

DAMOP06-2006-000578

Abstract for an Invited Paper
for the DAMOP06 Meeting of
the American Physical Society

Resonance spin dynamics in ultracold gases

KLAUS SENGSTOCK, University of Hamburg

Collective dynamical effects and in particular coherent interactions in spinor Bose Einstein condensates offer new fundamental insights into a new class of magnetic phenomena at ultralow energies, which connect conventional magnetism and coherent spin dynamics. Concentrating on ^{87}Rb spinor condensates we present experimental observations of a magnetically tuned resonance phenomenon in the spin mixing dynamics in a $F = 2$ system. We analyze general features like quadratic Zeeman dephasing and its influence on coherent spin mixing processes and propose an extension of the resonance concept to higher spin systems in the framework of four wave mixing. Furthermore we discuss experimental signatures of the transition from coherent spinor oscillations to thermal equilibration, which is marked by dephasing and decoherence of the spinor order parameter. An outlook on future work towards spinor Bose-Einstein condensates on a triangular optical lattice will be given.