of high-beta sc cavity for field flatness and HOM measurements | WG2 |
| Soltan Institute | Radiation protection simulations | WG4 |
| JLAB | Collaboration on all subjects | WG1,2,3,4 |

**Table 2: SPL events in 2010/11**

| Title | Date | Organiser | Comment |
|---|---|---|---|
| SC cavities (regular video meetings) | Since 11 Jan. 2010 | W. Weingarten | |
| Signature of ESS/SPL addendum: collaboration on 4-cavity cryo-module & test infrastructure | 9 December | | **Signed!** |
| Cryo-module design review | Early 2011 | V. Parma | t.b.c. |
| Joint ESS-SPL collaboration meeting | June 30 – July 1st 2011 | ESS/SPL/CEA | In Paris |
| Review of high-power coupler design & construction | October 2011 | E. Montesinos | t.b.c. |
| SPL CDR (joined with PS2) | Summer -Autumn 2011 | F. Gerigk | |

## 2. Scope of the SPL study

The CERN management has decided to support the R&D for a high-power linac matched to the needs of neutrino facilities. The low-power SPL (LP-SPL) is kept as a fall-back option for the LHC injector upgrade, which now focuses on the upgrade of the existing injectors (PSB, PS, SPS) and assumes the existence of Linac4. This implies that the LP-SPL study will finish with a design report in 2011, and that the SPL team concentrates on hardware R&D and non-site-specific layout issues. The 2011 SPL report will also contain all considerations for a high-power SPL (HP-SPL), since the LP-SPL was always conceived as a machined that can be upgraded several MW of beam power. The general parameters of the high power SPL are given in Table 3.

As announced in the 4th collaboration meeting [2] CERN has started to prepare the construction of a 4 cavity "short" cryo-module to be tested at high RF power early in 2013. The 4 cavities are designed in the context of the Working Group on sc cavities (WG2) and they will be built in industry under CERN supervision. Their surfaces will then be processed at CERN using the DESY recipe. The short module will allow testing fundamental concepts of the final module, which will ultimately contain 8 cavities. For the high-power tests at CERN a 704 MHz klystron will be bought and installed together with a 50 Hz (or *n* x10 Hz) modulator, contributed by ESS. ESS is presently preparing for tendering for such a device. Some of the workshop talks focused on how the existing infrastructure at CERN (SM18) needs to be upgraded for these tests.

It was discussed how to simplify the organisation of future collaboration meetings from the various institutes and one possibility might be to organise them under the umbrella of the TTC. This can potentially reduce the total number of meetings and make it easier to attract international experts from various related projects. A final decision was not yet taken.

The following sections contain the summaries of the 4 CERN working groups, focusing on the work done at CERN and by the SPL collaborators.

**Table 3: Operational scenarios for the SPL**

| Operation type | Low-current / single high power user | High-current/two simultaneous high power users |
|---|---|---|
| beam energy [GeV] | 5 | 5 |
| beam power [MW] | 4 | 4 |
| repetition rate [Hz] | 50 | 50 |
| average pulse current [mA] | 0 - 20 | 0 - 40 |
| peak current [mA] | 32 | 64 |
| nominal chopping ratio | 3 out of 8 | 3 out of 8 |
| pulse length [ms] | 0.8 | 0.4 |
| protons/pulse [$10^{14}$] | 1 | 1 |
| linac length [m] | 525 | 525 |
| cavity gradient ($\beta$=0.65/1.0) [MV/m] | 19.3/25 | 19.3/25 |
| beam duty cycle [%] | 4 | 2 |
| RF duty cycle [%] | 7.8 | 3.9 |
| cryo duty cycle [%] | 8.2 | 4.1 |

