Minutes of an interlock meeting held on 22nd of July 2011

Present: A. Butterworth, G. Hagmann, L. Arnaudon, B. Puccio, I. Kozsar, J-L. Sanchez, B. Mikulec.

1. Chopper and BIS

B. Mikulec shortly introduced the relationship between the chopper and the BIS (see this link).

1. **The chopper is client of the BIS**: Chopper failure conditions have to be combined. Through a BIS user interface module (CIBU) the chopper has to send its condition (no error=beam permit) to the master BIC 'Source RF'. The CIBU module is the same also used for the LHC (2 redundant inputs have to be provided representing the chopper status). B. Puccio can help with details on the required convention. It has to be discussed with the hardware specialist (M. Paoluzzi) which signals can be provided and care has to be taken that they cover all possible failures. L. Arnaudon will follow this up.

2. **Chopper action following a non-valid beam permit from the Master BIC 'Choppers'**: Together with the pre-chopper, the chopper has to cut the beam (=the chopper has to pulse) in case the beam permit from this master BIC is false. The beam permit should be checked at a certain point before the beam pulse is produced (e.g. via a 'warning' timing signal shortly before the start of the source rf pulse). B. Puccio mentioned that one has to count a few 100 ns for processing of the BIS signals. At this moment in time, the 2 frequencies sent by the BIC (9.375 and 8.375 MHz) have to be both present for normal beam production. In case one or both of the frequencies cannot be detected, the chopper has to pulse during a window starting with the timing 'start source rf' and ending ~600 us later (exact stop time to be defined, but the duration has to cover the full Linac4 pulse). In case the beam permit turns FALSE during the beam pulse, the chopper has to remove the remaining beam fraction (latched).

3. **Role of the chopper with the PSB External Conditions**: The chopper has to react as well in case of a PSB failure affecting individual PSB rings; in this case the action of the chopper has no additional redundant action of another equipment. For individual ring failures, the information will be available at the start of the next basic cycle, and the chopper will have to pulse during the time when beam for the failing ring arrives. This implies that the chopper needs to be synchronous with the ring timing (timings of the distributor). A. Butterworth should clarify with I. Kozsar which solution would be the most appropriate for the chopper to obtain the information of an External Condition (decoding from telegram, via a CTRV or direct reception of the timing pulse and processing with a FPGA).

A discussion has also been started on the chopper action in general and the requirements for different beam production schemes, which will affect the choice of the control hardware. This discussion should be continued with C. Carli and P. Baudrenghien.

-- BettinaMikulec - 25-Jul-2011

- BIS_Chopper_July2011.pptx: Linac4/PSB BIS and chopper.

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