

Magnetometry with amplified spontaneous emission from sodium vapors

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The measurement of Earth magnetic field is an extremely important topic in geophysical research; measurements in the range 10-300 km can only be achieved with stand-off magnetometry. Current techniques, based on resonant scattering from atoms or molecules, are often limited by low collection efficiency [1]. In the mean time, the generation of a directional laser-like emission, amplified spontaneous emission (ASE), from a sodium vapor cell was recently reported [2].

Here we demonstrate, on a table-top experiment, the detection of the sodium ground-state free-precession under the influence of an external magnetic field by recording the intensity of the backward-directed ASE, see Fig. 1. This method enables scalar magnetometry in the Earth field range without the need of calibration which is extremely suitable for remote sensing using the sodium layer in the mesosphere.

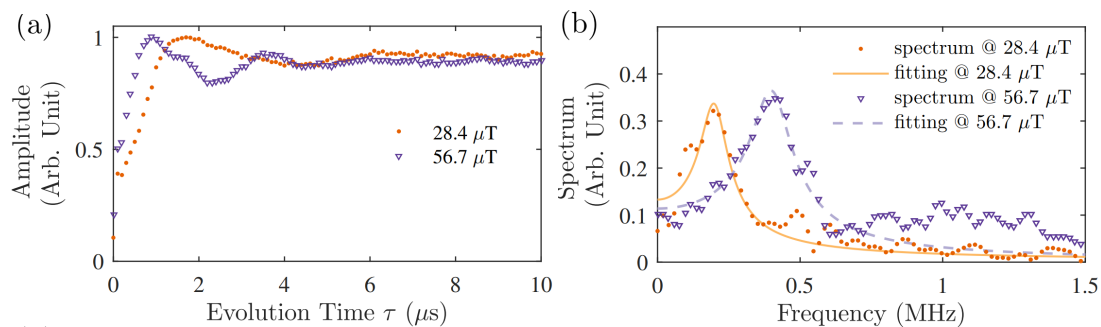


Figure 1: Sodium ground-state free-precession detected with ASE. (a) ASE intensity as a function of the evolution time. (b) Fourier transform of the ground-state free-precession.

References

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