Discussion

Salvini:

In seems usual in the e-p and e-deuterium scattering experiments to talk in terms of the transferred momentum q, in a sense to measure the information in terms of q.

Now in this field of physics the statistics are important, even more than in any other field (no event is here interesting in itself) and the quantity of information is actually a function of: the maximum attainable value of q; the intensity of the electron beam (perhaps it goes as the square root of the intensity); the shape of the nucleon.

The intensity is therefore extremely important.

Now, I would be grateful to Prof. R. Wilson for some comment on the quantity of information he hopes to reach at Cornell.

For instance, will he succeed to separate F_1 and F_2 in the proton structure?

Wilson:

Although it is well-known that at present linear accelerators give larger intensities than do electron

synchrotrons, the reason that electron scattering can be measured, using the synchrotron is because the target of CH_2 can be placed directly in the circulating beam of the synchrotron. The electrons can make hundreds of traversals of the target, depending on the thickness of course, before being scattered out of the synchrotron. This gives a very large augmentation of the synchrotron beam and perhaps is the reason why so much data has been obtained at these high energies in such a short time.

Another and more important result that results from multiple traversals and the use of the synchrotron is that the beam can be spread out in time by as much as milliseconds - a factor of about one thousand better that for the linac - thus, coincidence experiments are easy to perform. I have already obtained a target of CD_2 and expect to measure coincidences of the scattered electron with the recoil proton or the neutron. I understand in discussions with R. Walker and R. Wilson (Harvard) that defining the recoil particle allows a much clearer separation of the scattering of the electron by the neutron from the scattering by the proton in the deuteron. Thus, in answer to Prof. Salvini s second question I can say that for the future we expect to extend the measurements on the proton to larger angles and higher energies, that will give results at q^2 as high as 40, i.e. 135^o at 1.2 BeV that is available at present for the equipment.

Secondly we will concentrate on the determination of the form factors for the neutron by the method of recoil-coincidence.

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Shmushkevich:

I wish to emphasize the importance of polarization experiments in electron scattering by protons and deutrons. Such experiments would provide additional information on form-factors and serve to verify quantum electrodynamics at high energies. It is true, polarization experiments in e-p scattering are obviously very difficult. Thus, for instance, in non-polarized electron scattering by non-polarized protons no electron or proton polarization arises. Similarly, no azimuthal asymmetry arises in polarized protons. Polarization effects manifest themselves only in polarized electron scattering by polarized protons or in measuring the polarization of electrons or protons produced in polarized electron scattering by non-polarized protons.

Taking into account the importance of these experiments and the difficulty of their performance I would like to ask prof. Hofstadter about the possibility of carrying out such experiments in the near future.

Hofstadter:

We have not considered this problem.
