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Abstract

Low Energy Properties of Pseudoscalar Interaction with Hard Core.
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The properties of the nucleon-nucleon interaction are being examined on the assumption of a nucleon structure of approximate radius 0.5×10^{-13} cm. The effects of this structure are described by an infinite repulsion in the interaction for $r < r_0$, along the lines of an earlier calculation by the author. An attempt is made to restrict the phenomenology to the interior region ($r < r_0$) by taking the interaction for $r > r_0$ to be determined by the symmetrical pseudoscalar theory with pseudoscalar coupling. This interaction is dominated by singular ($1/r^3$) central and tensor attractive potentials coming from fourth and second order contributions in the pseudoscalar interaction¹. Terms of higher order appear to be too short-ranged to make appreciable contributions for $r > 0.50 \times 10^{-13}$ cm. The results of preliminary low energy calculations with $f^2/4\pi = 11.5$ and core radii of 0.42 (triplet) and 0.46 (singlet) are as follows: effective range = 1.53 (triplet) and 2.70 (singlet); deuteron binding energy = 2.23 Mev; quadrupole moment = $+0.60 \times 10^{-27}$ cm²; singlet scattering length = - 23.8. Lengths are in units of 10^{-13} cm.

¹ J. V. Lepore. (This meeting).