## 2.1 Progress and activities in WG1 (RF), E. Ciapala

### 2.1.1 RF Power system

Some discussions have taken place recently with manufacturers of RF power sources. Initial tentative ideas have been gathered on feasibility of alternative solutions to klystrons and their cost. Multi-beam IOTs at the power levels needed would need considerable development investment. High-power solid-state amplifiers solutions for the moment seem expensive and bulky compared to klystrons, mainly due to the large numbers of combiners needed with present devices which reach around 1 kW. Klystrons costs, on a large production basis appear considerably less than the original estimates; these had been estimated on single unit production. The costs of high-power klystrons at the 1.6 MW and the 3.4 MW levels are a stronger function of power level than was originally assumed. This would mean lower additional investment for a single cavity per klystron configuration than was previously estimated. The lower power klystrons are also expected to be few percent more efficient, which would also mean further reduced operating costs with this configuration.

Nevertheless, IOTs have some important advantages over klystrons, e.g. no gain drop on overdrive, simpler modulator, better efficiency and lower operating voltage (see previous collaboration meeting presentations) and could certainly be used in the low-power section. A 600 kW MB-IOT would be a very interesting option to study in collaboration with industry. Such a development has many other potential applications. The same is true for high-power solid-state amplifiers. A particular advantage of solid-state for SPL would be in the modularity and the ability to exactly configure the size of the amplifier according to the power needed. This again would be a particular advantage in the low-power section, where a single amplifier per cavity would be the obvious choice. Reliability, good lifetime and easy maintenance are important advantages with solid-state. Solid-state amplifier work is being actively followed up by CERN's RF group, in collaboration with other institutes.
While no specific presentation was made on the use of magnetrons at this meeting, it is understood that many of the design issues have been studied and that high-power tests could be envisaged. A detailed report is in completion.

#### 2.1.2 LLRF

The simulation studies have now progressed from the single cavity to the two cavities per klystron configuration and some important results have been obtained. Differences in cavity loaded Q and Lorenz force detuning have been simulated. The feedback can easily compensate overall amplitude and phase errors but the piezo tuner is essential to equalize the fields in the individual cavities, both to minimize power and to avoid overdrive of one cavity or the other. Feed-forward also helps to minimize the phase and amplitude differences between the cavities. An interesting point raised was that cavities could be selectively matched according to their loaded Q value and installed to give optimum performance along the linac. Good pulse-to-pulse stability of the source intensity has been identified as an important objective in order to minimize the necessary power overhead for feedback. The effects of transit times not ideally matched to the cavity β values have also been analyzed. The next phase of the work will include optimization to minimize such effects along the linac.
An important test will be to validate the LLRF simulation results by building a complete control system to be tested on a cold cavity, at CEA Saclay.

#### 2.1.3 SM18 test stand and RF power

The work plan for SPL prototyping in SM18 has been established in detail and work is well under way. The planning is tight, constrained especially by Linac 4 work but it should be feasible. A decision on whether to take an existing 1 MW design or a new higher power klystron will be made early in 2011. The possibility of a common order together with ESS is also being looked at. The RF power distribution layout in SM18, i.e. choice of common or separate circulator for each of two cavities powered is being studied and a final decision will be taken in spring 2011.

#### 2.1.4 Klystron modulators for ESS and SM18

The ordering of the SM18 modulator is on track; the order is to be placed in 2011 for delivery in October 2012. For ESS the discussions with suppliers are under way, specifications for a small pre-series are to be completed by 2012, for delivery in 2014.

### 2.2 Progress and activities in WG2 (SC cavities), W. Weingarten

As to the generalities, the recent CERN Medium Term Plan decisions were already presented by R. Garoby and will not be repeated here. The plan to test a fully equipped short cryo-module in mid 2013 is maintained. CERN is now member of the TTC (TESLA Technical Collaboration) and more specifically in its Proton Accelerator Working Group. CERN prepared participation in the recent FP7 "CRISP" (Cluster of Research Infrastructures for

Synergies in Physics) proposal to the EU (covering SPL cavities diagnostics and SRF staff training linked with XFEL, ESS, DESY). TRIUMF withdrew from the SPL collaboration.

