

ABSTRACT OF THE THESIS

The thesis entitled "Relativistic studies about electronic properties of some one-dimensional systems" is concerned with theoretical studies of (I) Some issues concerned with relativistic impacts on impurity states, (II) Relativistic impacts on tunnelling of electrons through multibarrier systems, and (III) Relativistic impacts on electrical conduction in quasiperiodic systems corresponding to Thue-Morse lattice and related issues.

The general approach followed for studies under (I)-(III) is to carry out relativistic generalizations of some relevant nonrelativistic treatments, a procedure that lies behind many relativistic studies of one-dimensional (1D) condensed matter in other areas e.g., bulk states of 1D crystalline systems, surface states of 1D systems and electronic states of 1D disordered systems. We find that there are many realistic circumstances under which relativistic impacts on electronic properties of 1D systems can be quite substantial. We hope that the results of our thesis would be of considerable utility in regard to electronic properties of low-dimensional systems with heavy atoms.

Key Words: Dirac equation, Transfer matrix, Scattering matrix, Impurity state, Existence condition, Transmission coefficient, Resonant tunnelling, Transmission spectrum, Band structure, Bloch theorem, Crystal momentum, Quasiperiodic system, Thue-Morse lattice, Trace map, Landauer resistance.