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Correcting for time-dependent field inhomogeneities in a time orbiting potential magnetic trap¹ ADAM FALLON, SETH BERL, CHARLES SACKETT, University of Virginia — Many experiments use a Time Orbiting Potential (TOP) magnetic trap to confine a Bose-condensate. An advantage of the TOP trap is that it is relatively insensitive to deviations and errors in the magnetic field. However, precision experiments using the trapped atoms often do require the rotating field to be well characterized. For instance, precision spectroscopy requires accurate knowledge of both the field magnitude and field direction relative to the polarization of a probe laser beam. We have developed an RF spectroscopic technique to measure the magnitude of the field at arbitrary times within the TOP trap rotation period. From the time-variation mapped out, various imperfections can be isolated and measured, including asymmetries in the applied trap field and static environmental fields. By compensating for these imperfections, field control at the 10 mG level or better is achievable, for a bias field of 10 G or more. This should help enable more precision experiments using trapped condensates, including precision measurements of tune-out wavelengths and possibly parity-violation measurements.

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