



Contribution ID: 4

Type: **not specified**

Drive Beam Quadrupoles for the CLIC project: a novel method of fiducialisation and a new micrometric adjustment system

CLIC (Compact Linear Collider) Drive Beam Decelerator will generate RF power to accelerate the colliding beams. One key component of the decelerator is the Drive Beam Quadrupole (DBQ). More than 40000 DBQ will have to be pre-aligned within a challenging precision and accuracy: the magnetic axis of each DBQ will have to be positioned in a cylinder with a radius of 20 micrometers, over a sliding window of 200m along the 20 km of linacs. The current strategy of pre-alignment foresees; first to perform the fiducialisation of the DB quadrupoles, i.e. determining the position of the magnetic axis of each quadrupole w.r.t. external alignment targets; second to pre-align two DBQ on a common support; third to align the support once installed in the tunnel. In order to make the strategy easier, we propose a novel method of fiducialisation based on a combination of laser tracker, 3D Coordinate Measuring Machine (CMM) and Wire Positioning Sensors (WPS) measurements. In this paper, the method is described and the results of its cross-comparison with the standard method of fiducialisation are shown. We also propose a new adjustment system to pre-align the DBQ on their supports according to 5 degrees of freedom. The conceptual design of the system is introduced, as well as the results obtained during the validation of the prototype.

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