of slow neutrons in hydrogen there follows

$$W-M+B-H=-(W+M+B+H)/3+2c_3/3\leqq -1/3,$$
$$W-M-B+H=-3(W+M-B-H)+3(M-2B)\geqq -3/2. \quad (4)$$

These inequalities put one-sided limits on the triplet and singlet p interactions involved in the elastic scattering of fast neutrons and protons in hydrogen. Furthermore

$$9(W-M+B-H)+(W-M-B+H)=-6(W+M)\sim -9/2, \quad (5)$$

a useful relation establishing a connection between the p scattering of protons in hydrogen (associated with the triplet interaction) and the p scattering of neutrons in hydrogen (involving both singlet and triplet interactions). It is worth noting explicitly that the upper bound on the triplet p interaction given in (4) is a consequence of $c_3\leqq 0$ alone while Eq. (5) follows from $c_1=0$ alone.

E. Feenberg

Institute for Advanced Study,
Princeton, N. J.,
September 2, 1937.

[1] G. Breit and E. Feenberg, Phys. Rev. **50**, 850 (1936).
[2] N. Kemmer, Nature **140**, 192 (1937).
[3] D. R. Inglis, Phys. Rev. **51**, 531 (1937).
[4] E. Feenberg, Phys. Rev. **51**, 777 (1937).
[5] H. Volz, Zeits. f. Physik **105**, 537 (1937).
[6] E. Wigner, Phys. Rev. **51**, 947 (1937). Using the experimental value for the ratio of the triplet and singlet s interactions one finds

$$W-M+B-H=-2(M-2B-H)+(W+M-3B-3H)\sim -2(M-2B-H).$$

The β-Ray Spectrum of Mn^{56}

We have measured the β-ray spectrum of Mn^{56} excited by bombarding $NaMnO_4$ solution with neutrons from a Ra-Be source. Using a field of 850 gauss, we obtain a single group with a K-U end-point at 6.5 mc^2, in agreement with Gaerttner, Turin and Crane.[1] Using a field of 425 gauss, we obtain curves similar to those of Brown and Mitchell,[2] with end-points at 3.4 and 6.5 mc^2, respectively. With a field of 637 gauss, the spectrum again shows the two groups with the same end-points as found with 425 gauss, but with the relative population of the lower energy group greatly diminished. More than 1300 tracks were measured for each field.

This work then confirms the existence of the low energy group reported by Brown and Mitchell. We attribute the discrepancy between their results and those of Gaerttner, Turin and Crane to the suppression of some of the tracks of the low energy group by the stronger magnetic fields, but our work does not permit us to draw conclusions as to the ultimate origin of the low energy group.

Ralph H. Bacon
Edgar N. Grisewood
Carel W. van der Merwe

New York University,
Washington Square College,
August 31, 1937.

[1] Gaerttner, Turin and Crane, Phys. Rev. **49**, 793 (1936).
[2] Brown and Mitchell, Phys. Rev. **50**, 593 (1936).