

Minutes of the SPL steering group

meeting no. 2

date: 09. November 2007

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

excused:

Agenda

1. Recent news (R. Garoby + all)
2. Frequency choice for the SPL (F. Gerigk)
3. Round table
4. New actions
5. Next meeting

1. Recent news (R. Garoby + all)

- R. Garoby is in contact with the CEA management to discuss the "in-kind" contributions of France to Linac4/SPL. For the RFQ, the recommendation has been made to limit the French contribution to a tight collaboration to the design (based on IPHI) and to the measurement and adjustment after construction, using the measurement set-up and the algorithms developed by the CEA. The French contribution could advantageously be focused on the development of superconducting RF structures for the SPL, for example in the context of the IA in FP7. The contributions of IN2P3 are still under discussion. The amount of work which is included in the FP7 bid (2 or 3 cavities), needs to be finalised.
- E. Ciapala will visit S. Chel next week to learn about the CEA infrastructure for construction of Niobium cavities. At the conclusion of the meeting there will be a phone conference with Stephane to finalise the contents of the FP7 bid.
- R. Losito stressed that CERN has considerable knowledge in the construction of Nb SC cavities and that some of first cavities, which were delivered to DESY made gradients in the range of 40 MV/m. The CERN competence includes all processing steps such as machining, chemistry, etc.
- Sergio Calatroni at TS is the contact at TS for all relevant production and chemistry steps and he is willing to give an overview of the CERN competences. A general SPL meeting in December should be foreseen for this purpose.
- W. Weingarten reported that the high-power RF system at 704 MHz (klystron) has been removed from the FP7 bid for a high-power RF test stand at CERN. The bid includes a coordination of Europe-wide SC test facilities. The cut also concerns cryostat equipment for Supratec and was made to favor the participation of universities and of BESSY. So far O. Napoly and the Supratec coordinator seem to agree.

2. Frequency choice for the SPL (F. Gerigk)

F. Gerigk revisited [the](#) arguments to choose a certain multiple of 352 MHz as operating frequency for the SC part of the SPL. Based on the real estate energy gain per metre (energy gain per period divided by the total period length) he considered various scenarios using the nominal 704 MHz, 1057 MHz and 1408 MHz. For all cavities it was assumed that the length between cavities, the length of magnets, and the between cryo-modules is independent of the frequency choice. The maximum power per cavity was limited to 1 MW and the synchronous phase is always -15 deg. The result was that all frequency options lead to almost the same

number of cavities and the same total linac length. In all scenarios the high-beta section used cavities with a geometrical beta < 1.0 to take advantage of the effect that the optimum transit time factor in multi-cell cavities is always achieved at particle betas, which are higher than the geometric beta of a cavity. The main points of the discussion where:

- for none of the 3 frequencies are klystrons available. The closest match can be found for 1408 MHz. This should not be a show stopper due to the amount of units needed for the SPL but it makes the equipment of a test stand more costly.
- 1057 MHz seems the most unattractive option, since one cannot neither make use of the ILC cyro-modules, nor the cavities.
- 1408 MHz means that one needs either 3 families of cavities, or one uses 704 MHz for low-beta section, or one uses spoke cavities at 352 MHz to push the transition energy for the frequency jump to higher values. It is not clear up to which energy it makes sense to use spoke cavities.
- The Frankfurt design of a SC H-mode cavity is close to that of a multi-spoke cavity. Maybe this can be used for the SPL?
- the lowest energy for a 4x frequency jump needs to be estimated (-> action A. Lombardi),
- klystron manufacturers need to be contacted to get their impression on 1400 MHz klystrons, E. Ciapala will ask O. Brunner to contact Thales, F. Gerigk will contact Toshiba and CPI (->actions).
- Need to check how many modifications (if any) one needs to adapt the 1300 MHz ILC cyro-module for 1408 MHz cavities (-> action V. Parma).

3. Round table

- this group was re-named to SPL steering group to avoid confusion with the Linac4 core team,
- discussed agenda for next weeks general SPL meeting

4. Actions

Assigned to	Start date	Description	State	Result
EdmondCiapala	2007-11-09	information on 1408 MHz klystrons from Thales		
				no information from CPI received, Toshiba is interested in a development for 1408 MHz, they could relatively easily adapt their 1300 MHz single beam klystron to 1408 MHz, it would be more effort to have a multi-beam klystron, an average power of 250 to 500 kW seems realistic
FrankGerigk	2007-11-09	information on 1408 MHz klystrons from CPI/Toshiba		
AlessandraLombardi	2007-11-09	estimate of lowest suitable energy for a 4x freq. jump		
		check compatibility of ILC cyro-module with 1408 MHz SPL cavities		
VittorioParma	2007-11-09			

FrankGerigk	2007-11-09	find old arguments for 704 MHz choice.	SPL meeting 71 ↗ , see presentation ↗ the main argument was that higher frequencies do not yield higher gradients and that an additional frequency will only increase the cost of the RF system (at this time it was still assumed that Linac4 uses 704 MHz in its high-energy part), edit furthermore test results of 704 MHz low-beta cavities seemed encouraging. It was pointed out that each frequency jump entails longitudinal re-matching, which means lowering the synchronous phase and therefore lowering the acceleration efficiency.
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Updated ActionListSPLSteeringGroup

5. Next meeting

will take place on Friday, November, 23d, 2007, 16:00 in room 354-1-001

-- FrankGerigk - 12 Nov 2007

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