line in Rb_2BeF_4 is composed apparently of five partially resolved components, suggesting a different structure.

Analyses were made of the F^{19} resonance in CaF_2 and NaF as a check on the reliability of the method. Eight lines were plotted for CaF_2 over a period of six months, giving values ranging from 6.00 to 6.85 gauss^2; this range is large, as some of the data were taken before the electronic circuits were completely adjusted. The average second moment is 6.42 ± 0.13 gauss^2. The second moment computed from the known crystal structure and nuclear properties is 6.47 gauss^2. The agreement confirms the absence of any very appreciable magnetic properties for Ca^{40}. In NaF, the range of five experimental second moments is 6.05 to 6.40 gauss^2 with an average of 6.21 ± 0.05 gauss^2. The second moment computed from crystal structure and a spin of 3/2 for Na^{23} is 6.16 gauss^2. If a Na^{23} spin of 1/2 or 5/2 is used, the computed second moments become 4.23 and 9.36 gauss^2. Thus a spin of 3/2 for Na^{23} is confirmed.

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On the Hard Sphere Model of the Nucleon*

ROBERT JASTROW
Radiation Laboratory, Department of Physics, University of California, Berkeley, California
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IT has been suggested that the evidence from *p-p* scattering experiments[1] at 340 Mev for large momentum transfers in nucleon-nucleon collisions can be explained by the assumption of a strong short-range repulsion between nucleons.[2] Since the completion of calculations based on this assumption, additional experimental results have been reported at 340 Mev and at lower energies.

The experiments at intermediate energies are of special interest because the assumption of a hard sphere repulsion in the nucleon-nucleon interaction results in the appearance of a pronounced minimum in the singlet cross section at energies in the neighborhood of 170 Mev, as a result of interference between the repulsion and the surrounding attractive well. This minimum is partially masked by a maximum in the tensor contribution to the complete cross section at corresponding energies; but, nevertheless, its effect becomes appreciable for sufficiently large radii of repulsion.

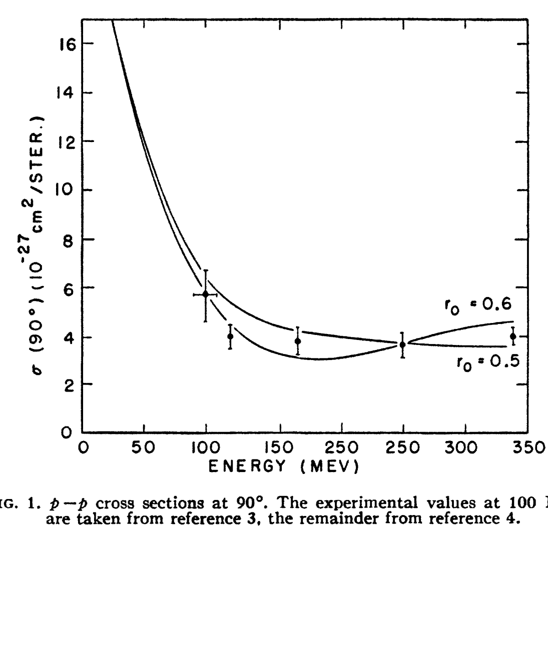

FIG. 1. *p-p* cross sections at 90°. The experimental values at 100 Mev are taken from reference 3, the remainder from reference 4.

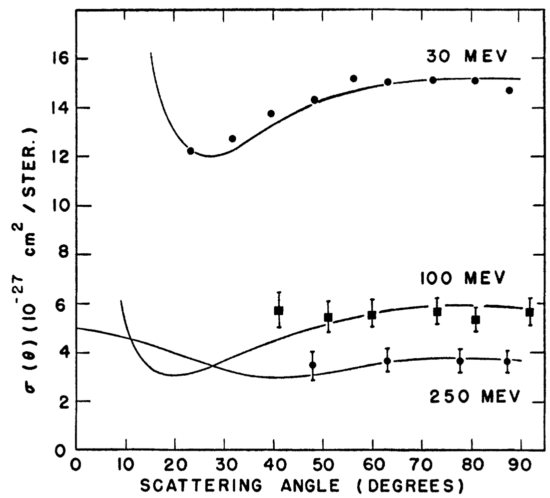

FIG. 2. *p-p* cross sections at 30 Mev, 100 Mev, and 250 Mev compared with calculations assuming a radius of repulsion 0.60×10^{-13} cm.

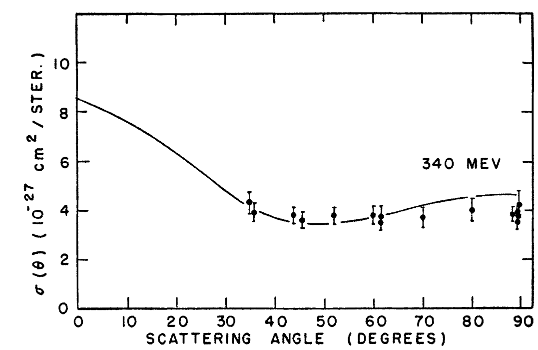

FIG. 3. *p-p* cross sections at 340 Mev compared with the same model.

In Fig. 1, values of the *p-p* cross section at 90° for energies between[3] 100 Mev and[4] 340 Mev are compared with calculations in which the repulsion is represented by a hard sphere, using radii of 0.50 and 0.60×10^{-13} cm. From Fig. 1, one can conclude that a radius greater than 0.60×10^{-13} cm would lead to a minimum in the *p-p* cross section incompatible with present experimental values.

The angular dependence of the *p-p* cross section at intermediate energies has also been measured recently and is compared in Fig. 2 at[3] 100 Mev and[4] 250 Mev with curves calculated on the assumption of a hard sphere repulsion of radius 0.60×10^{-13} cm. Previously published values at 30 Mev are also shown.[5]

Revised values at 340 Mev are shown in Fig. 3 on a plot of the *p-p* cross section calculated from the same model.

The indicated experimental uncertainties include both statistical and estimated systematic errors, with the exception of the 100-Mev values in Fig. 2, where only the estimated 10 percent uncertainty in the *relative* values at various angles is shown. The absolute value of the 100-Mev cross-section values is subject to an uncertainty of 20 percent.

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