

Abstract Submitted
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Nondestructive Phase Shifting Imaging of Cold Atoms CHIH-CHIEH LIN, YING-HSIAN WANG, HUNG-SHIUE CHEN, PO-JUI TSENG, Z.X. FAN, DIAN-JIUN HAN, National Chung Cheng University, Taiwan — We propose a nondestructive phase shifting imaging for cold atoms by using a Gaussian beam and accompanying with phase shifting interferometry in a Mach-Zehnder interferometer [1-2]. This imaging scheme could require no imaging lens. Hence, aberration associated with it is completely eliminated and mechanical focusing can be avoided. Compared to the common single-beam nondestructive means [3], our proposed scheme allows energy per probe pulse delivered to the cold samples lowered by almost three orders of magnitude due to signal enhancement inherently provided in the two-beam configuration. In this meeting, we will describe the working principle and show our experimental realization of this novel nondestructive detection means for in-situ imaging on the rubidium-87 atoms confined in a magneto-optical trap. Besides, we will present measured data to demonstrate the focusing capability provided in this scheme as well, though no imaging lens is used.

- [1] Tzu-Ping Ku *et al.*, *Opt. Express* **19**, 3730 (2011).
- [2] Chih-Yuan Huang *et al.*, *J. Opt. Soc. Am. B* **31**, 87 (2014).
- [3] M. R. Andrews *et al.*, *Science* **273**, 84 (1996).

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