Abstract Submitted
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Pulse pumping high spatial resolution atomic magnetic microscopy[1] XUYANG HU, HAICHAO HUANG, LIN CHEN, HAIFENG DONG, Beihang University — Atom vapor magnetometer is currently the most sensitive magnetometer with the fundamental sensitivity of $0.012\text{fT} \cdot \text{cm}^{-3} \cdot \text{Hz}^{-\frac{1}{2}}$ and a measured sensitivity of $0.16\text{fT} \cdot \text{Hz}^{-\frac{1}{2}}$ with a measurement volume of 0.45cm^3[1]. However, the spatial resolution is limited to millimeter scale even with the buffer gas because of the atom diffusion. We present a way to limit atom diffusion range and improve the spatial resolution by using short pulse pumping and CCD detector. The diffusion model and spin-exchange relaxation time are used to calculate theoretically the relation between the spatial resolution and the magnetic sensitivity, which shows that sensitivity-resolution product of the atomic magnetic microscopy (MM) is smaller than that of other MMs, such as scanning SQUID MM, NV diamond MM and BEC MM. The pulse pumping is generated using Photodigm DBR 180TS laser which can output a short pulse light of 300ns with a power of 180mW. The magnetic image is obtained from the laser spot images received by a Manta G145 NIR CCD.

[1] H. B. Dang, A. C. Maloof, and M. V. Romalis, Applied Physics Letters 97, 151110 (2010).

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