THEORETICAL AND EXPERIMENTAL STUDY OF THE GUIDING EFFECT FOR 5 KEV ELECTRONS

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The guiding effect of electrons has been observed in several works and different models [4],[5] have been developed. However, unlike the guiding effect in ions [3] a generally accepted description of the main mechanisms responsible for the phenomenon does not exist yet. Important questions concerning the energy of transmitted electrons, the role of secondary electrons, and of the charged patch remain open.

In this work, a program in Fortran that simulates elastic scattering processes resulting from the interaction of an electron beam with a dielectric material is written. The initial conditions for the electron trajectories are generated through random sampling of the beam profile and individual electron energies. The dielectric atom positions are generated for a limited spatial region. The resulting particle trajectories and charge distributions in the dielectric material are analyzed, accounting for the deflected as well as impinged electrons. The results are compared with experimental data of the guiding effect for 5 keV electrons.

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