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ANGULAR DISTRIBUTIONS OF ELASTICALLY SCATTERED ELECTRONS FROM HYDROGEN*

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Angular distributions of electrons scattering from hydrogen are compared with the predictions of Glauber theory.

It was not until quite recently that angular distributions of atomic reactions have been measured. The myriad of experimental details and difficulties will be discussed in a forthcoming paper.[1] Here we wish only to show the results and compare them with theoretical models.

The simplest theory for this reaction is the first Born approximation (FBA). Another theory, the Glauber theory of multiple scattering, has been shown by Franco[2] to give better agreement with total cross-section data for this reaction than the FBA. Accordingly we have calculated angular distributions with the Glauber theory.

The experimental data were compared with each of the theories by normalizing at 60° for each incident energy. The results are shown in Fig. 1.

We note that the Glauber theory is superior to the FBA at every energy. It is also noted that the present calculation shows better agreement with the data than does the close coupling calculation of Scott,[3] the Glauber theory being more sharply peaked in the forward direction than the distribution based on the close coupling approximation. The FBA and Glauber model at 200 eV are very close except at very forward angles. This is understandable if one notes that Glauber theory is essentially an expansion in Born approximations.

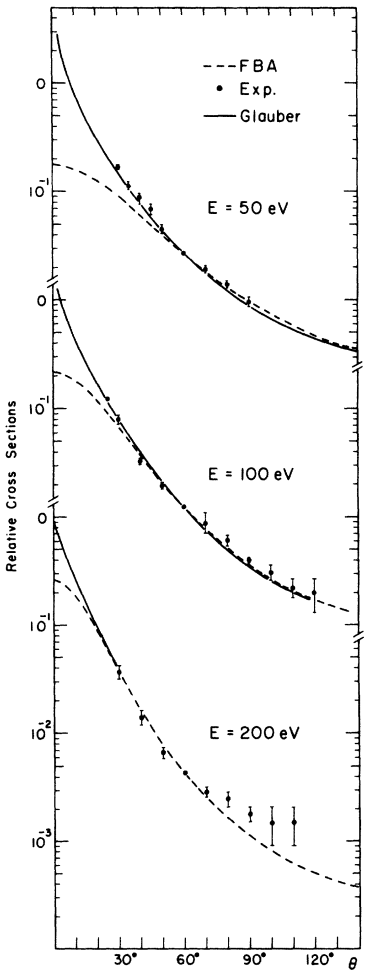

FIG. 1. Comparison of the first Born approximation and Glauber theory with experiment. At 200 eV, the Glauber theory and the first Born approximation are indistinguishable for angles greater than 30°.

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[1]P. J. O. Teubner, K. G. Williams, and J. H. Carver, to be published.

[2]V. Franco, Phys. Rev. Letters 20, 709 (1968).

[3]B. L. Scott, Phys. Rev. 140, A699 (1965).