Contribution ID: **27** Type: **Paper**

DEVELOPMENT OF ADVANCED MECHANICAL SYSTEMS FOR STABILIZATION AND NANO-POSITIONING OF CLIC MAIN BEAM QUADRUPOLES

Thursday, 13 September 2012 15:40 (25 minutes)

CLIC is a multi-TeV electron-positron linear collider currently under study at CERN. This accelerator will have a very high number of components. To reach the desired high luminosity, stringent alignment requirements should be satisfied, particularly for the Main Beam Quadrupoles (MBQ). An alignment stage will align the MBQ with micrometre resolution. Displacements due to ground motion and technical vibrations in the 0.1-100 Hz frequency range can however not be corrected with the alignment stage. An active vibration isolation system, based on piezoelectric actuators and inertial reference masses, will therefore be installed between the mechanical alignment stage and the magnet. This system can also be used for relative repositioning in between beam pulses with nanometre resolution and with a range of 10 micrometre. Compatibility between the actuating support and the alignment and fiducialisation should however be guaranteed. The actuating support should, in the same way as the alignment system, be robust against forces acting on the quadrupole and displacements created by the active support should not upset the initial alignment. Stiff piezo actuators with a fast response are therefore combined with flexural mechanisms and joints to create a guide for very precise displacements, to eliminate play and friction between parts and to increase the frequency of internal modes. Precise measurement of the relative displacements and a good analysis of the kinematics are essential to insure that the alignment of the MBQ is always well known. The performance and precision reached with prototypes of the actuating supports and a comparison between different solutions will be presented in this paper.

Primary author: Mr ESPOSITO, Marco (CERN)

Co-authors: Mr CHRISTOPHE, Collette (ULB (Universite Libre de Bruxelles)); Mr ARTOOS, Kurt (CERN); Mr FERNANDEZ CARMONA, Pablo (CERN); Mr LEUXE, Raphael (CERN); Mr JANSSENS, Stef (CERN)

Presenter: Mr ESPOSITO, Marco (CERN)

Session Classification: Alignment aspects of Linear Accelerators

Track Classification: Alignment aspects of Linear Accelerators