

Minutes of the SPL working group

meeting no. 80

date: 14. June 2006

present: G. Bellodi, F. Caspers, R. Garoby, F. Gerigk, K. Hanke, A. Lombardi, M. Magistris, T. Meinschad, M. Paoluzzi, M. Pasini, C. Rossi, E. Sargsyan, M. Vretenar, R. Wegner

agenda

1. General remarks (Roland Garoby)
2. Radiation aspects for H₀ dump at injection into the PSB (Matteo Magistris)
3. Tour de table
4. Operational flexibility of the SPL as proton driver for neutrino and other applications (Frank Gerigk)
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1. General remarks (Roland Garoby)

R. Garoby reminded that tomorrow Linac4 will be presented to the CERN Radio-Protection Committee. This committee has to approve the layout of Linac4 as well as the foreseen mode of operation. On Friday, June 16th, an IPHI-SPL collaboration meeting will take place in Saclay. R. Garoby stressed that Linac4 is now getting close to its approval and that it is therefore extremely important that there are no further delays in the construction of the IPHI RFQ.

2. Radiation aspects for H₀ dump at injection into the PSB (Matteo Magistris)

M. Magistris presented (slides) simulation results on the radiation created by a dump in the PSB injection area which collects the "half-stripped" H₀ particles after the stripping foil. He simulated with FLUKA one (of four) dumps, assuming 25 W (2%) of "half-stripped" H₀ particles reaching the dump at an energy of 160 MeV. In order to be generic, 3 pieces of iron were placed at different locations around the dump at a distance of approximately 1 m. The simulations were done assuming 6 months operation and 1 week of cool-down, or 10 years of operation and 2 years of cool-down. While the dump itself becomes highly radioactive (and remains highly activated even after long cool-down periods) the induced radioactivity in the surrounding iron pieces is relatively modest. It could also be seen that the iron obstacles provide considerable shielding. It was commented that taking into account all elements that are located in the injection area, localized lead shielding may be sufficient to allow reasonable access times during shut-downs. Alternatively one would have to divert the H₀ beam to a dump further away in the tunnel walls, but this implies the use of four additional stripper foils (one per ring) to transform the H₀ into protons, which can then be diverted with four septa (one per ring) to a remote dump. Since the layout of the injection region is already very tight it is highly desirable (and much cheaper) to consider a dump close to the stripper foil. Once the layout of the injection region is more clear, the simulation should be repeated assuming local lead shielding. F. Gerigk pointed out that the radiation created is approximately equal to the radiation at the ISIS H⁻ injection at RAL, where a local dump takes care of the "half-stripped" particles. Very little difference was observed when using carbon instead of steel as dump material.

