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Real time measurement in slow displacement of the tunnel floor due to dynamic ground motion at the KEKB injector linac

A new remote-controllable sensing system in a laser-based alignment system is in progress to measure slow tunnel floor displacements due to dynamic ground motion in real time at the KEKB injector linac. The 600-m-long linac comprises two (125 m and 476 m) straight sections, by which directly inject electron and positron beams into the Super KEKB rings. Two independent laser-based alignment systems are installed in each straight section.

Ten remote-controllable quadrant photo-detectors (QPDs) were installed in summer shutdown of 2015 just close by plural locations of expansion joints of the building along the linac tunnel, while two detectors of them were installed at the middle location in 2014. The real time measurement pursues to take data since Jan. 2016.

Based on the preliminary analysis, we have observed non-negligible slow floor displacements due to dynamic ground motion, while the required alignment is to attain the precisions of 0.1 mm (rms) level in a local region. The correlation and displacement vector analyses depending on each location were carried out based on the data in this duration. In this report, the detailed experimental results and the present status are described in the laser-based alignment system of the injector linac.

Summary

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