Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

In Situ Magnetic Field Measurement using the Hanle Effect[1]
JAROM JACKSON, DALLIN DURFEE, Brigham Young University — We have developed a simple method of in situ magnetic field mapping near zero points in magnetic fields. It is ideal for measuring trapping parameters such the field gradient and curvature, and should be applicable in most experiments with a magneto-optical trap (MOT) or similar setup. This method works by probing atomic transitions in a vacuum, and is based on the Hanle effect, which alters the polarization of spontaneous emission in the presence of a magnetic field. Unlike most techniques based on the Hanle effect, however, we look only at intensity. Instead of measuring polarization we use the change in directional radiation patterns caused by a magnetic field. Using one of the cooling beams for our MOT, along with a linear polarizer, a narrow slit, and an inexpensive webcam, we measure the three dimensional position of a magnetic field zero point within our vacuum to within 1 mm and the gradient through the zero point to an accuracy of 4

[1]This work was supported by NSF grant number PHY-1205736.

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Date submitted: 29 Jan 2016 Electronic form version 1.4