### 2.2.1 Fundamental power coupler

The fundamental power coupler design stage is completed and the prototyping is under way. Required infrastructure, if not yet available at CERN, was identified (clean rooms). The present plan covers 4 SPL-LHC couplers, 4 SPL-SPS couplers, 8 double walled tubes, 4 coupler test cavities. In April 2011 2 x 4 couplers will be assembled in the DESY facilities, for June 2011 RF power tests are foreseen at CEA.

### 2.2.2 HOM damping

The HOM damping requirements were refined. From the beam stability point of view, a damping corresponding to $Q_{ext} < 10^5$ is recommended, provided that all possible chopping schemes shall be coped with. The previous requirement of $Q_{ext} < 10^4$, valid for resonant excitation of HOMs and less than 100 W extracted power, can be avoided by tuning the resonant frequency of the specific HOM. The fundamental power coupler helps for HOM damping. The CERN-Saclay hook coupler is being simulated at Rostock University.

### 2.2.3 Cavity processing

The EP equipment is not yet complete. Still missing are the cathode, top interface, and the bottom interface.

### 2.2.4 Diagnostic equipment & inspection

The required equipment is defined but no prioritization was done yet.

As far as clean work and post mortem inspection is concerned, the upgrade proposal and cost estimation for the SM18 clean room is finished (attention: useful space < 13 m!).

### 2.2.5 Mechanical aspects

With regard to the mechanical issues a lot of coordination work is needed, "copy-paste solution is an illusion". Some mechanical tests at cryogenic temperatures still need to be understood (e.g. Ti - Cu gasket - SS flange). Interfaces between cavity, helium tank and cryostat are an issue.  A stainless steel tank would have alleviated some issues and should be the baseline for the future. The procurement of Nb is underway (although later than originally envisaged) and the cavity manufacture market survey was launched. Some details on the welding procedure are under study (Ti/Nb welding preferred w.r.t. Nb/NbTi/Ti). The manufacture and treatment sequence was defined (including 800 °C annealing). Manufacturing by industry is foreseen Feb. 2011, delivery end 2011 (however, consequent to the late delivery of the Nb sheets, this date cannot be kept).
An active magnetic shielding was discarded and a design proposal was concluded.

### 2.2.6 Partner institutes

As to the news from partner institutes, CEA - Saclay started the manufacture of the tuners. The design of the helium tank is completed, the drawings and specifications are in progress. High power RF tests are going on in the frame of the SLHC-pp program. The processing of new couplers from CERN will follow. An impressive new SRF processing and assembly area is available now.

### 2.2.7 Other issues & outlook

To mention other issues and give an outlook for future work, the necessity of the tapers in cavity string was questioned. The fundamental mode coupling is only weakly sensitive to

taper and the HOM coupling increases if the taper is absent. These arguments have to be weighted against an increase of the impact energy of field emitted electron current, if the taper were absent. Different cavity production methods are being investigated, such as HIPIMS coating with ions.
As **open issues** remains a check of concordance of the planning with external partners. Another issue are multipactor calculations for the HOM coupler. A spare cavity for electropolishing studies is highly welcome (in replacement of beta = 0.5 Saclay cavity), but the financing is not yet granted and must be discussed.

## 2.3 Progress and activities in WG3 (cryo-module design and integration), V. Parma

Presentations and discussions of WG3 were concentrated on the 26th November due to the unavailability of most WG3 members on the 25th November. 3 presentations were scheduled: a first one on the mechanical calculations of the cryomodule (P.Azevedo, CERN), a second one dedicated to work progress in the detailed design of the cryomodule at CNRS (P.Duthil, CNRS); the third presentation was given by ESS (W.Hees, ESSS), who was recently welcomed to join WG3. In the summary of WG3 presentation, V.Parma gave an overview of the status of the design of the cryo-module, including highlights from the technical specification meeting held at CERN in October 2010.

