Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Effective gaufe fields for dark-state polaritons JOHANNES OTTERBACH, TU Kaiserslautern, JULIUS RUSECKAS, ITPA, Vilnius University, RAZMIK G. UNANYAN, TU Kaiserslautern, GEDIMINAS JUZELIUNAS, ITPA, Vilnius University, MICHAEL FLEISCHHAUER, TU Kaiserslautern — We discuss dynamical phenomena of light-matter quasi-particles, so-called dark-state polaritons (DSP). These particles arise in the Raman interaction of a weak probe field with a coherently driven atomic ensemble under conditions of electromagnetically induced transparency (EIT), and are the basis of phenomena such as slow-, stopped and stationary-light. We study the creation of an effective magnetic field for the DSP. In the limit of large a pulse length they behave as effective Schrödinger particles with an externally adjustable mass. By uniformly rotating the medium an effective magnetic field is created. With the proposed scheme degeneracies of the lowest Landau level of 100 and above is achievable. Thus the system can be used to study effects as the Lorentz force for neutral particles or, upon creating interactions between the DSP, the bosonic analogue of the fractional quantum Hall effect.

Johannes Otterbach
TU Kaiserslautern

Date submitted: 27 Jan 2010 Electronic form version 1.4