

LHC Beam Loss Monitor System Design

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Abstract

At the LHC a beam loss system will be installed for continuous surveillance of particle losses. The system is designed to prevent hardware destructions, to avoid magnet coil quenches and to provide quantitative loss values. Over 3000 ionization chambers will be used to initiate the beam abort if the loss rates exceed the quench levels. The time and beam energy dependent quench levels require the acquisition of chamber currents in the range from 50 pA to 0.5 mA and an update of the values every 90 microseconds. The acquisition and control electronics will consist of a front end electronics near to the ionization chambers (< 400 m) and a dump controller in the surface buildings. The front end will include a charge balance converter, a counter and multiplexer part. Six channels will be transmitted over one twisted pair of up to 2 km long multi-wire cable. The dump controller will issue warnings and dump signals depending on the beam energy and the loss durations. The whole requirements of the loss monitor system will be explained and the prototype front end electronics will be discussed. Test measurements will be shown using this electronics together with an ionization chamber.