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Open Quantum Systems and Feynman Integrals

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Every part of physics offers examples of non-stability phenomena, but probably nowhere are they so plentiful and worthy of study as in the realm of quantum theory. The present volume is devoted to this problem: we shall be concerned with open quantum systems, i.e. those that cannot be regarded as isolated from the rest of the physical universe. It is a natural framework in which non-stationary processes can be investigated. There are two main approaches to the treatment of open systems in quantum theory. In both the system under consideration is viewed as part of a larger system, assumed to be isolated in a reasonable approximation. They are differentiated mainly by the way in which the state Hilbert space of the open system is related to that of the isolated system - either by orthogonal sum or by tensor product. Though often applicable simultaneously to the same physical situation, these approaches are complementary in a sense and are adapted to different purposes. Here we shall be concerned with the first approach, which is suitable primarily for a description of decay processes, absorption, etc. The second approach is used mostly for the treatment of various relaxation phenomena. It is comparably better examined at present; in particular, the reader may consult a monograph by E. B. Davies.