### 2.3.1 Mechanical studies of the cryomodule

In his presentation, P.Azevedo gave an overview of the possible concepts for supporting the cavities in the cryostat putting in perspective their advantages and drawbacks. After presenting the alignment budgets, he detailed the adopted conceptual design solution featuring the RF coupler double-walled tube as the main mechanical supporting element. By showing results of mechanical calculations, based on FE analysis, Paulo underlined the need to add a support between adjacent cavities (so called “inter-cavity support”) in order to reduce the vertical sag of the cavities to about 0.15 mm, which is the goal for vertical sagitta. Since the RF coupler defines the fixed point for each cavity, the inter-cavity support will have to allow thermal contraction movements with low friction. Paulo stressed the fact that his calculation is aimed at specifying mechanical stiffness rather than yielding a full structural analysis with precise stress mapping; this will have to be accomplished by CNRS when the detailed design will be completed.
The double-walled tube dimensions have been fixed by the RF coupler and heat load requirements, so the inter-cavity support is the only component which remains to be designed in order to achieve the vertical sagitta goal. The detailed design is in progress by CNRS.
Paulo showed the possible vacuum vessel solutions and stress and deformation calculation results; the design solution is strongly dependent on the cryostat assembly solution which will be adopted. The comparison between options is work still in progress.

### 2.3.2 Work progress at CNRS

P. Duthil presented the detailed design developments at CNRS, now concentrated on the design of the interface between RF coupler and vacuum vessel and on the design of the inter-cavity support.
In order to free space for the integration of the inter-cavity support, CNRS has studied a new orientation of the tuner. It was noticed that the concept of inter-cavity support presented by CNRS is not consistent with the one specified by CERN, resulting in sag values about twice higher. CNRS will have to correct the design to be consistent. The sliding feature of the inter-cavity support is achieved by a close fit between a tube in a bore, but no assumptions on friction modeling have been made. Doubts were raised by the audience on the risk of sticking

during thermal transients, resulting in unforeseen longitudinal pull between cavities. CNRS confirmed that it is premature to judge on the validity of this design since much work still needs to be done on this item.
Vacuum vessels of two types are been compared, a U shaped solution, associated to a vertical assembly of cavities pre-mounted on a base plate, and a tube-shaped vessel, where the string of cavities is inserted longitudinally. The former results in a more complex mechanical construction, but has the advantage of being more compact than the tube-shaped solution, where the large diameter results from the need of inserting the string cavities pre-equipped with the RF coupler. It's still premature for making a final choice, though the tube-shaped solution seems more suitable and cost-effective for an industrial-type construction.

#### 2.3.3 ESS requirements for the high beta cryo-modules

Though it is still early for ESS to express cryo-module specific requirements, it is clear that the very similar needs can lead to synergy between the R&D development for SPL and the ESS project. The first goals is therefore to share the technical specification document that CERN is preparing for the SPL short prototype cryo-module, and add specific ESS requirements and needs for testing of the prototype at CERN. A preliminary version of this document should be ready at the end of 2010.

#### 2.3.4 Summary

In the summary session, V.Parma took the opportunity of recalling, in addition to the points listed above, the outcome of the technical specification meeting which took place at CERN on the 19th October 2010 (http://indico.cern.ch/conferenceDisplay.py?confId=108640).
The alignment budgets were reviewed and confirmed in this meeting, though some of the figures regarding mechanical tolerance were considered by JLAB experts as quite tight to achieve.
The cryogenic scheme is now settled, though a hydraulic head connection between cavities could be needed according to JLAB experts in order to guarantee liquid leveling in case of unequal boil-off between cavities. This is now being considered, and could be easily implemented by making use of the existing DN25 filling tap on the bottom of the helium vessels. The sizing of the thermal shield circuit is also an outstanding issue, and should be settled in order to achieve the required operating temperature and gradients on the thermal shield as a function of the availability of cooling capacity in the test stand at CERN (SM18).
The functional specification for the magnetic shielding is still to be clarified, but the baseline is to have 2 levels of shielding, one at RT and one at cryogenic temperature.
The priority for the coming months is to settle a technical specification document as reference for the detailed design and which would also be a first attempt in defining the test plan for the short prototype cryo-module. As far as the design is concerned, the major milestones are the detailed design of the cavity supporting system, and its validation by a test moch-up. The choice of the vacuum vessel type and the associated assembly procedure are also top priority. These design features should be confirmed by a preliminary design review in Spring 2011. The planning is recognized to be very tight.

