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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.[1] We demonstrate to smoothly tune the relative phase by 140 $^\circ$ in 275 ms, with an average peak-to-peak phase difference jitter less than 0.9 $^\circ$. The overall achievable tuning range, both for continuous and stepwise scans, can be more than 320 $^\circ$. 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.

[1]Bor-Wen Shiau *et al.*, to be published in JPSJ (2010).

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