SFB/TRR 21 - Seminar
7. Januar 2009, Stuttgart

Brian Anderson
(University of Arizona)

Spin Echo Techniques for Magnetic Field Control in Cold Atom Experiments

Quantum control of atomic spins requires precise control of the magnetic field at the location of the atoms. This makes accurate nulling of the background magnetic field one of the most important limiting factors of a real-world control experiment. We have devised a convenient method to use the atoms themselves as an in situ probe, combining spin-echo techniques and polarization spectroscopy to generate a highly sensitive signature of a desired component of the background field. This allows us to quickly and independently measure all three orthogonal components of the total field with a resolution of a few tens of μG in a bandwidth of ~1kHz. We can subsequently apply the inverse of the measured field with three sets of Helmholtz coils driven by arbitrary waveform generators. The resulting background field is typically less than ~50μG rms over a 10 ms window, an overall reduction of about one order of magnitude compared to the uncompensated AC field in our laboratory.

7. Januar 2009, 14:00 Uhr

Universität Stuttgart, NWZII, Raum 3.123
Pfaffenwaldring 57, 70569 Stuttgart

CO.CO.MAT