

LAMB SHIFT IN CLASSICAL ELECTRODYNAMICAL MODEL OF ATOM

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Abstract. The Lamb shift in hydrogen spectrum is obtained here in the framework of some weak generalization of the classical Maxwell electrodynamics. It is shown that weakly generalized classical Maxwell electrodynamics can describe the intra-atomic phenomena with the same success as relativistic quantum mechanics can do. Group-theoretical grounds for the description of fermionic states by bosonic system are presented briefly. The advantages of generalized electrodynamics in intra-atomic region in comparison with standard Maxwell electrodynamics are demonstrated on testing example of hydrogen atom. We are able to obtain some results which are impossible in the framework of standard Maxwell electrodynamics. The Sommerfeld–Dirac formula for the fine structure of the hydrogen atom spectrum is obtained on the basis of such Maxwell equations without appealing to the Dirac equation. The Bohr postulates are proved to be the consequences of the equations under consideration. The relationship of the new model with the Dirac theory is investigated. Possible directions of unification of such electrodynamics with gravity are mentioned.

1. Introduction

Lamb shift is a specific effect of quantum electrodynamical consideration. It is explained in this theory as a consequence of polarization of vacuum. Below we are able to explain this effect in the framework of classical electrodynamics. More precisely speaking this effect is obtained in the framework of weakly generalized classical electrodynamics, which contains electric and magnetic gradient-type sources.

Before such nonstandard consideration of the Lamb shift the group-theoretical grounds of a new model of atom and the main assertions of this model must