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**Photon number dependent group velocity in vacuum induced transparency** NIKOLAI LAUK, MICHAEL FLEISCHHAUER, Department of Physics and Research Center OPTIMAS, University of Kaiserslautern, Germany — Vacuum induced transparency (VIT) is an effect which occurs in an ensemble of three level atoms in a  $\Lambda$  configuration that interact with two quantized fields. Coupling of one transition to a cavity mode induces transparency for the second field on the otherwise opaque transition similar to the well known EIT effect. In the strong coupling regime even an empty cavity leads to transparency, in contrast to EIT where the presence of a strong control field is required. This transparency is accompanied by a reduction of the group velocity for the propagating field. However, unlike in EIT the group velocity in VIT depends on the number of incoming photons, i.e. different photon number components propagate with different velocities. Here we investigate the possibility of using this effect to spatially separate different photon number components of an initially coherent pulse. We present the results of our calculations and discuss a possible experimental realization.

Nikolai Lauk  
Department of Physics and Research Center OPTIMAS,  
University of Kaiserslautern

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