The Weyl-Dirac theory and our universe

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Mark Israelit (Haifa U.)
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Abstract (Nova Science Publishers, Inc.)
The aim of the present book is very simply stated; it is to discuss and to some extent to explore the Weyl-Dirac theory in connection with classical electromagnetism and cosmology. The study of our universe in recent years became one of the most interesting and important subjects. Current cosmology considers a large number of various subjects from elementary particles to the large-scale structure of the universe. In order to explain this variety of phenomena, which occur between the Planck time and tens of billions of years, one makes use of methods stemming from different physical theories: elementary particle physics, quantum mechanics, thermodynamics, statistical physics, celestial mechanics etc. It is, however, generally accepted to express those approaches in terms of the general theory of relativity, which is based on Riemann's geometry. In this book, it is shown that some unexplained cosmological and electrodynamical phenomena may be treated and understood in the geometrically based framework of Weyl and Dirac. The book is intended for physicists, astrophysicists, cosmologists and mathematicians who are familiar with the foundations of Einstein's general theory of relativity. It is written in a clear and pedagogical way and will be useful for students who are interested in the subject.

Note: *Brief entry*
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Nielsen-Ninomiya and Dirac/Weyl semimetals. Field-theory motivation. A lot of confusion in HIC physics… Table-top experiments are easier? ü Quark-gluon plasma ü Hadronic matter ü Leptons/neutrinos in Early Universe • Condensed matter physics: ü Weyl semimetals ü Topological insulators. Hydrodynamic approach. Classical conservation laws for chiral fermions. • Energy and momentum. • Angular momentum. • Electric charge. The Dirac large numbers hypothesis (LNH) is an observation made by Paul Dirac in 1937 relating ratios of size scales in the Universe to that of force scales. The ratios constitute very large, dimensionless numbers: some 40 orders of magnitude in the present cosmological epoch. According to Dirac's hypothesis, the apparent similarity of these ratios might not be a mere coincidence but instead could imply a cosmology with these unusual features: