η + N reaction near threshold can be explained in terms of strong interactions in $S_{\frac{1}{2}}$ and $D_{\frac{3}{2}}$ states. When reaction amplitudes for the states $J = l + \frac{1}{2}$ and $J = l - \frac{1}{2}$ are denoted, respectively, by $A^{+}_{l} \exp(2i\xi^{+}_{l})$ and $A^{-}_{l} \exp(2i\xi^{-}_{l})$, differential cross sections due to the $S_{\frac{1}{2}}$ and $D_{\frac{3}{2}}$ states are expressed by [4, 5]

$$4k^2 \frac{d\sigma}{d\Omega} = |A_0^+|^2 + (1 + 3\cos^2\theta)\,|A_2^-|^2 + + (3\cos^2\theta - 1) A_0^+ A_2^- \times 2\cos 2(\xi_0^+ - \xi_2^-) \,. \qquad (7)$$

If

$$A_2^-/A_0^+ \approx -2\cos 2(\xi_0^+ - \xi_2^-) \,, \qquad (8)$$

the form of the $d\sigma/d\Omega$ becomes isotropic. Since we may expect the case in which condition (8) is satisfied, it is impossible to conclude from the experimental data [1] that the $D_{\frac{3}{2}}(1512)$ pion-nucleon resonance does not play a large role in the π + N → η + N reaction near threshold. Moreover we cannot exclude another possibility that $S_{\frac{1}{2}}$, $P_{\frac{1}{2}}$ and $D_{\frac{3}{2}}$ states react strongly, because the following condition in addition to (8) may be satisfied as a possible case. The interference between $S_{\frac{1}{2}}$ and $P_{\frac{1}{2}}$ states may almost be cancelled out by that between $P_{\frac{1}{2}}$ and $D_{\frac{3}{2}}$ states *.

Finally we discuss the following problem:

Among the two (or three) kinds of interpretations mentioned above, which should be taken? If the π + N → η + N reaction near threshold can be described in terms of the effect of $P_{\frac{1}{2}}(1485)$ only, we can expect no polarization of recoil nucleon. If the π + N → η + N reaction near threshold can be described in terms of strong interactions in $S_{\frac{1}{2}}$ and $D_{\frac{3}{2}}$ states, polarization of recoil nucleon has the following form [5]:

$$4k^2 \frac{1}{\sin\theta} \frac{dP}{d\Omega} = -6\cos\theta \cdot A_0^+ A_2^- \sin 2(\xi_0^+ - \xi_2^-) \,. \qquad (9)$$

From these results we can say the following: If large polarization of the recoil nucleon is observed in experiment, the former model in which only the $P_{\frac{1}{2}}$ state reacts strongly is inconsistent with the result. Since this conclusion is also valid for the case of γ + p → η + p reaction near threshold, measurement on polarization of recoil proton for this reaction would be very useful to examine the reaction mechanism for η meson production near threshold.

* Note that both interference terms have a same cos θ-form in the expression of angular distribution.

References

1. F.Bulos et al., Phys. Rev. Letters 13 (1964) 486.
2. J.B.Bronzan and F.E.Low, Phys. Rev. Letters 12 (1964) 522.
3. L.David Roper, Phys. Rev. Letters 12 (1964) 340.
4. S.Minami, Prog. Theor. Phys. 11 (1954) 213.
5. S.Hayakawa, M.Kawaguchi and S.Minami, Prog. Theor. Phys. Supplement 5 (1958) 41.

