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Development and validation of an absolute FSI network

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We present developments for the realization of a multilateration network based on Frequency Scanning Interferometry (FSI). Our developments include a reference sphere and kinematic mount for localizing the FSI optical fibre tip and therefore allowing distance measurements in different directions from the same point. Through simulations, we have optimised geometry of our multilateration network for precise coordinate determination. We have carried out fiducialisation of a CLIC Main Beam Quadrupole (MBQ) magnet using our developments. We have validated our solution using a Leitz Infinity coordinate measuring machine which has a Maximum Permissible Error of length measurement ($E_{L,MPE}$) of 0.3 µm + 1 ppm via a 3D Helmert transformation of coordinates determined by both systems.

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