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Stern-Gerlach experiment on the lattice

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We have explored ground state energies of the light vector mesons on the base of the SU(3) lattice gauge theory. This study was performed without dynamical quarks. We have observed the energies spliting depending on the value of the spin projections on an external magnetic field. The ground state energy of neutral mesons with the zero spin projection diminishes with the increase of the field, while the energy of charged one increases according to the theoretical expectation. The neutral mesons energies with non-zero spin projections increase with the value of the magnetic field. The Landau level describes the energy of a charged point-like particle in a magnetic field, while in our calculations we took into account the quark structure of a particle and introduced the term with magnetic polarizability. The background magnetic field enables to calculate the magnetic polarizabilities and the magnetic dipole moments of the hadrons. We measured the energy of a meson as a function of the uniform abelian field. In our calculations external magnetic field is constant and it's values vary from 0 up to $2.5\,GeV^2$. The magnetic dipole moment of the charged ρ meson has been defined for various quark masses more precisely then in our previous work. This value is in good agreement with the experimentally obtained value. We have also estimated the magnetic dipole moment of the K^* meson.

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