

Abstract Submitted  
for the DAMOP07 Meeting of  
The American Physical Society

**A portable ultrasensitive atomic magnetometer for biomagnetic measurements.**<sup>1</sup> ROBERT WYLLIE, ZHIMIN LI, Department of Physics, University of Wisconsin-Madison, RONALD WAKAI, Department of Medical Physics, University of Wisconsin-Madison, NICHOLAS PROITE, PETER COOK, THAD WALKER, Department of Physics, University of Wisconsin-Madison — We present a portable Rb cell atomic magnetometer suited for biomagnetic measurements. Working in the spin-exchange relaxation free regime, we demonstrate an initial white noise floor of  $60 \text{ fT}/\sqrt{\text{Hz}}$ . We show an adult magnetic cardiogram and demonstrate the feasibility of extending our measurements to fetal MCG. Based on previous experiments the noise floor can be further reduced by parametrically modulating the z-magnetic field, which also allows for the simultaneous measurement of the x and y field components using a single probe beam [1]. We will present the simple conversion of the magnetometer to a gradiometer that still uses a single probe beam. Finally, we discuss related technical advances over previous designs, including the replacement of bulky air convection heating apparatus by simple rf heating and an effective insulation material that allows 1 cm working distance from the subject at 180C temperature differential. [1] Z Li, R T Wakai, and T G Walker, Appl. Phys. Lett. 89, 134105 (2006)

<sup>1</sup>This work is funded by the NIH.

Thad Walker  
Department of Physics, University of Wisconsin-Madison

Date submitted: 06 Feb 2007

Electronic form version 1.4