The Franz-Keldysh effect revisited: Electroabsorption in GaAs including interband coupling and excitonic effects FEDERICO DUQUE-GOMEZ, J.E. SIPE, Department of Physics, University of Toronto — We show numerical results for the linear optical absorption of bulk GaAs in the presence of a homogeneous dc electric field. Our approach, based on gauge-invariant nonequilibrium Green functions [1], is suitable for including many-body effects and using realistic band models. We calculate the time evolution of the interband polarization driven by an optical pulse and derive the absorption coefficient from it. The interband effects of the dc field are captured in a matrix transform in the band indices, which satisfies a differential equation solved efficiently in a separate numerical calculation. For the present calculation we have used a 14-band $\mathbf{k} \cdot \mathbf{p}$ model and treated excitonic effects at a Hartree-Fock level. Previous calculations in the independent particle approximation have shown interesting effects of the band structure and the importance of the interband coupling.[2] We describe the effect of including the Coulomb interaction, which is especially relevant in low temperature and low field experiments. [3]

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