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Optical absorption of light carrying orbital angular momentum by semiconductors: free-particle quantum kinetics P.I. TAMBORENEA, G.F. QUINTEIRO, Departamento de Física and IFIBA, Universidad de Buenos Aires, Argentina — We develop a free-carrier theory of the optical absorption of light carrying orbital angular momentum (twisted light) by bulk and quasi-two-dimensional semiconductors. We obtain the optical transition matrix elements for Bessel-mode twisted light and use them to calculate the wave function of photo-excited electrons to first-order in the vector potential of the laser [1]. We then pose the problem of the quantum kinetics of interband transitions in terms of the Heisenberg equations of motion of the electron populations, and interband and intraband coherences [2]. We solve the equations of motion in the low-excitation regime, and obtain analytical expressions for the coherences and populations; with these, we calculate the orbital angular momentum transferred from the light to the electrons and the paramagnetic and diamagnetic electric current densities.

[1] G. F. Quinteiro and P. I. Tamborenea, EPL **85**, 47001 (2009).
[2] G. F. Quinteiro and P. I. Tamborenea, Phys. Rev. B **82**, 125207 (2010).

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