Minutes of the Linac4 Diagnostics Working Group Meeting held on 9 June 2008

Present: A.Lombardi, E.Bravin, U.Raich, J.Tan, K.Hanke, B.Mikulec.

Agenda:

1. Communications

2. Follow-up of open actions

3. Updated layout of Linac4 CCDTL

4. BLMs in Linac4 to PSB transfer line

1. Communications

A fellow has been assigned to work for Linac4 under supervision of K.Hanke, but unfortunately he rejected the offer as he got another job. It has to be checked whether it is possible to get a replacement. Remark: In the meanwhile, K.Hanke found a replacement.

Emittance meter software application: the application is needed by the end of the year. K.Hanke reported that a meeting has taken place between CO, BI, ABP and OP representatives. It was stated that the application should profit from the RADE development (LabView). Maybe a Russian collaborator could write the application under CO supervision (A.Raimondo), but there is a budget issue. M.Vretenar proposed to look also into the possibility of a collaboration with the Indian community.

Linac4 software applications: K.Hanke underlined that operational applications should be based on operational CO standards. As is already common practice for the PS complex machines, J-L.Sanchez should be the contact person in OP for the applications with CO fulfilling the supervision role.

Status of CERN ADC card: U.Raich mentioned that a colleague from Pakistan is preparing the test procedure for the card. He is pushing for a first quick test to prove within about 2 weeks if the major functionalities of the card are working.

BLMs: It was proposed to have again a discussion about the Linac4 BLMs in one of the coming meetings. The specifications should be finalised. The question came up whether the BLMs are sensitive to magnetic fields and if this can be quantified. The question has been transmitted to B.Holzer by email. She should also check with RP (E.Mauro) if a recent geometry description in FLUKA is already available as has been suggested by A.Lombardi.

2. Follow-up of open actions

No news on this subject.

3. Updated layout of Linac4 CCDTL

A.Lombardi presented the updated layout of the Linac4 CCDTL (CCDTLforBD.june08.pdf). In general the CCDTL consists of 7 modules - each module is made of 3 tanklets fed by a klystron. There are quadrupoles between tanklets (limited transversely in space) and originally there were quadrupole-steerers in the very limited space between modules.

The changes implemented this year comprise the following points:

- The CCDTL will cover the energy range from 50 to 100 MeV (was: from 40 to 90 MeV).

- Originally, to control the losses to better than 1 W/m at SPL (6%) duty cycle, 1 steerer plus 1 position monitor were needed after each of the 7 modules. As inter-module space was limited, a combined quadrupole-steerer was proposed. After some studies (T.Zickler) this proved to be bad for the magnet (bulky) and the power supplies (cross-talk, stability). Therefore the idea of a combined quadrupole-steerer has been dropped and a common Linac4 quadrupole design chosen (bore radius: 20 mm - was 14 mm, length 115 mm). This simplifies layout and production and reduces cost.
  - With the new parameters, the aperture of the CCDTL could be increased (40 mm) which results in a reduction of the number of required steerers (4 instead of 7).
    - As a result of the separation of quadrupole and steerer, the inter-module distance was reduced.

Error studies for the new CCDTL layout (with only 4 steerers and 4 profile monitors) confirm that beam losses can be controlled below the 1 W/m limit. The rms beam profile is in average 1.5 mm.

For the beam diagnostics this means that the number of wire scanners was reduced from 5 to 2 (no wire scanner anymore after modules 1, 3 and 5). The SEMgrids were left in their originally foreseen position after modules 4 and 7.

L.Soby has to be informed concerning the increased aperture for the pickups (done).

Assigned to	Start date	Description	State	Result
A.Lombardi	2008-06-17	Inform Y.Cuvet that he should update the drawings of the CCDTL and provide him with the necessary information.		Done. edit

4. BLMs in Linac4 to PSB transfer line

B.Mikulec presented a proposal for the rough positioning of BLMs in the Linac4 to PSB transfer line (see BLM_TL.pdf). For this first iteration, BLMs were placed at aperture limits, in high dispersion regions and in high loss regions. The simulations of M.Eshraqi (see minutes https://twiki.cern.ch/twiki/bin/view/SPL/10April) served as basis. The proposal results in a minimum of 10/11 BLMs at the following locations:

New transfer line:

1. between 2 horizontal bendings at start of new transfer line
2. after debuncher
3. after last quadrupole before 2 vertical bendings
4. between 2 vertical bendings
5. after first quadrupole after 2 vertical bendings

Old transfer line:

1. between LTB.BHZ20 and LTB.BHZ30 around LTB.QDN65
2. after the distributor (location of BI.MBL10)
3. close to septum (location of BI.MBL20)
4. before BI.BVT (location of BI.MBL30)
5. close to stripper foil ???
6. at location of BI.MBL40 (is this still needed???)

The question was asked whether a BLM would be useful in the Linac4 dump line and in the LBE/LBS lines.

In general the consensus was that the BLMs have to be installed with some degree of freedom to be moved to hot spots (leave some extra cable length and possibility for connection points!). Maybe it would be good to foresee 10 (11) BLMs plus additional 3 BLMs to be placed following operational requirements.

If this is possible, it was suggested to simulate the effect of the PS fringe field on the beam to evaluate the need for additional BLMs under these conditions.

Assigned to	Start date	Description	State	Result	
M.Eshraqi	2008-06-17	If possible, simulate the effect of the PS fringe field on the beam to evaluate the need for additional BLMs.			edit

-- BettinaMikulec - 12 Jun 2008

- BLM_TL.pdf: BLMs for Linac4 transfer line

- CCDTLforBD.june08.pdf: new CCDTL layout

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