time but inhomogeneous in space. In this case G(0) should be taken to mean the fluctuations on entering the crystal, and G(t) and B(t) the same on emerging from the crystal. In all other respects, the prescriptions a, b, and c remain in force.

In addition to obtaining more detailed information on the space-time picture of the PL process, the statistics of the photocounts in the PL process can find also the following applications:

1)Inasmuch as the quanta are produced in a small spatial region (within the volume of the crystal), PL serves as a source of pairs of quanta of different frequencies with well-correlated instants of production. By studying the temporal statistics of quantum pairs passing through different devices we are able to measure the difference of group delays in time at two different frequencies.

2) A system of a PL-crystal and counter 1 (see the figure) in one half-space, with quantum efficiency $\zeta_1 = 1$, can be regarded as an example of a system at whose output there are generated (in the direction $\vec{n}$) states with a definite number of quanta. We know of no other proposed system (even hypothetical) for this purpose.

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MAGNETISM OF CONDUCTION ELECTRONS IN THE PRESENCE OF AN ELECTRIC FIELD

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We consider in this paper the magnetism of an electron gas situated in a homogeneous constant magnetic field $\vec{B}$ and in an alternating electric field $\vec{E} = \vec{E}_0 \cos\omega t$, where $\vec{E}_0$ is the amplitude, ω the frequency, and $\vec{E} \perp \vec{B}$.

Let H be the Hamiltonian of the system of electrons with concentration n. Then, in the natural system of coordinate system, the magnetization is equal to

$$M = -\frac{1}{V}\mathrm{Sp}\left(\frac{\partial \hat{H}}{\partial B}\rho\right), \tag{1}$$

where V is the volume of the system and ρ is the density matrix, which satisfies the Neumann equation with Hamiltonian $\hat{H}$. Solving the Neumann equation and substituting ρ in (1) we obtain, after time averaging,

$$M = M_0 - \frac{e^3 n}{2m^2 c}\frac{\omega_c}{(\omega_c^2 - \omega^2)^2} E_0^2 , \tag{2}$$

where $e > 0$ is the absolute value of the electron charge, m and c are the electron mass and the speed of light, and $\omega_c = eB/mc$ is the cyclotron frequency. M_0 is the magnetization [1] at $E_0 = 0$. From (2) we get for the differential magnetic susceptibility χ

$$\chi = -\frac{\mu_0 n}{B}\frac{\omega^2 + 3\omega_c^2}{\omega^2 - \omega_c^2}\frac{E_0^2}{E_{cr}^2}, \tag{3}$$

where $\mu_0 = e\hbar/2mc$ is the Bohr magneton, and the critical field is

$$E_{cr} = \frac{|\omega_c^2 - \omega^2|}{\omega_c^2}\frac{\hbar\omega_c}{er_0}; \quad r_0 = (c\hbar/eB)^{1/2}. \tag{4}$$

As seen from (2) and (3), the magnetization and the differential magnetic susceptibility have resonances at $\omega_c = \omega$. If $\omega > \omega_c$, then $\chi < 0$. $\chi > 0$ when $\omega < \omega_c$. It should be noted that although χ does reverse sign, the magnetization and the ordinary susceptibility are always negative, i.e., the electron gas is diamgnetic also in the presence of an electric field.

We now estimate the value of χ for semiconductors of the InSb type, for which $m \sim 10^{-2} m_0$, where m_0 is the mass of the free electron. For fields $B = 10^4$ G and concentrations $n = 10^{17}$ cm^{-3}, and also at frequencies $\omega \sim \omega_c = 1.8 \times 10^{13}$ sec^{-1} we have

$$\chi \sim 10^{-5}(E_0/E_{cr})^2, \quad E_{cr} = 3\times10^3 \text{ V/cm}. \tag{5}$$

For fields $E_0 = 10^4$ V/cm, which can now be readily obtained in pulsed form, say with the aid of a CO_2 laser ($\lambda = 10.6\mu$), we have $\chi \sim 10^{-4}$, and the corresponding value of the magnetization is $M \simeq 1$ G. For comparison we recall that a typical value of M_0 observed in experiment is about 10^{-2} G. At resonance, M increases by a factor $(\omega_c\tau)^4$, where τ is the relaxation time. In practice, however, such an increase cannot be obtained, in view of the absorption of the radiation.

