

In this thesis we investigate solution of Dirac equation in spherically symmetric potential. The potential consist of Coulomb field of the nucleus and average potential of all other electrons in atom. We expand the solution of Dirac equation in finite Sturmian basis set. For this finite basis we introduce and investigate corresponding Foldy-Wouthuysen transformation. We apply the theory to the case of cesium atom. We find that non-relativistic energies are monotonically decreasing with increasing basis set. However, relativistic corrections cause oscillatory behaviour of energies present in fully relativistic case.