### 2.4 Progress and activities in WG4 (beam dynamics), A. Lombardi

#### 2.4.1 Collaborators

TRIUMF , who was co-leading this work package has withdrawn from the collaboration. Most of the beam dynamics work is taking place at CERN and in collaboration with ESS-S. At CERN the groups involved are: BE/ABP for end-to-end multiparticle tracking, layout definition/validation; and WG coordination; TE/ABT for the extraction areas, the transfer lines and collimation; and AB/RF for HOM calculations. ESS-S has a considerable role in end-to-end multi-particle tracking; layout definition/validation; CEA Saclay has a consulting role on beam dynamics and provides the tracking code. Collaboration has been established with Turkey during the workshop and it will start with an exchange of students.

### 2.4.2 Progress since last meeting

The mixed structure layout has been thoroughly studies and solidified. This includes proper matching of the transitions at 1.4 GeV and 2.5 GeV, compatibility with cryo-segmentation and the Linac4 beam. The main advantage of such a structure is that it minimizes the probability of magnetic stripping losses without further complicating the layout or compromise on cryo-segmentation.

Since the last meeting a number of small issues have been discovered. None of them are show stoppers, but all of them deserve some particular care. The first issue concerns the maximum sextupole component acceptable in the steerer magnets. So far it is planned to have a combined quadrupole-steerer magnets. This choice -which simplifies the layout- has the only drawback that a higher than normal sextupole component is present, due to the embedded 4-fold geometry inside the dipole coils. Beam dynamics simulations have shown that such component should be kept lower than 5 units at 75% of the radius to contain emittance degradation under all possible circumstances.

Another phenomenon that had not been taken into account so far and that has the potential of increasing the operational losses is intra-beam stripping. This mechanism has not been considered so far in any of the loss pattern calculations. The cross section was measured by M. Chanel et al, in LEAR in 1987 and recalculated recently from electron detachment data available at BNL. This unaccounted loss -for stripping of H- might be the explanation for the high energy losses in SNS and it might be the explanation of the difference between empirically optimized settings and theoretical settings (quadrupole field reduction for a larger beam). The probability of stripping increases with decreasing beam volume, and with the relative velocity of the particles. Therefore tightly focused beams (both transversally and longitudinally) favour the detachment of the electron as well as beams with a relatively high energy spread. The probability is also proportional to the current in the micro-bunch, therefore long pulses at lower current are an advantage. For the SPL case, the maximum stripping probability occurs at the transition between LINAC4 and SPL, where a very fast phase advance was adopted to make a compact and achromatic bend into the SPL tunnel. The average loss, excluding this problematic point, is about 0.15 W/m at 40 mA. It is still to be verified whether these losses are acceptable under the present shielding and running conditions.

A new layout has been defined based on HOM considerations rather than beam dynamics. The induced HOM voltage vs. cavity geometry and beam energy has been taken as optimization parameter. The preliminary results of these studies indicate that increasing the transition energy to 180 MeV and adopting Beta<1 cavities for the high energy part would be beneficial. Such changes are somehow radical and before proceeding in this direction further studies, including varying current jitter parameters and chopping patterns should be pursued.

### 2.4.3 Outlook and further studies

As the layout is relatively well established a series of ancillary studies might start now, including the definition of a collimation system, which is more critical for the High Power SPL, the study of the impact of cavity performance and evaluating the feasibility of the idea of BPMs for envelope information.

