Real-Time Configuration Control of Optical Lattices Using an Optical Interferometer DIAN-JIUN HAN, BOW-WEN SHIAU, TZU-PING KU, National Chung-Cheng University — We present an experimental scheme for fast phase difference control of optical beams based on a simple, however robust setup of Mach-Zehnder interferometer.\textsuperscript{1} We demonstrate to smoothly tune the relative phase by 140° in 275 ms, with an average peak-to-peak phase difference jitter less than 0.9°. The overall achievable tuning range, both for continuous and stepwise scans, can be more than 320°. This scheme is totally immune to intensity fluctuation and allows to engage the conventional phase-shifting imaging. It is especially suitable for real-time configuration control of 2D and 3D optical lattice potentials to study the tunneling and transport effects on cold atomic samples if a Michelson-type interferometer is used.

\textsuperscript{1}Bor-Wen Shiau et al., to be published in JPSJ (2010).