Tour de table

- **G. Bellodi:** reported that the transfer line design (Linac4-PSB) is frozen for the moment and that she is now working on minimizing the emittance growth in the line. At the moment there is a 40% rms emittance increase in the matching section from linac to transfer line which is probably caused by mismatch. Additionally work has started to match the beam sizes to the new apertures of distributor and septum in the booster injection line (BI-line).
- **A. Lombardi:** work is in progress on the alignment tolerances for Linac4. There was a request from the alignment team to increase tolerances for the alignment of the DTL quadrupoles.
- **R. Wegner:** work is in progress to study the effects of 2nd neighbour coupling in the Linac4 SCL section.
- **K. Hanke:** reported that the work on various publications (diagnostics/PSB for the Linac4 TDR, EPAC) is progressing well. There seems to be a communication problem with the people responsible for the planned tests of the CERN beam shape and halo monitor (with beam) at Orsay. It was recommended to contact A. Mueller to arrange a meeting during the upcoming IPHI-SPL meeting at Saclay.
- **E. Sargsyan:** is working on the refinement of the LEBT optics. The goal is to decide if new (bigger) solenoids are needed to minimize the emittance growth in the LEBT. So far it seems that the beam performance depends to a large degree on the beam distribution coming from the source and the post-accelerator.
- **F. Caspers:** during the vacuum tests of the chopper unit a problem occurred with a water connection inside the vacuum chamber. The connection used was of an unpolished type, which is fine for water-tightness but not for vacuum-tightness. During the tests a small leak was observed and the connection is now replaced. Further RF tests are planned using a set-up that includes the empty volume behind the chopper plates, in order to measure the performance under the most realistic circumstances. There will also be a measurement of the heat transfer between the ceramic plate and the metallization on the back of the plates. As already announced the first batch of chopper plates received from Kyocera has not met the specification and has now been sent back for replacement (to which Kyocera has agreed). A new method is investigated to synchronise the propagation speed of the electric field on the two plates: this should be possible by machining grooves into the metallization on the backside of the plates.
- **M. Paoluzzi:** started work on the amplifiers needed for the H⁻ source.
- **F. Gerigk:** reported that CDR2 is still with the CERN publishing office. They promised to finish the editing process by the end of this week. After that the report will go the CREB committee which will decide if the report becomes a yellow report or not and after a positive decision the CERN library will allocate a ISBN, ISSN, and CERN number for the report. There is no longer a graphics designer who can do a cover design, meaning that if a colour front page is to be used it has to be designed and paid for by the authors. It was decided to stick with the standard yellow report format. On the 21st of June, Michel Martini will summarize his simulations on the PSB operation at higher intensity with injection of a 160 MeV beam. The seminar will take place in 6-2-004 at 9:00.
- **C. Rossi:** reported that on Monday S. Mathot was still working on the brazing test which shall verify if there is any movement between brazed components during horizontal brazing. He also reported that next week L. Ferreira from CERN will visit Mecachrome to check the newly developed vane cleaning procedure. The layout of the electrical installation for the 3 MeV test stand will be finalized by the end of July. A revised version of the addendum for the collaboration agreement with India on pulsed power supplies for the LEP klystrons has been transmitted to the PO group and the Indian collaborators.
- **T. Meinschad:** J.P. Delaye was recently at DESY to secure a signature on the MoU between CERN and DESY. So far there are no news whether the document has been signed or not.
- **M. Vretenar:** reported that so far he has received 5 out of 31 contributions for the Linac4 Technical Design Report (TDR), stressing that the deadline was the end of May! In order to prevent editing delays which are currently experienced for the SPL CDR2, he suggested to make the document a departmental report and then, in case of approval of Linac4 at the end of the year, to submit the document as yellow report at a later stage. The suggestion was approved. While the first leak on the

CCDTL prototype has been fixed, a 2nd one has been found. If it can be repaired from the outside the prototype could be operational within 2 weeks, if it has to be welded from the inside a delay of 1-2 months will occur. The leaks are due to the fact that CERN people who had little previous experience with this kind of welding were doing the job.

- **M. Pasini:** has received the low-gradient permanent magnet quadrupole from ASTER, which is going to be measured very soon. The high-gradient version should be delivered within the next weeks. He also updated the SPL web-pages with new graphics and tables. In this context he requested that all members of the SPL study group check the list of publications which is on-line and send him a list of their publications which is not yet included.

4. Operational flexibility of the SPL as proton driver for neutrino and other applications (Frank Gerigk)

F. Gerigk presented (slides) a talk that he gave at the recent HB06 workshop in Japan. The report of the International Scoping Study is likely to recommend a proton driver for neutrino factories that has an energy above 5 GeV, a repetition rate of 50 Hz and which delivers 5 bunches per pulse. Since the first SPL design report the requirements for a neutrino factory proton driver have changed drastically and F. Gerigk showed that the SPL design can be adapted to all the different requirements which makes it the most flexible proton driver for such a facility. He also presented a staged approach for neutrino physics at CERN involving a) EURISOL and beta-beams (which could be supplied even with protons instead of H⁻), b) EURISOL plus Superbeam which needs the installation of an accumulator ring to reduce the beam pulse length to the microsecond range, and c) a full blown neutrino factory which needs an additional compressor ring to reduce the bunch length to the nanosecond range. This approach also allows a staged target development, allowing to adapt the target technology step by step to shorter bursts and shorter bunches. The main limitation for a linac based driver is the maximum energy. While a 5 to 8 GeV driver is still reasonable in terms of power consumption and uncontrolled H⁻ stripping in the transfer line, higher energies are likely to become uneconomical.

next meeting:

to be announced

-- FrankGerigk -

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