

DRAFT Minutes of the CLIC meeting of 17.9.2010

Approval of the minutes of the last two meetings:

There was a comment about the name of the 'cascade tridents'. Daniel confirms that this is the name presently used.

The minutes were otherwise approved without comments.

News:

Jean-Pierre reports that the SPC and Council have approved the new MTP. The schedule for the CDR work will have to be reviewed and discussed at the ILCWS. He congratulates everyone who is involved in the 18 papers for the LINAC conference.

He reminds about the CLIC-ILC workshop with the inscription deadline on 24 September. Already more than 400 participants are inscribed.

Karl announces that the SLAC klystron is presently being shipped to CERN.

Mike Barnes reports about '*Kickers for CLIC*' with contributions from S. Smith and J. Uythoven. He describes the design of kickers and the locations and numbers of kickers in the CLIC layout. He compares the CR extraction kickers for CLIC to the one from CTF3. Critical parameters are rise and fall time, flat top stability, repetition rate and burst mode frequency.

Mike presents the IP kicker for the IP feedback and the phase loop compensation kickers that need a very small latency, as the one for the IP feedback that has been developed by Oxford.

For the CLIC DR kickers, in particular, the field homogeneity and low ripples are extremely demanding.

The beam coupling impedance has to be reduced for ferrite kickers by a shielding. Even with this reduction, the impedance is too high for the CLIC DR kickers, hence striplines are required. Tapered stripline kickers achieve a low impedance at high frequency but a peak at low frequency is unavoidable. Discussions with Giovanni Rumolo, following the presentation, confirmed that the striplines do meet the longitudinal beam coupling impedance requirements: at low frequency because the specified longitudinal impedance (few Ohms) is in fact a Z/n specification rather than an absolute impedance.

It is hoped that CIEMAT will design the CLIC DR striplines. Mike shows contributors to instability, ripple and droop, where despite every effort to minimize it, it may be present at a level above that of the specification. Impedance matching of connector feedthroughs has been improved (at ATF) by HFSS design but does not reach the required level yet. Theoretically, the droop due the PFL can be well compensated by careful choice of the length of the transmission cable.

A double kicker system for the extraction from the DR can drastically reduce the jitter if the kicks are identical and the beam optics well designed. Mike shows a design with a cable delay to compensate for the time of flight. A double kicker system at ATF shows a 17% difference between the kicks, probably due to not uniform TiN coating, cable attenuation and dispersion. Empirically minimizing the jitter by beam optics changes reduced the jitter (measured at a single point in the pulse) by a factor ~ 3.3 compared to a single kicker. The gain for

measurements along the kicker waveform, multiple bunches, is expected to be more significant.

An Inductive Adder with many fast switches, on the transformer primary, adding up on the transformer secondary, for the HV kicker pulse is a promising means of compensating for ripple as well as attenuation and dispersion in the transmission cables. This will be studied by the Ph.D student **Janne Holma**. A prototype at ATF has given 20 ns rise time, yet too slow for the ILC.

Mike presents possible technologies for the switches and other issues like beam optics and machine protection issues.

Karl asks about the requirements of the mains and heat dissipation to air. This has not yet been studied in detail. The CR kickers could have some higher heat dissipation due to the higher repetition rate. Water or oil cooling could be studied.

Karl reminds that the heat dissipation in the main linac is important.

Mainly striplines are planned for impedance reasons, turnaround kickers could be ferrite one. **Daniel** comments on the importance of the impedance even in the transfer line. **Roberto** adds that it could be also important for the CR, even with three passes. This has to be studied.

Yannis suggests contacting **Junji Urakawa** during the ILCWS for future testing possibilities at ATF.

Alexandra asks about the issues related to phase compensation kicker and linearity. Mike replies that this has been studied for IP feedback and would have to be done for the phase compensation system.

Jean-Pierre asks about intermediate dumps for machine protection. **Michel** replies that this still needs to be studied. **Jan** adds that he would suggest a dump at the end of the linac and passive protection elements. **Jean-Bernard** comments that this has to be simulated. Michel adds that emergency kickers in the DBA might be needed.

A.O.B.:

Frank Tecker, 20.9.2010