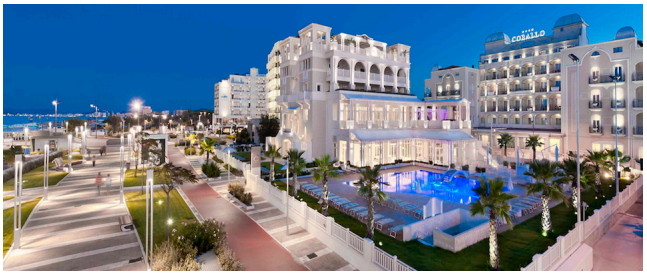

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Spin dynamics in nonuniform electromagnetic wave fields

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Based on solution of Dirac equation, the dynamics of a quantum particle with a half-integer spin in the field of an arbitrary inhomogeneous electromagnetic wave has been analyzed. It is shown that, in the first order of expansion in longitudinal energy, the effective interaction potential of a fermion coincides with that of a scalar particle, while the spin features of interaction in this field appear only in the next expansion term. Analyzing the semiclassical approximation of dynamics of an arbitrary spin for a charged particle in an optical lattice field, we have shown that under the condition that the both field and energy of an individual photon are small compared to the longitudinal energy of a charged particle, the dynamics of the polarization vector reveals a smooth precession, over which fast small oscillations are superimposed. The rate of smooth precession is proportional to the difference between the magnetic moment of the particle and its anomalous part $\Omega \sim \mu - \mu'$. An estimate of the angular velocity of the spin vector precession is also found, which can reach rather large values Ω 10^9 s^{-1}.

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