6.7 Large Frequency Shifts of Absorption Profiles Due to the Combination of Light-Shift, Optical Pumping and Magnetic Fields in Sodium Vapor

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Shifts of the energy of atomic states by the interaction with intense laser fields have been described in several contexts. We found an unusually strong effect, which shifts the position of an absorption line by several GHz at an intensity of only a few mW/mm^2 - many orders of magnitude stronger than any effect know previously. We found that the effect can be understood as arising from a combination of Zeeman effect, light shift and optical pumping. The shift exists only for circularly polarized light and changes its sign with the polarization of the light as well as with the direction of the external magnetic field.