

Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Continuous motional sensing with highly dispersive medium PEI-CHEN KUAN, CHANG HUANG, SHAU-YU LAN, Nanyang Technological University — Current state-of-the-art atoms-based motional sensors rely on measuring the first-order Doppler shift of the atomic transition of single-particles. By using Doppler-sensitive detection methods, the population of atomic states and, therefore, the velocity of atoms can be measured precisely. On the contrary, here, we demonstrate a novel method of measuring the center-of-mass motion of an atomic ensemble using the collective interference of light passing through the ensemble under the condition of electromagnetically-induced-transparency (EIT). With the large enhancement of the dispersion in the EIT medium, we realize an atom-based velocimeter that has a sensitivity two orders of magnitude higher than the velocity width of the atomic medium used. This method has the advantages of high data rate and convenient detection of the interference phase of light over the conventional method of detecting the fluorescence of atoms and could lead to a new design of compact atoms-based motional sensors.

Pei-Chen Kuan
Nanyang Technological University

Date submitted: 26 Jan 2018

Electronic form version 1.4