

Meeting on Diagnostics for Linac 4 28/03/06

L4: K.Hanke, M.Pasini AB/BI: C.Dutriat, F.Lenardon, U.Raich, L.Søby

We do not deal with source and LEBT, this is left to the source specialists (but should not be forgotten). We do not consider the chopper line, as here we have already diagnostics which exists/is under construction. We consider the linac and the transfer line to the PSB.

- **Beam current measurement** Beam current measurement is mandatory along the linac and transfer line in order to trigger interlocks (“watchdog”). Relative precision of 1% can be achieved. Need to check with radio protection what precision is needed in order to limit the losses to 1W/m. Absolute precision is a different issue. This is to be confirmed with SC/RP.
- **Beam position measurement** Can it be combined with the beam current measurement (limited space)? If yes, is the achievable precision sufficient? Beam position measurement is required along the linac and transfer line. The beam position is depending on the alignment. With the given tolerance and generating different machines, one can find that the expected beam centroid can be found within +/- 4.65mm from the axis.
- **Beam profile measurement** Beam profile measurement required at certain locations. Discussion whether SEM grid or wire scanner is appropriate. Choice depends also on the beam size that is expected at the corresponding positions (from simulations). Cost of an SEM grid scales with the number of wires. Beam profiles have Gaussian-like distribution. We expect to have 1 sigma=2mm.
- **Bunch length measurement** We need bunch length measurement at least during the commissioning phase (movable), probably a permanent installation at the end of the linac. The bunch length is a fraction of 2.84ns, if we assume e.g. 1/6 of it this means 300ps. The required resolution is hence about 100ps. Technically this could be accomplished either by a Feschenko-type monitor, or by a measurement line like in Linac2. A “poor man’s” measurement line just consisting of a dipole and a fast FC could be envisaged.
- **Transverse emittance measurement** Either Linac 2-type emittance measurement line, or a combination of moving slit and profile monitor. A Feschenko-type monitor could handle both transverse and longitudinal emittance and be put at the exit of the linac, avoiding measurement lines. Find out whether it fulfills requirements.
- **Longitudinal emittance measurement** This could be some sort of measurement line for the longitudinal emittance (see Linac 2) or a combination of bunch length monitor and spectrometer. Required resolution?
- **Beam energy measurement** Spectrometer dipole is the standard approach. Try to find out more about energy degrader.

-- KlausHanke - 13 Sep 2007

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