The obtained expressions (2) and (3) are exact with respect to the electric field, if the latter is homogeneous. It is curious that in (2) the addition to M_0 does not contain Planck's constant, i.e., it is a classical quantity. If the electric field is inhomogeneous, then terms that depend on the wave vector of the field and already contain Planck's constant are added to (2) and (3).

Leaving the discussion of these terms aside, in view of their smallness, we note that the presence of a classical contribution is not strange and does not contradict the known Bohr - van Leeuwen theorem, which states that the electron system of a solid has no classical magnetic moment. The point is that this theorem is valid for systems that are in statistical equilibrium, whereas in the presence of an electric field the state is not in statistical equilibrium. Finally, the obtained formulas are valid in the limit when the influence of the body boundaries can be neglected. The corresponding validity conditions are

$$\epsilon_F \ll \frac{\hbar^2}{2m}\frac{R^2}{r_0^4}, \quad \hbar\omega \ll \frac{\hbar^2}{2m}\frac{R^2}{r_0^4}, \tag{6}$$

where ε_F is the Fermi energy and R is the characteristic dimension of the body.

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VERIFICATION OF THE CONSEQUENCES OF THE $\Delta T = 1/2$ RULE IN THE $K \to 3\pi$ DECAY

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In [1] they obtained a relation for the total probabilities of the τ decay from the $\Delta T = 1/2$ rule. However, a verification of this relation is made difficult by the fact that it contains the pion scattering lengths a_T, which are not well known at present.

It is noted in [2] that the influence of scattering, leading to singularities on the boundary of the physical region of the decay, can be decreased by comparing the total probabilities near the center of the Dalitz plot. We present below a relation for γ_R - the total probabilities in a circle of radius R with center at the center of the Dalitz plot, divided by the area of the circle:

$$\frac{\gamma_R^{++-}}{4\gamma_R^{oo+}} - \frac{3\gamma_R^{+-o}}{2\gamma_R^{ooo}} = -\frac{175}{54}\Phi(R)(a_2 - a_o)^2 m_\pi E . \qquad (1)$$

$R = 3Q/E$ and varies from 0 to 1; $E = M_k - 3m_\pi$; Q - maximal pion energy on the boundary of the circle, measured from the center of the Dalitz plot. At small values of R we have $\Phi(R) \simeq 3/64R^2$ and

$$\frac{\gamma_R^{++-}}{4\gamma_R^{oo+}} - \frac{3\gamma_R^{+-o}}{2\gamma_R^{ooo}} = -\frac{175}{128}(a_2 - a_o)^2 m_\pi (Q^2/E). \qquad (2)$$

When R = 1 we have $\Phi(1) = 1/3 - \sqrt{3}/2$ and the result agrees with the relation obtained in [1]:

$$\frac{\gamma^{++-}}{4\gamma^{oo+}} - \frac{3\gamma^{+-o}}{2\gamma^{ooo}} = -\frac{175}{162}\left(1 - \frac{3\sqrt{3}}{2\pi}\right)(a_2 - a_o)^2 m_\pi E . \qquad (3)$$

The table lists the values of $\Phi(R)$.

Relation (1) is valid under the following assumptions:

a) the decay is due to an interaction with $\Delta T = 1/2$ and $\Delta T = 3/2$;

b) transitions with $\Delta T = 5/2$ are small compared with $\Delta T = 1/2$, so that we can confine ourselves to the first order in this interaction;

c) there are no transitions with $\Delta T = 7/2$;

R	Φ(R)	R	Φ(R)
0	0.001	0.6	0.020
0.1	0.002	0.7	0.026
0.2	0.003	0.8	0.035
0.3	0.005	0.9	0.045
0.4	0.010	1	0.058
0.5	0.013		