* * * * *

ON THE ALGEBRA OF SU_6

A. SALAM

International Centre for Theoretical Physics, Trieste

Received 19 November 1964

The remarkable success of SU_6 ideas [1] in elementary particle physics makes it imperative to look for its relativistic basis. Consider the free Dirac Lagrangian $\mathcal{L} = \bar{\psi}(\not{p} - m)\psi$ for a single particle. $\mathcal{L}$ is invariant for the Pauli-Lubanski transformation

$$\psi' = (1 + i\epsilon_\mu \omega_\mu)\psi \qquad (1)$$

where

$$\omega_\mu = \tfrac{1}{4}\,\epsilon_{\mu\nu\rho\kappa}\,\sigma_{\nu\rho}\,p_\kappa \,.$$

Since $p_\mu \omega_\mu \equiv 0$, there are three independent generators with the * commutation relation

$$[\omega_\mu, \omega_\nu] = i\,\epsilon_{\mu\nu\rho\kappa}\, p_\rho\, \omega_\kappa \qquad (2)$$

The generators give rise to an SU_2-like (in general non-compact) structure which satisfies for the spin $\frac{1}{2}$ case the anti-commutation relation: -

$$\{\omega_\mu, \omega_\nu\} = -\tfrac{1}{4}(\gamma_5[\gamma_\mu, \not{p}], \gamma_5[\gamma_\nu, \not{p}]) = 2(p_\mu p_\nu - p^2 g_{\mu\nu}) \qquad (3)$$

Consider now the case when ψ is a three-component Sakata-like entity (representing quarks). It is possible to extend (1) to the general (SU_6) transformation:

$$\psi' = (1 + i\epsilon^i T^i + i\epsilon^\alpha_\mu T^\alpha \omega_\mu)\psi \qquad (4)$$

Here $T^\alpha \begin{pmatrix} \alpha = 0, \ldots, 8 \\ i = 1, \ldots, 8 \end{pmatrix}$ are the usual U_3 generators with $T^0 = 1$ and from (2),

$$\begin{aligned}[T^\alpha \omega_\mu, T^\beta \omega_\nu] &= \tfrac{1}{2}\{\omega_\mu, \omega_\nu\}[T^\alpha, T^\beta] + \\ &+ \tfrac{1}{2}[\omega_\mu, \omega_\nu][T^\alpha, T^\beta] = i(p_\mu p_\nu - p^2 g_{\mu\nu}) c_{ijk} T^k + \\ &+ \tfrac{i}{2}\epsilon_{\mu\nu\rho\kappa} p_\rho \omega_\kappa (\tfrac{1}{3}\delta_{ij} T^0 + d_{ijk} T^k) \\ [T^i \omega_\mu, T^j] &= \tfrac{1}{2}\omega_\mu c_{ijk} T^k \end{aligned} \qquad (5)$$

The adjoint representation-densities are given by $\bar{\psi}\gamma_\mu \omega_\nu T^\alpha \psi$ and $\bar{\psi}\gamma_\mu T^i \psi$ which satisfy as usual,

$$\bar{\psi}\not{p}\,\omega_\nu T^\alpha \psi = \bar{\psi}\not{p}\, T^i \psi = 0 \qquad (6)$$

One may now generalise the case of SU_6 above the more general case [2] $(SU_6)_L \times (SU_6)_R$; i.e., start with the fields $\psi_{L,R} = \frac{1}{2}(1 \pm \gamma_5)\psi$. Clearly $m\bar{\psi}\psi$ term is not invariant for the full group (though the invariance is unaffected for the pure ω_μ transformations). There are altogether now 70 generators $\bar{\psi}_{L,R}\gamma_\mu \omega_\nu T^\alpha \psi_{L,R}$, $\bar{\psi}_{L,R}\gamma_\mu \times T^i \psi_{L,R}$. The conservation equations (6) however need modifying; thus:

$$\bar{\psi}\not{p}\,\omega_\nu \gamma_5 T^\alpha \psi \neq 0 = (2m\bar{\psi}\,\omega_\nu \gamma_5 T^\alpha \psi),$$
$$\bar{\psi}\not{p}\,\gamma_5 T^i \psi \neq 0 = (2m\bar{\psi}\gamma_5 T^i \psi) \,.$$

From this point of view the 0^-, 1^- 35-fold (represented by the field operators $\bar{\psi}\omega_\nu\gamma_5 T^\alpha\psi$ and $\bar{\psi}\gamma_5 T^i\psi$) is a remnant of the broken $(SU_6)_L \times (SU_6)_R$ symmetry.