## Appendix A: Meeting goals and working groups

**Meeting Goals**

- to inform about the status and plans of the sc linac projects world-wide,
- to hear about recent technical achievements, and check the overall technical progress with respect to expectations,
- to guide future work (priorities, distribution of tasks…),
- to update and enhance collaborations,
- to organize the future connections between projects (meeting(s), workshops etc.).

**Working Groups**

The working groups were created at the first SPL collaboration meeting:

**- WG1 (RF):** RF distribution, amplitude/phase modulators, circulators, loads. Lo Level RF… - E. Ciapala, A. Dexter

**- WG2 (Cavity design):** geometric beta, high power coupler, HOM damper/coupler, tuner …, and construction (Manufacturers, processing facilities, low power RF tests …) - W. Weingarten, S. Chel

**- WG3 (Cryomodule and integration):** Design, construction, assembly… - V. Parma, P. Duthil

**- WG4 (Beam dynamics and loss management**): Collective effects, H- stripping, collimation, HOMs … - A. Lombardi

**Appendix B: Timetable of the fourth SPL collaboration meeting**

# Thursday 25 November 2010

## Introductory session (09:10-12:30)

Conveners: Garoby, Roland (CERN)

| | | |
|---|---|---|
| 09:00 | Welcome | COLLIER, Paul (CERN) |
| 09:05 | Present status and plans of the SPL R&D | GAROBY, Roland (CERN) |
| 09:25 | SPL architecture & organization of meeting | GERIGK, Frank (CERN) |
| 09:40 | Meeting goals | GAROBY, Roland (CERN) |
| 09:55 | *Coffee break* | |
| 10:25 | News from ESS | LINDROOS, Mats (ESS) |
| 10:50 | JLAB plans for SRF developments | STIRBET, Mirca (JLAB) |
| 11:15 | Proton Accelerator Project at the Turkish Accelerator Centre | ALGIN, Emel (Eskisehir Osmangazi University, Turkey) |

## WG4 – beam dynamics (11:40-14:25)

Conveners: Lombardi, Alessandra (CERN)

| | | |
|---|---|---|
| 11:40 | Highly segemented SPL as a mixture of Doublet and FODO focusing | ESHRAQI, Mohammad (ESS) |
| 11:55 | H- stripping and consequences for the SPL, RF error studies | POSOCCO, Piero Antonio (CERN) |
| 12:15 | Latest results of HOM simulations | SCHUH, Marcel (CERN) |
| 12:30 | *Lunch break* | |
| 14:00 | Layout considerations based on passband modes | SCHUH, Marcel (CERN) |
| 14:10 | SPL source R&D | KRONBERGER, Matthias (CERN) |

## WG1 - RF systems (14:25-16:20)

Convener: Ciapala, Ed (CERN)

| | | |
|---|---|---|
| 14:25 | High-power klystron and solid state amplifiers | MONTESINOS, Eric (CERN) |
| 14:50 | RF layout, LLRF and simulation results | HOFLE, Wolfgang, HERNANDEZ FLANO, Matias (CERN) |
| 15:20 | *Coffee break* | |
| 15:50 | Status of modulator tendering | RATHSMAN, Karin (ESS) |
| 16:05 | Status of klystron order and test stand preparations | BRUNNER, Olivier (CERN) |

## WG2 – SC cavities, part 1 (16:20-17:30)

Convener: Weingarten, Wolfgang (CERN)

| | | |
|---|---|---|
| 16:20 | SPL cavities construction | CAPATINA, Ofelia (CERN) |
| 16:45 | Status of EP at CERN | ANTUNES FERREIRA, Leonel Marques (CERN) |
| 17:00 | Perspectives with new techniques of Nb coating | CALATRONI, Sergio (CERN) |
| 17:15 | Diagnostics for reception tests of SPL cavities | LIAO, Kitty (CERN) |

