Application of optical single-sideband laser in Raman atom interferometry

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A frequency doubled I/Q modulator based optical single-sideband (OSSB) laser system is demonstrated for atomic physics research, specifically for atom interferometry where the presence of additional sidebands causes parasitic transitions. The performance of the OSSB technique and the spectrum after second harmonic generation are measured and analyzed. The additional sidebands are removed with better than 20 dB suppression, and the influence of parasitic transitions upon stimulated Raman transitions at varying spatial positions is shown to be removed beneath experimental noise. This technique will facilitate the development of compact atom interferometry based sensors with improved accuracy and reduced complexity.

Keywords: Atom Interferometry, Raman Laser, Optical Single Sideband, IQ Modulator

Presentation Type: