

SECTION 1 – PARTICLE PHYSICS

1.1 High-energy scattering of an electron off a bound electron

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We consider a model in which the bound electron is viewed as an electron infinitely many times scattered off the external potential. The amplitude and the wave function may be found using the eikonal approximation, in which the internal momenta of the electron are replaced by

$$(p - \sum k_i)^2 - m^2 \simeq 2p \sum k_i.$$

The model thus obtained gives a possibility to consider the scattering of very fast electrons or gamma quanta off an electron bound in the nucleus.

1.2. Electromagnetic form factors of pions and nucleons

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Couplings of the existing and also of the still hypothetical vector mesons to nucleons and pions are calculated from the dispersion theory of form factors within the VMD model. The results are compared with the values obtained from vector meson contributions to the nucleon-nucleon potential.

Dynamical information is induced by assumptions on the high-energy behaviour of the form factors. Some suggestions about the masses of possible, still undiscovered, vector mesons are obtained. Form factors are calculated only in the spacelike region of the invariant momentum transfer. Finally, calculations are compared with the experimental data and the existing formulas following from dual models.