The author's thanks are due to Drs. P. T. Matthews and J. Charap for stimulating discussions and to Drs. R. Delbourgo and J. Strathdee for carefully reading through the manuscript.

* By the usual procedure one constructs the conserved current-density $\bar{\psi}\gamma_\mu \omega_\nu \psi$ so that a representation for ω_ν is given by $\int d^3x\, \bar{\psi}\gamma_4 \omega_\nu \psi$. In checking the C.R. (2), (5) and (6) care is needed in writing anti-commutators like $\{\bar{\psi}(x), \not{p}\,\psi(y)\}\,\delta(x_0 - y_0)$.

References

1. F.Gürsey and L.A.Radicati, Phys. Rev. Letters 13 (1964) 173;
A.Pais, ibid, 13 (1964) 175;
B.Sakita, Physics Letters, to be published.
2. This is analogous to study of the extended algebras $(SU_3)_L \times (SU_3)_R$ by A.Salam and J.C.Ward, Il Nuovo Cim. 19 (1961) 167;
M.Gell-Mann, Phys. Rev. 125 (1962) 1067;
and Y.Nambu and P.Freund, Phys. Rev. Letters 12 (1964) 714.

* * * * *

CLASSICAL PHOTON BREMSSTRAHLUNG IN ELECTRON COLLISIONS

V. N. BAYER and V. M. GALITSKY

Novosibirsk State University, USSR

Received 9 November 1964

a) Photons emitted in the collision of charged particles may be conveniently divided into two classes: classical and hard. By definition the emission of classical photons only weakly influences the motion of the charged particle. Evidently, the condition

$$\omega/\epsilon \ll 1 \qquad (1)$$

is to be fulfilled, where ω is photon energy; ϵ - charged particle energy. The emission of classical photons occurs in an independent way so that the cross-section of a process with the emission of n photons, may be represented as [1]:

$$d\sigma_n = d\sigma_0 \frac{1}{n!}\, dW(\kappa_1)\, dW(\kappa_2) \ldots dW(\kappa_n) \,, \qquad (2)$$

where $d\sigma_0$ is the cross-section of the elastic process; while

$$dW(\kappa_m) = \frac{1}{2\omega_m}\mathcal{J}^*_\mu(\kappa_m)\mathcal{J}^\mu(\kappa_m)\, d^3\kappa_m . \quad (3)$$

Here $\mathcal{J}_\mu(\kappa_m)$ is classical current

$$\mathcal{J}_\mu(\kappa_m) = \frac{ie}{(2\pi)^{\frac32}}\left[\sum_i \frac{(p_i)_\mu}{(\kappa_m p_i)} - \sum_j \frac{(p'_j)_\mu}{(\kappa_m p'_j)}\right]. \quad (4)$$

p_i is momentum of the incoming particles; p'_j is that of the outgoing ones.

The terms with classical currents can be easily separated in the matrix element of any process with photon emission, independently of the spin of emitting particles. To this end, one should separate terms which do not contain vectors "κ" in the nominator. For example, in case of one photon emission

$$M = \frac{M_0(ej)}{\sqrt{2\omega}} + \text{terms with } \kappa \text{ in the nominator}, \quad (5)$$

where e is photon polarization vector; M_0 is matrix element of the elastic process. It is evident that in case $\omega \to 0$ the expressions containing classical currents describe the infrared region. In fulfilling the condition (1) the terms containing vector κ in the nominator yield a small contribution and may be omitted.

b) Now we consider the simplest example of photon emission in Coulomb scattering. In this case

$$d\sigma_{c1} = d\sigma_{c0}\, dW_c(\kappa), \quad (6)$$

where $d\sigma_{c0}$ is the cross-section of the elastic scattering (Rutherford formula);

$$dW_c(\kappa) = \frac{\alpha}{2\pi^2}\left(\frac{p_\mu}{(p\kappa)} - \frac{p'_\mu}{(p\kappa)}\right)^2 \frac{\omega^2 d\omega d\Omega}{2\omega}. \quad (7)$$

