

Aspects and Applications of Atom Interferometry for mid band frequency (0.1-10 Hz) Gravitational Waves detection.

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Abstract

Since the first confirmed detection of gravitational wave (GW150914) on 14 September 2015 by LIGO, the detection of gravitational waves by terrestrial LASER interferometric detectors became a routine job. Despite their high sensitivity (100 Hz region), it is important to consider that such terrestrial interferometric detectors lose their sensitivity in the lower frequency region of gravitational waves owing to various types of seismic vibration noises. In order to overcome this problem atom interferometric detectors with unprecedented sensitivity in the deci-hertz (0.1-10 Hz) region of gravitational wave are being considered and proposed by various matter-wave research groups across the world. Some of the various long baseline state-of-the-art atom interferometric detectors that are being considered are MIGA (Rustrel, France) MAGIS-100 (Fermilab, USA), AION (UK based) and ZAIGA (Zaoshan, near Wuhan, China) .The mid-band spectrum of gravitational waves contains Information about various sources such as white dwarf binaries (supernova Type 1A) , intermediate mass black hole and neutron star binaries etc. and possibly from various early Universe stochastic sources such as inflation and information about CMB. It is also worth mentioning that atom interferometric detectors are also optimal for sensitive angular sky localization of sources. I propose to review some of these important aspects through my presentation.

Keywords: Atom Interferometry, gravitational waves.