# Friday 26 November 2010

## WG2 – SC cavities, part 2 (09:00-11:30)
Convener: Weingarten, Wolfgang (CERN)

| | | |
|---|---|---|
| 09:00 | Clean room refurbishment in SM18 | CHAMBRILLON, Janic Kevin (CERN) |
| 09:15 | Magnetic shielding simulations for SPL cryo-modules | JUNGINGER, Tobias (CERN) |
| 09:30 | Status of SPL RF coupler development | MONTESINOS, Eric (CERN) |
| 09:45 | BNL activities on 704 MHz cavities | CALAGA, Rama (BNL) |
| 10:00 | SPL activities at CNRS-IPN-Orsay | OLRY, Guillaume (CNRS) |
| 10:15 | SPL activities at CEA-Saclay | PLOUIN, Juliette (CEA) |
| 10:30 | *Coffee break* | |
| 11:00 | HOM coupler modeling for SPL | GLOCK, Hans-Walter (Rostock University) |
| 11:15 | Simulations and calculations of HOMs in strings of cavities | MOLLOY, Stephen (RHUL) |

## WG3 - Cryogenics (11:30-12:30)
Convener: Parma, Vittorio (CERN)

| | | |
|---|---|---|
| 11:30 | Work progress at CNRS-IPNO | DUTHIL, Patxi (IPNO-IN2P3-CNRS) |
| 11:50 | Mechanical studies of the cryo-module | MOREIRA DE AZEVEDO, Paulo Coelho (CERN) |
| 12:10 | Specific ESS requirements for the high-beta cryo-module | HEES, Wolfgang (ESS) |

## Status reports and summaries (16:05-18:05)
Convener: Garoby, Roland (CERN)

| | | |
|---|---|---|
| 14:00 | Status/Summary of WG4: beam dynamics | LOMBARDI, Alessandra (CERN) |
| 14:20 | Status/Summary of WG1: RF systems | CIAPALA, Ed (CERN) |
| 14:40 | Status/Summary of WG2: SC cavities | WEINGARTEN, Wolfgang (CERN) |
| 15:00 | Status/Summary of WG3: Cryogenics | PARMA, Vittorio (CERN) |
| 15:20 | *Coffee break* | |
| 15:50 | Outcome and discussion | GAROBA, Roland (CERN) |
| 16:20 | Tour of Linac4 | GERIGK, Frank; WEISZ, Sylvain (CERN) |

## Appendix C: Participants

| name | institute |
|---|---|
| ALGIN, Emel | Eskisehir Osmangazi University, Turkey |
| BOUSSON, Sebastien | CNRS/IN2P3 IPN Orsay |
| BRUNNER, Olivier | CERN |
| CALAGA, Rama | BNL |
| CALATRONI, Sergio | CERN |
| CAPATINA, Ofelia | CERN |
| CARLI, Christian | CERN |
| CATALAN LASHERAS, Nuria | CERN |
| CHIAVERI, Enrico | CERN |
| CIAPALA, Edmond | CERN |
| COELHO MOREIRA DE AZEVEDO, Paulo | CERN |
| DANARED, Håkan | ESS |
| DEVANZ, Guillaume | CEA |
| DUCHESNE, Patricia | IPNO/CNRS |
| DUTHIL, Patxi | IPNO - IN2P3 - CNRS |
| ESHRAQI, Mohammad | ESS |
| GAROBY, Roland | CERN |
| GASSOT, Hui Min | IPN Orsay |
| GERIGK, Frank | CERN |
| GLOCK, Hans-Walter | Uni Rostock, IEF, IAE |
| HEES, Wolfgang | ESS |
| HERNANDEZ FLANO, Matias | CERN |
| HOFLE, Wolfgang | CERN |
| HUNG, Wei-Che | National Central University-Unknown-Unknown |
| KESSOKU, Kohei | Department of Particle Physics-University of Tokyo-Unknown |
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[1] http://indico.cern.ch/event/109664

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