Photon and Poincaré Group

Photon and Poincaré Group – VALERI V. DVOEGLAZOV, Editor, a Volume in Contemporary Fundamental Physics, Nova Science Publishers, Inc., Commack, New York, 1999.

This book represents a valuable collection of research papers on the Lorentz, Poincaré groups and their representations; C, P, T, and super – symmetries, Abelian and non-Abelian gauge theories, non-linear and topological field models, and also on some mathematical issues. It is a significant piece of wok in the field of the Lorentz and Poincar\'e groups' representations and the theory of electromagnetism, contributed by distinguished researchers. This volume contains five chapters. The first one focuses on the Lorenz and Poincar\'e groups' representations and superalgebras that are the basis of modern fields and strings theories. The second chapter is devoted to the discussion of C, P and T symmetries which are important for verifying the status of the standard model and for studying electric dipole moments of elementary particles. Third chapter deals with Dirac equation for massive and massless particles as well as with its non-linear extension. This is of particular interest now in connection with the problem of nature of neutrinos, their oscillations and with a non-contradictory description of the electron. Chapter four mainly focuses on antisymmetric tensor fields' investigations, gravity with torsion and topological models of electromagnetism. Non-Abelian gauge theories and mathematics issues are the core of the fifth chapter which is varied in content.

This volume will be of indispensable reference for anyone taking interest in the above mentioned areas of scientific knowledge. Those who are interested in the progress of theoretical physics will find this work to be a scientific treasure for researchers.

This collection will also be of considerable interest to specialists in the field of electromagnetism, general and special relativity, cosmology, high-energy physics, mathematical physics, particles and fields, quantum mechanics, theoretical physics and philosophy of science.

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The Weyl-Dirac Theory and Our Universe

The Weyl-Dirac Theory and Our Universe - MARK ISRAELIT. Nova Science Publishers, Inc., Commack, New York, 1999.

The author of this monograph explores and develops the Weyl-Dirac theory which is the generalization of Einstein's relativity theory. The purpose of this work is to unify electromagnetism and gravitation and to solve some problems of modern cosmology such as the origin of dark energy and others. The latter is of a special interest now in the light of recent development of the superstring theory and the theory of inflation. The unification of various interactions may help to understand the nature of cosmological singularities arising in the general theory of relativity based on Riemann's geometry. Another important aspect of cosmology is to test particle theories which are beyond the standard model.

Historically, Weyl (1919) generalized Einstein's theory of gravitation (1916) in the case of the unified theory of electromagnetism and gravitation in the framework of a geometrical description. Riemann's geometry, the basis of Einstein's theory of gravitation, is a particular case of Weyl's geometry. Dirac (1973) modified the Weil theory by removing some earlier difficulties such as nonintegrability of the length and was the first to propose measuring standards by introducing two line elements. The Weyl-Dirac theory provides the non-contradictory description of the gravity and electromagnetism. Later, Rosen (1982, 1983) generalized the Weyl-Dirac theory by including the matter term into the action and discussed physical consequences of the above mentioned theory. Rosen's scheme allows us to describe massive vector fields on the basis of the geometrical approach.

The author of this monograph suggested the modified scheme conta i-ning gravitation, electrodynamics with massive magnetic monopoles and massive photons. In this modified approach intrinsic magnetic and electric currents were introduced in such a way that in absence magnetic fields photons become massless. The author points out that massive magnetic monopoles and massive photons can contribute to the cold dark matter in solving the problem of understanding the origin of dark energy. Using this approach makes it possible to treat the cosmological problems in the framework of Einstein's general relativity theory alongside the hidden Weyl-Dirac geome-

try as a source of dark matter. It was also shown that in the framework of the Weyl-Dirac theory massive matter may be created by the geometry. In the scenario of a homogeneous and isotropic model of the expanding universe, the cosmic matter production during the expansion phase can occur due to the geometry. It should be noted that in the classical Einstein's general theory of relativity the matter is the source of the geometry. The approach discussed can stimulate the consideration of various inflationary theories on the basis of the Weyl-Dirac geometry.

This monograph will be of great interest for physicists, cosmologists and astrophysicists.

CONTENTS: Preface; CH. 1. Introduction; CH. 2. The Geometry; CH. 3. Measuring Standards in Weyl's Geometry; CH. 4. The Weyl-Dirac Theory of Gravitation and Electromagnetism; CH. 5. The Weyl-Dirac Torsional Massive Electrodynamics; CH. 6. Dark Matter Created by the Weyl-Dirac Geometry; CH. 7. Matter Production by the Integrable Weyl-Dirac Theory; CH. 8. Discussion.

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