By carrying out the integration over the photon emission angle we get

$$dI_c(\omega,\theta) = \int_{\Omega_\kappa} dW_c(\kappa) = \frac{2\alpha}{\pi}\left[\frac{2x^2+1}{x\sqrt{x^2+1}}\ln(x+\sqrt{x^2+1}) - 1\right]\frac{d\omega}{\omega} \quad (8)$$

where $4m^2x^2 = (p-p')^2 = 4|\boldsymbol{p}|^2\sin^2\frac12\theta$, θ is electron scattering angle. In limiting cases we have:

a) for $\theta \gg m/|\boldsymbol{p}|$

$$dI_c(\omega,\theta) = \frac{2\alpha}{\pi}\frac{d\omega}{\omega}\left[\ln\left(\frac{4\epsilon^2\sin^2\frac12\theta}{m^2}\right) - 1\right], \quad (9)$$

b) for $\theta \ll m/|\boldsymbol{p}|$

$$dI_c(\omega,\theta) = \frac{2\alpha}{3\pi}\frac{d\omega}{\omega}\frac{\boldsymbol{p}^2\theta^2}{m^2} \quad (10)$$

For calculating the total cross-section of the process with photon emission with energy ω, formula (6) should be integrated over the electron scattering angle θ. The main contribution in this integration gives the region of small momentum transfer q^2. The lower integration limit θ_{c0} is determined from the condition

$$q^2_{\min} = (|\boldsymbol{p}| - |\boldsymbol{p}'| - |\boldsymbol{\kappa}|)^2 = \epsilon^2\theta^2_{c0} \quad (11)$$

From which

$$\theta_{c0} = \omega/2\gamma^2\epsilon \quad ; \quad \gamma = \epsilon/m \quad (12)$$

At small scattering angles θ, the cross-section in the ultra-relativistic limit has the form:

$$d\sigma_{c1} = \frac{4z^2r_0^2}{\gamma^2}\frac{d\Omega}{\theta^4}\, dI_c(\omega,\theta). \quad (13)$$

Taking into account the fact that the angle $\theta_{c0} \ll 1/\gamma$, one may make use of the expression (10) for dI_c restricting the integration to the value $\gamma \sim 1/\gamma$. From the above we get, with logarithmic accuracy

$$d\sigma_{c1}(\epsilon,\omega) = \frac{16}{3}z^2r_0^2\alpha\frac{d\omega}{\omega}\ln\frac{2\gamma^2 m}{\omega}. \quad (14)$$

This result coincides with the main (logarithmic) part of the formula, obtained in the integration of the exact expression for the bremsstrahlung cross-section on the Coulomb center (Bethe-Heitler formulas [2]). The constant which is contained in the exact expression cannot be obtained in this approximation since it is not given by the terms with classical currents alone.

c) In the similar way one may consider bremsstrahlung in case of two electron collisions

$$d\sigma_{e1} = d\sigma_{e0}\, dW_e(\kappa). \quad (15)$$

Here $d\sigma_{e0}$ is Møller's formula. The expression $dW_e(\kappa)$ integrated over the photon emission angle has the form:

$$dI_e(\omega,\theta) = \int_{\Omega_\kappa} dW_e(\kappa) = \frac{4\alpha}{\pi}\frac{d\omega}{\omega}\left[\frac{2x^2+1}{x\sqrt{x^2+1}}\ln(x+\sqrt{x^2+1}) + \frac{2y^2+1}{y\sqrt{y^2+1}}\ln(y+\sqrt{y^2+1}) - \frac{2z^2-1}{z\sqrt{z^2-1}}\ln(z+\sqrt{z^2-1}) - 1\right], \quad (16)$$

where

$$4m^2x^2 = (p_1-p'_1)^2 \; ; \quad 4m^2y^2 = (p_1-p'_2)^2 \; ; \quad 4m^2z^2 = -(p_1+p_2)^2 . \quad (17)$$

