

Preface

Since the development of the Special Theory of Relativity more than a hundred years ago, there has been consensus among scientists worldwide that Newton's physical laws have only limited validity.

The commonly accepted restriction is that Newtonian mechanics based on these laws is only applicable to constant masses and low velocities.

On the other hand, the results of modern particle physics research show that the inertia, and thus the mass associated with the elementary particles, is not unalterable but increases with increasing velocity.

Thus, Newtonian mechanics does not seem to be compatible with natural phenomena at high speeds.

However, the second law of dynamics, correctly defined in the sense of Newton as a time derivative of the momentum, consists of two terms. The first well known term describes the speed change. The second generally unused term takes into account a possible change in inertia of the physical body on which the force acts.

In the present study it is shown that, by using both terms, the second law of Newton's dynamics also remains valid with variable mass and at high velocities.

This gives the possibility to prove some relativistic formulas, which have a special physical relevance, using Newton's law.

Thus, the application of Newtonian mechanics in combination with some relations of electromagnetic radiation, i.e., more precisely with the formulas of energy and momentum of photons, as well as the optical Doppler effect at low velocities, contributes to a further confirmation of the results of relativity theory.

Thus, no new theory is developed, but rather the present work demonstrates a hitherto unknown, closer connection between Newtonian and relativistic mechanics.

The work concludes with the section "Historia operis" in which the author explains the methods used to calculate the derivations.

Elementary knowledge of mechanics, particle physics and of the special theory of relativity are sufficient to understand the mathematical requirements.

To conclude my foreword, I would like to point out that the contents of this book are not only available in English, but also in my native language Italian and in German under the title "Newton und die Relativität" by the same publisher.