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PCB technology for small diameter field probes

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Summary

Rotating coil systems are the most important tools to test the magnet field quality, strength and harmonics. This is a key task for the quadrupoles of the future linear collider that aims at aligning the accelerator components at the nanometre scale. The future accelerator will work with high-energy beam and the magnets will have an extremely small aperture, CLIC quadrupoles achieving only 8 mm diameters. With so small dimension, the use of new technologies as PCB design becomes necessary to build small sensing coil with high precision. As all sensors, sensing coils need to be opportunely calibrated to achieve high precision measurements. The different kind of sensing coils will be illustrated in this paper, with relative advantages and disadvantages, together with the calibration steps adopted in particular for small dimension coil. Challenges related to the centering of very small rotating coils will be introduced. Future work includes the optimization of a measurement setup dedicated to extremely small diameter coils, exploring new coils' design and studying axis fiducialization within rotating coils.

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