In integrating over the electron scattering angle the main contribution comes from the region of small angles θ (similar to the case of external field scattering) and angles θ close to π (in view of the exchange diagram contribution). The contributions of these regions to the total cross-section are the same. The minimal momentum transfer in c.m. system is defined by the formula

$$q^2_{\min} = (|\boldsymbol{p}_1| - |\boldsymbol{p}'_1| - |\boldsymbol{\kappa}|)^2 - (\epsilon_1 - \epsilon'_1 - \omega) \simeq \frac{m^6\omega^2}{16\epsilon^6} = \epsilon^2\theta^2_{e0}, \quad (18)$$

where from

$$\theta_{e0} = \frac{\omega}{4\gamma^3\epsilon} \quad (19)$$

it may be seen that the cut-off angle θ_{e0} in case of electron scattering in the c.m. system is γ times smaller than the cut-off angle for Coulomb field scattering. The rest of the calculation is carried out in the same manner as in b). As a result, we get the following expression for the total cross-section for electron scattering in the c.m. system with the emission of a single photon

$$d\sigma_{e1}(\epsilon,\omega) = \frac{32}{3}r_0^2\alpha\ln\frac{4\gamma^3m}{\omega}\frac{d\omega}{\omega} \quad (20)$$

The larger numerical factor in this expression compared with eq. (14) is due to the fact that both electrons emit. The same formula holds for emission in electron positron collision. The result obtained (20), coincides with the cross-section calculated with the aid of Weizsäcker-Williams method.

d) One may assume that the given method of calculation can be used for calculating the total cross-sections of processes with the emission of a larger number of photons. The double bremsstrahlung in electron-electron (positron) collision is of particular interest. This process may be used in the colliding beam experiments in order to observe beam collision. Besides, it is the background in the observation of small angle annihilation.

It is evident that

$$d\sigma_{e2} = d\sigma_{e0}\frac{1}{2!}\, dW_e(\kappa_1)\, dW_e(\kappa_2). \quad (21)$$

The analysis of the integration regions shows that the main contribution is given by two regions: 1) photons are emitted in opposite directions at small angles to the direction of electron motion; 2) photons are emitted at small angles but in the same direction. In this event, the main contribution in case of electron-electron scattering is given by the angles $\theta \sim 0$ and $\theta \sim \pi$, while in case of electron-positron scattering it is given by the angle $\theta \sim 0$. In the calculation we shall take into account just case 1) which is more interesting for us, i.e. we shall calculate the total cross-section for the double bremsstrahlung in opposite directions. We note also that contrary to the case of single bremsstrahlung the cross-section at small scattering angles behaves as $\theta d\theta$, so that the cut-off plays no role. Therefore the major contribution is given by the region of angles $\theta \sim 1/\gamma$, so it is necessary to integrate the exact expression. By carrying out the integration over θ we get in the c.m. system

$$d\sigma_{e2}(\epsilon,\omega_1,\omega_2) = \frac{32r_0^2\alpha^2}{\pi}\frac{d\omega_1}{\omega_1}\frac{d\omega_2}{\omega_2}\left[\frac54 + \frac78\zeta(3)\right], \quad (22)$$

the double bremsstrahlung cross section in the electron-electron and in the electron-positron collision. It is essential that this expression (as well as the cross-section of processes with forward (backward) emission of a large number of photons) should not contain large logarithms.

Recently Zazunov and Fomin [3] calculated the cross-section of the double bremsstrahlung with the fulfillment of condition (1) for the Coulomb center and zero angle. Since the cross-section for the emission of classical photons at 0 angle is zero, the contribution obtained by them belongs to non-classical photons only. The result obtained in ref. 3 is applicable at $\theta \ll 1/\gamma$. Comparing it with the contribution for the classical photon (10), it may be easily seen that beginning with angles $\theta \sim \omega/\epsilon\gamma^2$, the cross-section of the classical photon emission exceeds the cross-section found in [3].

