Cesium coherent population trapping magnetometer for cardiosignal detection in an unshielded environment

J. Belfi,1 G. Bevilacqua,2 V. Biancalana,1,* S. Cartaleva,3 Y. Dancheva,1 and L. Moi1

1Dipartimento di Fisica, CNISM-Unità di Siena, Università di Siena, via Roma 56, 53100 Siena, Italy
2Dipartimento di Ingegneria dell’Informazione, CNISM-Unità di Siena, Università di Siena, via Roma 56, 53100 Siena, Italy
3Institute of Electronics, Bulgarian Academy of Sciences, 72 Tzarigradsko Chausse, 1784 Sofia, Bulgaria
*Corresponding author: biancalana@unisi.it

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We present encouraging results obtained with an experimental apparatus based on coherent population trapping and aimed at detecting a biological (cardiac) magnetic field in a magnetically compensated but unshielded volume. The work includes magnetic-field and magnetic-field-gradient compensation and uses differential detection to cancel common mode magnetic noise. Synchronous data acquisition with a reference (electrocardiographic or pulse-oximetric) signal makes possible improvement of the signal-to-noise ratio in off-line averaging. The setup has the significant advantages of working at room temperature with a small-size head, and the possibility of fast adjustments of the dc bias magnetic field, which makes the sensor suitable for detecting a biomagnetic signal at any orientation with respect to the axis of the head and in any position on the patient’s chest, which is not the case with other kinds of magnetometers. © 2007 Optical Society of America

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