

PREFACE

This collection contains my latest articles devoted only to the statistical operator and the density matrix. These quantities are the basic and only concepts on which to build a quantum theory.

The excellent Schrodinger equation explains the presence of quanta in the emission and absorption spectra of electromagnetic waves by atoms. But this is the most important thing that could be done with this equation.

Every system has its own energy. The Schrodinger equation states that the energy of the system is constant. But this is often not enough. Very often, the behavior of the system is influenced by the environment. The easiest way to account for this environmental impact is—this is to show at least one physical quantity that characterizes the environment. Most often, this value is the temperature.

A quantum system is called “open” if there is a term in the equation of this system that shows the influence of the environment on the system. The Swedish scientist Lindblad wrote down such an equation for a statistical operator. After him, the author of this book wrote down the dissipative diffusion and damping operators. Substituting these operators into the Lindblad equation, we get a new equation that can already be solved. This book shows examples of the application of this new equation.

In the first chapter, an equation with dissipative diffusion and attenuation operators was written down. This equation is solved and various

density matrices are found. The problem of the effect of a photo on the density matrix of a free particle is solved.

In the second chapter, the theory of photon absorption by the hydrogen atom was developed.

In order to be able to apply the new equation to describe the nuclei of atoms, a hypothesis was proposed about the potential energies and forces that determine the strong interaction. On the basis of this hypothesis, the nuclear process of the collision of a gamma-ray quantum with deuterium was described.

In the fourth chapter, a relativistic equation for a statistical operator is written.