The relation of the double bremsstrahlung cross section to the cross-section for the two quanta annihilation in c.m. system may be represented as:

$$\frac{d\sigma(e^+ + e^- \to e^+ + e^- + 2\gamma)}{d\sigma(e^+ + e^- \to 2\gamma)} = \frac{2.3\cdot 32\alpha^2\gamma^2}{\pi^2\ln 2\gamma}\frac{d\omega_1}{\omega_1}\frac{d\omega_2}{\omega_2} \quad (23)$$

This result does not contradict the preliminary experimental results obtained for the colliding electron-positron beams at E = 250 MeV. When attempting to discover the two-quanta annihilation at small angles there was observed a significant number of photons with energy satisfying the conditions (1) (C. Bernardini, private communication, see also ref. 4).

1. D.R.Yennie, S.C.Frautschi and H.Suura, Ann. Phys. 13 (1961) 379.

2. A.I. Ahiezer and V.B. Berestesky, Quantum electrodynamics (Moscow, 1959).
3. L.G. Zazunov and P.I. Fomin, Zh. Eksperim i Teor. Fiz. 46 (1964) 1392.
4. C. Bernardini et al., preprint LNF - 64/33 (1964).

* * * * *

ERRATA

J. K. Bienlein, A. Böhm, G. Von Dardel, H. Faissner, F. Ferrero, J.-M. Gaillard, H. J. Gerber, B. Hahn, V. Kaftanov, F. Krienen, M. Reinharz, R. A. Salmeron, P. G. Seiler, A. Staude, J. Stein, H. J. Steiner, Spark chamber study of high-energy neutrino interactions, Physics Letters 13 (1964) p. 80

p. 83, left column, line 6:

reads	should read
is	the

p. 84, left column, line 8 from bottom:

reads	should read
0.027 ± 0.066	0.027 ± 0.006

p. 86, ref. 14:

reads	should read
H. Faissner, etc..	
Vol. I (1963) p. 571	Vol. I (1963) p. 546

Reference 15 was omitted.
It should read:

15. G. Bernardini, G. Von Dardel, P. Egli, H. Faissner, F. Ferrero, C. Franzinetti, S. Fukui, J.-M. Gaillard, H.J. Gerber, B. Hahn, R.R. Hillier, V. Kaftanov, F. Krienen, M. Reinharz and R.A. Salmeron, Proc. Intern. Conf. on Elementary Particles, Sienna, Vol. I (1963) p. 571.

* * * * *

G. Bernardini, J. K. Bienlein, G. Von Dardel, H. Faissner, F. Ferrero, J. M. Gaillard, H. J. Gerber, B. Hahn, V. Kaftanov, F. Krienen, C. Manfredotti, M. Reinharz, R. A. Salmeron, Search for intermediate boson production in high-energy neutrino interactions, Physics Letters 13 (1964) p. 86

Author list:

reads	should read
F. Frienen	F. Krienen

p. 86, right hand column, 3rd line

reads	should read
W^+ pions and/or kaons	$W^+ \to$ pions and/or kaons (4)

Since one of the misprints in the first article influences the conclusions and these misprints are not due to the authors, a separate sheet is included to replace the erroneous pages.

H. Boersch, G. Herziger, H. Lindner, Messung der Güte von Laser-Resonatoren, Physics Letters 11 (1964) p. 38

Bildunterschriften

Fig. 1. Anordnung zur Messung der Abklingzeiten Krümmungsradius der Hohlspiegel H_1 und H_2: 2 m Länge der Entladungsrohre lm, Resonatorlänge $L = 2$ m.

Fig. 2. Abklingzeiten als Funktion der Verstärkung G_0.

