

Magnetic field diagnostics of plasmas based on coherent population trapping (CPT).

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A magnetic field diagnostic is proposed based on measurement of the modification of the optical resonance-fluorescence signal. The resonance-fluorescence radiation is suppressed in case of coherent population trapping (CPT) in test atoms with the Zeeman split-level structure for double - frequency laser radiation. This effect depends on the orientation of the magnetic field relative to the laser beam. A proof-of-principle experiment was performed in a discharge cell [1]. A proposal for measuring of the ratio of the poloidal and toroidal magnetic fields in tokamaks was formulated in [2,3].

The theory of CPT is well known for 3-level systems. But in case of hydrogen-like test atoms one must discuss a more complicated structure (structures). This report concentrates on this problem concerning the peculiarities of the magnetic field diagnostics in toroidal system.

[1] R. Akhmedzhanov et al., Phys. Rev. E 69, 036409 (2004).

[2] R. Akhmedzhanov ... M. Tokman... et al., Phys. of Plasmas 14, 093505 (2007)

[3] V. Vdovin & M.Tokman, JEPT, accepted.