

Abstract Submitted  
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**Dual-axis pi-  
pulse SERF magnetometer for biomedical applications<sup>1</sup>** ELENA ZHIVUN,  
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Wisconsin, Madison — We present a new two-axis vector SERF magnetometer with  
suppressed technical  $1/f$  noise on both sensitive axes. It reaches a probe sensi-  
tivity of  $2 \text{ fT} \times \text{Hz}^{-1/2}$  ( $\hat{x}$ ) and  $8 \text{ fT} \times \text{Hz}^{-1/2}$  ( $\hat{y}$ ) at 10 mHz, outperforming the DC  
SERF magnetometer in the same setup ( $27 \text{ fT} \times \text{Hz}^{-1/2}$ ). The lowest probe noise of  
 $0.7 \text{ fT} \times \text{Hz}^{-1/2}$  ( $\hat{x}$ ) and  $1.5 \text{ fT} \times \text{Hz}^{-1/2}$  ( $\hat{y}$ ) is reached at 10 Hz, comparable to the  
DC SERF probe noise at the same frequency ( $0.3 \text{ fT} \times \text{Hz}^{-1/2}$ ). The magnetometer  
operates by applying a superposition of a DC offset field and a  $\pi$ -pulse comb while  
remaining in the SERF regime. The resulting alkali precession signals for  $B_x$  and  
 $B_y$  fields are orthogonal to each other and synchronous to the pulse repetition rate.

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