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Design of a re-entrant cBPM and read-out system for the ILC main linac

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Cavity Beam Position Monitors (cBPMs) provide precise beam position measurements, essential for guiding and stabilizing the beam to maximize luminosity on next-generation particle colliders.
A new cryogenic setup is under development to house a reentrant cBPM and a superconducting (SC) quadrupole for use in the ILC Main Linac. The BPM prototype must measure the beam position, achieving temporal and spatial resolutions of less than 369 ns and 1 µm, respectively.
The optimization of an already existing cBPM design developed by CEA Saclay is performed using commercial software CST Studio Suite, where electromagnetic simulations are used to evaluate the cBPM's performance. Additionally, selecting suitable readout electronics is essential to effectively down-convert the high-frequency, fast-decaying cBPM signals while maintaining the required spatial resolution. The designed cBPM and its associated electronics readout system will be tested at ATF under ambient conditions at KEK, Japan.
This presentation will detail the operating principles of the cBPM and provide an overview of the developed design and electronics, demonstrating the high-resolution beam position measurements achieved.

Footnotes

Paper preparation format

LaTeX

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