<sup>1</sup>A. Citron, C. Delorme, D. Fries, L. Goldjahl, J. Heintze, E. G. Michaelis, C. Richard, and H. Øverås, Phys. Letters <u>1</u>, 175 (1962).

<sup>2</sup>G. E. Masek, L. D. Heggie, Y. B. Kim, and R. W. Williams, Phys. Rev. <u>122</u>, 937 (1961).

<sup>3</sup>R. J. Swanson and G. E. Masek, Rev. Sci. Instr. <u>32</u>, 212 (1961).

<sup>4</sup>C. D. Wood, T. J. Devlin, J. A. Helland, M. J. Longo, B. J. Moyer, and V. Perez-Mendez, Phys. Rev. Letters 6, 481 (1961).

<sup>5</sup>Strictly speaking we cannot prove that all particles in the high-angle region are pions. However, these particles have the correct angular distribution for pions, and their number grows with any relaxation of the pion rejection criteria.

<sup>6</sup>F. Bumiller, M. Croissiaux, E. Dally, and R. Hofstadter, Phys. Rev. <u>124</u>, 1623 (1961).

<sup>7</sup>S. D. Drell, Ann. Phys. (N.Y.) <u>4</u>, 75 (1958).

<sup>8</sup>This could be interpreted, for example, as a muon form factor. A muon "size" or electric form factor at the muon-photon vertex would multiply the Rosenbluth formula by  $f_1^2$ , and if we write as usual  $f_1 = 1 - \frac{1}{6} \times \langle r^2 \rangle q^2 + \cdots$ , we see that  $\langle r^2 \rangle^{1/2} = \sqrt{6\Lambda^{-1}}$ .

<sup>9</sup>G. Charpak, F. J. M. Farley, R. L. Garwin, T. Muller, J. Sens, and A. Zichichi, Phys. Letters 1, 16 (1962).

## ERRATUM

ELEMENTARY PARTICLES OF CONVENTIONAL FIELD THEORY AS REGGE POLES. Murray Gell-Mann and Marvin L. Goldberger [Phys. Rev. Letters 9, 275 (1962)].

Our expression for the contribution of a Regge pole in the u channel to the scattering of pseudoscalar mesons by nucleons (with isotopic spin ignored) is not quite correct. In reference 9, the sign of B should be changed in Eqs. (4.17), (4.18), (4.20), and (4.21); the same is true of Eqs. (2) and (3) of our Letter.

Let us denote by P the initial nucleon four-momentum minus the final meson four-momentum and write  $\not P = -i\gamma \cdot P$ , with  $\not P^2 = u$ . The contribution to the scattering amplitude of a Regge pole of positive signature in the u channel can then be written, for large s and fixed u, as

$$\gamma_{5} \frac{b(\sqrt{u})(u^{1/2} + \mathbf{P})}{2\sin\pi\alpha(\sqrt{u})} \left(\frac{s}{s_{0}}\right)^{\alpha(\sqrt{u})} \left\{1 + \exp[-i\pi\alpha(\sqrt{u})]\right\}\gamma_{5}$$
$$+ \gamma_{5} \frac{b(-\sqrt{u})(-u^{1/2} + \mathbf{P})}{2\sin\pi\alpha(-\sqrt{u})} \left(\frac{s}{s_{0}}\right)^{\alpha(-\sqrt{u})} \left\{1 + \exp[-i\pi\alpha(-\sqrt{u})]\right\}\gamma_{5},$$

in place of Eq. (2). Since  $(u^{1/2} + \not P)(2\sqrt{u})^{-1}$  and  $(u^{1/2} - \not P)(2\sqrt{u})^{-1}$  are projection operators, we may simplify and obtain

We now introduce a neutral vector meson of mass  $\lambda$  coupled to the nucleon current with coupling constant  $\gamma^2/4\pi$ ; perturbation theory to orders  $g^2$  and  $\gamma^2 g^2$  then gives, for large s and fixed u, the result

$$\gamma_{5} \left\{ \frac{g^{2}}{\not p - m} + \frac{\gamma^{2}}{8\pi^{2}} g^{2} \ln\left(\frac{s}{s_{0}}\right) \right. \\ \left. \times \int_{0}^{1} \frac{dx [\not P(1 - x) + m]}{\lambda^{2}(1 - x) + (m^{2} - \not P^{2})x + \not P^{2}x^{2} - i\epsilon} \right\} \gamma_{5}.$$

[Thus, in our Eq. (4), in the formula for A,  $I_0$  should be replaced by  $I_1$ .] If we identify the logarithmic term as part of a series transforming the Born approximation term into one representing

a Regge pole, then we conjecture that higher orders of perturbation theory in  $\gamma^2$ , with the highest power of lns retained in each order, will yield

$$\gamma_{5} \frac{g^{2}}{\not p - m} \exp\left\{\frac{\gamma^{2}}{8\pi^{2}} \ln\left(\frac{s}{s_{0}}\right)(\not p - m)\right.$$
$$\times \int_{0}^{1} \frac{dx [\not p(1 - x) + m]}{\lambda^{2}(1 - x) + (m^{2} - \not p^{2})x + \not p^{2}x^{2} - i\epsilon} \right\} \gamma_{5}.$$

If the conjecture is right, then we have, correcting Eq. (6), the following lowest-order expressions for  $\alpha$  and b:

$$\alpha(\mathbf{P}) = \frac{\gamma^2}{8\pi^2} (\mathbf{P} - m) \int_0^1 \frac{dx [\mathbf{P}(1 - x) + m]}{\lambda^2 (1 - x) + (m^2 - \mathbf{P}^2)x + \mathbf{P}^2 x^2 - i\epsilon} + \cdots,$$

 $b(\not P) = \pi g^2 \alpha (\not P) [2 \not P (\not P - m)]^{-1} + \cdots$