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Nanometer sensitive vibration measurement system R&D status for SuperKEKB final focus

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SuperKEKB, a double ring circular collider with 7 GeV electron and 4 GeV positron beams, utilizes "nano-beam collision scheme"in which low emittance beams collide at large crossing angle. Positional fluctuations of the colliding beams are predicted to have a deleterious impact on luminosity; therefore, it is important to measure position oscillation of its superconducting quadrupole Final Focus (FF) magnets. KEK has developed, in collaboration with Brookhaven National Lab, a stabilized pickup-coil system to measure the magnetic field center oscillations of FF quadrupoles. This system is currently undergoing checkout and calibration at KEK using a permanent magnet quadrupole as a FF stand-in. In this paper, we will report on the measurement system status and our calibration results. This work is relevant for any high-luminosity collider that uses few-nanometer sized beams such as the proposed future ILC and FCC-ee Higgs Factories.

Footnotes

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