* * * * *

H. Eichler, G. Herziger, Umformung von Wellenformen in passiven Laser-Resonatoren, Physics Letters 12 (1964) p. 193

Bildunterschrift

Fig. 1. "d,s Resonanzdiagramm" des passiven Resonators. Die unterbrochen gezeichnete Einhüllende der Resonanzmaxima wurde zur Verdeutlichung des Kurvenverlaufs nachträglich eingezeichnet.

* * * * *

R.W. Kavanagh, D.R. Goosman, Energy levels in K^{37} and Ar^{37}, and beta decay of K^{37}, Physics Letters 12 (1964) p. 229

Table 3 should be deleted. This table, which is part of another paper (Nuclear Phys. 56 (1964) p. 497), was sent in with corrections in proof, and was inadventently included here.

* * * * *

J. T. Lopuszanski, A solvable model of an interacting relativistic field, Physics Letters 8 (1964) p. 85.

The model considered was earlier proposed by Greenberg [1]. The conclusions drawn from this model are almost all contained in Greenberg's paper; moreover, Greenberg points to the restriction imposed by the Jacobi identity which is not mentioned in the author's paper. This restriction makes the model trivial (generalized free field) as shown by Robinson [2].

1. O.W. Greenberg, Ann. Phys. 16 (1961) 158.
2. D.W. Robinson, Physics Letters 9 (1964) 189.

H. Bacry and J. Nuyts, Remarks on classifications of hadrons according to spin and internal symmetries, Physics Letters 12 (1964) p. 156

p. 157, 2nd column, 12th line from bottom, instead of: According to property b) G possesses only integral... read: According to property a) G possesses only integral.
p. 157, 2nd column, eq. (3), instead of: $SO_2 = SU_2/Z_2$, read: $SO_3 = SU_2/Z_2$.
p. 158, 29th line from top, instead of: (SO_5, SO_4), read: (SO_5, Sp_4).
Reference 2, instead of: A. Boskow, read: A. Beskow.
Reference 7, instead of: In the following, given a group A, $\bar{A}$ will denote its U.C.G. and A a covering group of A or A itself, read: In the following, given a group A, $\bar{A}$ will denote its U.C.G. and $\bar{A}$ a covering group of A or A itself.
Reference 12c, instead of: $(G, \bar{G})$, read: $(G, \bar{G})$.

* * * * *

A. De Marco, R. Garfagnini and G. Piragino, Polarization of photoneutrons from Bi, Physics Letters 10 (1964) p. 213

Page 214 right column, read: $P^* = -0.14 \pm 0.10$ for....

* * * * *

D. Frèrejacque, D. Benaksas and D. Drickey, Direct measurement of the magnetic form factor of the proton, Physics Letters 12 (1964) p. 74.

The formula of page 74 should be read:

$$\frac{d\sigma}{d\Omega} = 2B \left(\frac{P}{P+T}\right)^2 G_m^2 (q^2)$$

D. R. Tilley, G. J. Van Gurp and C. W. Berghout, Anisotropy of the critical nucleation fields in superconductors, Physics Letters 12 (1964) p. 305

The statement "From the general solution of (1) it follows however that H_{c3} depends only on the field direction and is still given by $H_{c3} = 1.69$ H_{c2}" should be deleted because it is incorrect as the surface nucleation field is also dependent on the orientation of the surface relative to the principal axes of the mass tensor.

The correct value for H_{c3} will be given in a forthcoming paper.

* * * * *

T. Alväger, F. J. M. Farley, J. Kjellman and I. Wallin, Test of the second postulate of special relativity in the GeV region, Physics Letters 12 (1964) p. 260

p. 262, left column, third line, read:
$\Delta = 0.002 \pm 0.013$.
p. 262, left column, ninth line, read:
$c' = (2.9978 \pm 0.0004) \times 10^{10}$ cm/sec.

* * * * *

C. W. Gardiner, The combination of Lorentz and SU_3 invariance, Physics Letters 11 (1964) p. 258

The second of the two equations (17) should read

$$I_3 = -\sqrt{3} A_{100} .$$