Minutes of the SPL steering group

meeting no. 3

date: 23. November 2007

present: S. Calatroni, R. Garoby, F. Gerigk, A. Lombardi, R. Losito, V. Parma, C. Rossi, M. Vretenar, W. Weingarten
excused: E. Ciapala

Agenda

1. General news and facts
2. Cryo-modules
3. Power coupler
4. Round table
5. New actions
6. Next meeting

1. General news and facts

- R. Garoby agreed with A. Müller that the FP7 bid should be prepared with 2 options (704 MHz, and 1408 MHz). This presentation should not be seen as a disadvantage by the reviewers. If 704 MHz is chosen then Orsay would work on elliptical beta=0.65 cavities and Saclay on beta=1.0 cavities. If 1408 MHz is chosen then Orsay would work on medium-beta 352 MHz spoke cavities and Saclay on 9-cell elliptical 1408 MHz cavities.
- Sergio Calatroni joins the steering group as TS contact,
- R. Garoby asks the steering group members to assemble a list of manpower which is needed to arrive at a design report in 2011. The goal of this exercise is to see if the 40 manyears, which come from the white paper are sufficient to do the job. A. Lombardi for beam dynamics, V. Parma for cryo-module development, S. Calatroni for TS, W. Weingarten for the RF test stand, C. Rossi for the RF system, R. Losito for cavity development (most of which should be done outside?). R. Garoby will collect the numbers and then discuss with the group leaders.
- It was agreed that there will be a document, which details the frequency choice. In preparation, technical notes should be written to support the document.
- The future role of the Safety Commission will be restricted to giving comments on a final design. It is unlikely that they will be able to help with simulations or advice during the conception of new projects as the SPL.
- On November, 16th there was a small meeting to discuss the option of having PS2 in the ISR tunnel. The general feeling was that this option will have more disadvantages than advantages. Nevertheless, the question will be asked and for this reason a document will be produced, which clearly outlines all the arguments.
- On November, 15th the SPL was presented to the management of IT. The main point were the measures, which have been taken to ensure that the basement of building 513 will not be subject to significant radiation values. This was achieved by lowering Linac4 by 2.5 metres, so that there is now enough distance between the SPL accelerating tunnel and building 513.

2. Cryo-modules

- The requirements to the cryo-module design will in any case (regardless of the frequency) be different than for Tesla/ILC because of the higher average heat load. Nevertheless, V. Parma said that the

differences should not be too big.

- There may be a chance that even the 704 MHz cavities fit into the outer cylinder, which is used for ILC (action on V. Parma). This cylinder has the same size as the LHC dipole cylinders.
- CERN had already proposed to remove the intermediate thermal shield in the ILC modules. This could make space to fit the 704 MHz cavities.
- The helium return line in the ILC modules is dimensioned for 3 km long strings and to provide mechanical stability. The cross-section of this line can probably be reduced for the SPL, but then the mechanical stiffness has to be provided by other means.
- The ILC design is driven by the alignment precision of the quadrupoles. Having the quads outside (as warm quads or as separate cryo-modules) would remove this constraint, but would probably lengthen the linac.
- The quadrupoles will also bear most of the beam losses, unless they have very large apertures.

3. Power couplers

Some concern about the availability of power couplers for 1408 MHz, 1MW was voiced by Saclay. In response the following data was gathered by S. Calatroni and F. Gerigk.

- A. Variola (LAL) made the design for the XFEL couplers based on the DESY TTF3 couplers, he said that a thermal re-design may be necessary to cope with the higher average power load of the SPL couplers.
- Somebody working on thermal studies is C.Beard from Daresbury,
- The JLAB couplers on the ERL (1.5 GHz) work up to 35kW CW, tested up to 50 kW (no info on the design on these couplers)
- Flash/XFEL is specified for an average power of < 5 kW, and it has reached 1.5 MW peak power in tests. This coupler was the basis for further developments:
- Cornell, ER linac, gas cooled coupler was tested with 50 kW average power and is meant to operate in CW at this level, it may have been tested with peak powers up to 500 kW but that needs to be confirmed by either Hasan Padamsee hsp3@cornellNOSPAMPLEASE.edu or Sergey A. Belomestnykh SAB@LNS61NOSPAMPLEASE.LNS.Cornell.edu, developed to be used with bias but right now no bias voltage is applied,
- S. Calatroni will meet H. Padamsee next week on a conference in India and will talk with him about the Cornell coupler,
- at BESSY the coupler was also optimised towards high average power, and has been tested up to 50 kW average. contact is Jens Knobloch knobloch@bessyNOSPAMPLEASE.de
- from a different source: It seems that at BESSY they tested a TTF3 coupler without thermal modifications or thermal sinks in CW. The results are 5 kW SW, 10 TW and 25kW SW only by cooling the antenna, not sure whether air or water, and without thermal sinks (the numbers of the powers are written in a rather confused way...)
- In pulsed mode they seem to reach 2 MW, but the operation at 1.3 msec and 10 Hz is usually at 500 kW
- at the recent SRF workshop there was a nice overview of couplers by S. Belomestnykh (see page 7/8): http://www.pku.edu.cn/academic/srf2007/download/conference/wednesday/Belomestnykh_Lecture_WE3
- and there was also a talk on the Cornell ER linac by Matthias Liepe: http://www.pku.edu.cn/academic/srf2007/download/conference/monday/Liepe_Lecture_MO202.pdf
- L. Lilje pointed out, that even though the frequency difference is relatively small one should repeat the multi-pacting simulations (especially with HOMs),

4. Round table

- R. Duperriers reaction to the different frequency scenarios:

- ♦ the spoke scenario was made with normal conducting quadrupoles and seems to be more compact than the scenarios with elliptical medium-beta cavities, for a fair comparison consistent layouts should be compared.
- ♦ the longitudinal matching across frequency jumps will have an influence on the linac length and on the beam quality when injecting into a subsequent ring, this needs to be evaluated,
- ♦ there is a benefit in using low frequencies, such as 704 MHz for electrons (lower wake fields), which is why C. Pagani had suggested to use beta=1.0 for the high-energy part rather than b<1. That way one can be compatible with electron machines and one can hope for synergies with electron projects. *It was not felt that is a strong argument for the SPL*
- F. Gerigk: no news from klystron manufacturers yet,
- R. Garoby: it looks as if the envisaged neutrino schemes will also work with a 20 mA driver linac. This would result in significant saving in the number of klystrons. The option is under study by M. Aiba.
- M. Lindroos is also looking for people who can work on the SC post accelerator for ISOLDE. It would be good to have the same people as for the SPL in charge, so that the expertise can be shared.
- R. Losito has assembled the test history on niobium sputtered elliptical cavities: i) the result of a 1.5 GHz single cell elliptical cavity, and ii) all results on all of the low-beta 352 MHz (single- and multi-cell) cavities

5. Actions

Assigned to	Start date	Description	State	Result	
Main.Everyone	2007-11-26	establish a man-power list for each section (beam dynamics, RF system, TS, cryogenics, cavity development, cavity testing) and send the data to R. Garoby			edit
VittorioParma	2007-11-26	check compatibility of ILC/TTF cryo-modules with 704 MHz cavities		seems possible, but modifications will be necessary	edit

link to all open actions and closed actions

6. Next meeting

will take place on Friday, December, 6th, 2007, 09:00 in room ?

-- FrankGerigk - 26 Nov 2007

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