

Abstract

The coherent control of a two-state quantum system stands at the base of the field of quantum optics. We utilize cold rubidium atoms as a two state system and manipulate them coherently using microwave radiation. Using a single imaging shot, we simultaneously image multiple Rabi frequencies (10-20kHz), and observe spatial Rabi fringes "moving" with time. We present a technique in which we are able to use the single shot multiple fringes to accurately map a microwave field with micrometer spatial resolution. Such a system may be used for mapping complex fields as well as for high precision magnetic gradient sensing.