Title
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Radiation Laboratory, Department of Physics
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I. Scintillating Crystal Gamma Counter. K. D. Jenkins.

This talk was based on a thesis report UCRL-1766 of the same title by K. D. Jenkins, dated May, 1952. The short abstract of the report is quoted as follows:

"A description will be given of a simple counter which makes maximum use of existing commercial equipment and will count gamma rays down to ten kilovolts with no appreciable electrical or thermal noise being introduced. The counter has good stability and its gain can be made to stay constant indefinitely."

II. Analysis of Elastic d - p Scattering Experiments at 190 Mev. Martin Stern

In an attempt to learn more of the meaning of the experiment done last year a comparison has been made with existing theory in collaboration with O. Chamberlain. The point of view here taken is that elastic d - p scattering should exhibit interference between n - p and p - p scattering; thus, the experimental results should put another restriction on the allowable n - p and p - p interactions, a restriction which could not be demonstrated from p - p or n - p scattering experiments.

The method of analysis used follows that of Chew or Bethe and Gluckstern, and may be considered to be either impulse approximation or Born approximation. We are only concerned with the scattering in the forward direction. The results are open to question in that we have no positive indication of the accuracy to be expected of the impulse approximation in this case.

The analysis of Chew shows that the elastic d - p scattering differential cross section can be written in two factors. The first of these is called the "sticking factor". It depends on the momentum transfer to the deuteron and has been calculated by Chew from a deuteron wave-function. The second factor involves only the scattering amplitudes in n - p and p - p scattering. By taking these scattering amplitudes from existing potential theories of n - p and p - p scattering the second factor can be calculated.

When the experimental cross sections are corrected by the reciprocal of the "sticking factor" they appear to be quite close to the sum of n - p and p - p differential scattering cross sections, indicating that the interference term is quite small. For this reason we have centered attention on the quantity

$$\triangle \equiv \frac{\text{Corrected } \sigma_{dp}(\theta)}{\sigma_{np}(\theta) + \sigma_{pp}(\theta)} = \frac{9}{16S} \frac{\sigma_{dp}(\theta)}{\sigma_{np}(\theta) + \sigma_{pp}(\theta)}$$

S is the "sticking factor" used by Chew. When the corrected d - p differential scattering cross section is equal to the sum of n - p and p - p differential scattering cross sections, then this quantity is equal to one.

The following Table I contains the results obtained.

Table I

θ	$\triangle_{exp.}$	$\triangle^{CN}_{CH}$	$\triangle_{Sw}$	$\triangle_{J}$	$\triangle^{\sigma}_{J}$
0°	-	1.13	1.33	1.20	1.27
20°	1.03	1.06	1.32	.92	1.05
40°	.71	.90	1.23	.55	.78
60°	.64	.64	1.14	.58	.69
80°	.48	.43	1.04	.71	.80

CH represents the potential of Christian and Hart for n - p interaction. CN represents the potential of Christian and Noyes for p - p interaction. Sw is a charge independent model derived from CH and CN by D. Swanson. J indicates the potential of Jastrow involving a hard core in the potential for singlet states and is charge independent. δ indicates the use of phase shifts rather than Born approximation.

Within the accuracy to be expected of the impulse approximation as applied here we are forced to say that all of the potentials used seem to fit the data quite well. The discrepancies are greatest for the Swanson mixture; however, it would be difficult to argue that that potential should be discarded on this basis.

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