cross-section[4] for some value of the angle of collision, and the results in the remaining angular domain are examined. This permits us to see the angular dependence of the cross-section for each kind of field. (ii) It also seems useful to try to relate the results at low energies with those at higher energies, in looking for the role of the relativistic corrections in the *total* cross-section[3]. Using, for example, a mixture of symmetrical pseudoscalar and vector fields, we get for the total cross-section, in the system of the centre of gravity, and neglecting terms of the fourth order in the momentum p of nucleons :

$$S = S_{NR}\left(1 - \frac{p^2}{M^2}\right) + \frac{p^2 + M^2}{8\pi}\left\{\frac{10A}{\varkappa^2(\varkappa^2 + 4p^2)} - \frac{5A'}{4p^2}\left[\frac{1}{p^2}\log\frac{\varkappa^2 + 4p^2}{\varkappa^2} - \frac{4}{\varkappa^2}\frac{\varkappa^2 + 2p^2}{\varkappa^2 + 4p^2}\right] + \frac{B}{p^2(\varkappa^2 + 2p^2)}\log\frac{\varkappa^2 + 4p^2}{\varkappa^2}\right\}\frac{p^2}{M^2}$$

with

$$A = g_1^3\left(g_1 - 4g_2\frac{M}{\varkappa}\right) + g_2^2\left(4g_2^2\frac{M^2}{\varkappa^2} - f_3^2 - 2g_1^2 + 8g_1g_2\frac{M}{\varkappa}\right)$$

$$A' = g_1^4 + g_2^4 + g_1^3\left(g_1 - 4g_2\frac{M}{\varkappa}\right) - g_2^2\left(4g_2^2\frac{M^2}{\varkappa^2} - f_3^2 - 2g_1^2 + 8g_1g_2\frac{M}{\varkappa}\right)$$

$$B = g_1^2\left(4g_2^2\frac{M^2}{\varkappa^2} - f_3^2 - g_1^2 + 4g_1g_2\frac{M}{\varkappa}\right) - g_2^2\left(4g_2^2\frac{M^2}{\varkappa^2} - f_3^2 - 5g_1^2 + 20g_1g_2\frac{M}{\varkappa}\right) + 8g_1g_2\frac{M}{\varkappa}(g_1^2 + 3g_2^2),$$

where g_1, g_2 are the coupling constants between the vector meson field and the nucleons.

The corresponding non-relativistic cross-section is:

$$S_{NR} = \frac{p^2+M^2}{8\pi}\left\{(g_1^4+3g_2^4)\frac{10}{\varkappa^2(\varkappa^2+4p^2)} + \frac{g_1^4-3g_2^4+6g_1^2g_2^2}{p^2(\varkappa^2+2p^2)}\log\frac{\varkappa^2+4p^2}{\varkappa^2}\right\} \quad (4)$$

and it does not involve any pseudoscalar coupling constants.

Using, for example, the constants of interaction of the Møller–Rosenfeld theory, $f_1 = g_1 = 0{\cdot}62$; $f_2 = g_2 = 1{\cdot}08$, corresponding to a meson mass 286 m_e, one gets, for incident neutrons of 90 MV. (laboratory system), $S_{NR} = 13{\cdot}5 \times 10^{-26}$ cm.^{2}. The experimental value[7] is approximately 9×10^{-26} cm.^{2}. The non-relativistic cross-section, as in the usual theories, is too large. If we take into account the relativistic terms, we obtain $S = 16{\cdot}2 \times 10^{-26}$ cm.^{2}, showing a further increase in the cross-section. This result is not changed by a more exact evaluation of the cross-section in terms of the velocities of the nucleons. In order to draw more definite conclusions, however, it seems necessary to revise the usual treatment of the ground state of the deuteron by taking account of the velocity-dependent and contact interactions.

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C. Marty

Physics Department,
University,
Manchester 13.

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Meyer Analysis of Metals

Messrs. Finniston, Jones and Madsen discuss in a recent communication[1] the variation of ultimate hardness number *Pu* with the Meyer index n, in the ball indentation test. There are several good reasons for associating a decrease in the n value with a decrease in the work-hardening capacity of a metal, especially since n and *Pu* have hitherto shown a negative correlation coefficient. Finniston *et al.*, however, suggest that this generalization should be reconsidered, and they give results showing a positive correlation coefficient between *Pu* and n for metals of non-cubic structure and of increasing anisotropy as judged by results for thermal expansion. Their proposal is interesting because certain anomalies exist regarding the n value. Thus, during the progressive cold rolling of copper it may drop from 2·34 to 2·0 at an early stage and then remain more or less constant, while the *Pu* value will continue to increase and thus indicate further work-hardening[2]. This peculiarity has not been explained, and it should be remarked that the progressively rolled copper increasingly develops anisotropic properties (preferred orientation) as shown by X-ray diffraction and etching tests. This effect does not appear to be inconsistent with their proposal.

Furthermore, there is evidence that when a stainless steel 18/8 alloy is progressively cold-worked, the *Pu* value rises steadily while n first falls and then *rises*. During the tempering of high-carbon steel, *Pu* will fall progressively but n will first fall and then rise slightly. Finally, in the course of investigations with the new hardness microtesters, results are being obtained where the Meyer index to the pyramid indentation *increases* with cold working as compared with a fall in the normal ball test.

Hugh O'Neill

University College,
Swansea.
Jan 16.

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The Geminid Meteor Shower

In 1947, Whipple[1] published new elements of the Geminid meteor shower, obtained photographically. An extremely short period, 1·65 years, moderate inclination and considerable eccentricity (see below) together make the orbit of this shower an extraordinary one both in comparison with comets and with minor planets. But, according to Hoffmeister[2], the existence of similar meteor showers seems to be indicated. Such a short-period meteor shower as