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KEK LUCX facility new FPGA based LLRF phase and amplitude feedback performance report

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KEK LUCX facility is a compact linear accelerator used for advanced accelerator technology and electron beam instrumentation R&Ds.

New LLRF (Low-Level RF) phase and amplitude feedback based on FPGA (Field-Programmable Gate Array) board was developed and tested during the LUCX facility routine operation. The RedPitaya 125-14 (also known as STEMLab 125-14) FPGA board was chosen due to its well-balanced specifications and the board-to-board synchronization ability. The LLRF feedback loop includes digitization of In-phase and In-Quadrature DC signals, PI controller for I and Q terms correction calculations, I/Q modulation and RF signal regeneration.

This report presents the LLRF feedback development and implementation status, as well as performance test results acquired during several LUCX machine runs. Also, the technical issues of the feedback implementation into the LLRF system of the KEK LUCX accelerator are discussed.

Funding Agency

Footnotes

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