On ring-like event systems in quantum logic

Dietmar Dorninger and Helmut Länger

Abstract

A class of ring-like event systems (RLSEs) is studied that generalizes Boolean rings. Quantum logics represented by orthomodular lattices are characterized within this class and the correspondence between Boolean algebras and Boolean rings is enlarged to orthomodular lattices. The structure of RLSEs and various subclasses is analysed and classical logics are especially identified. Moreover, sets of numerical events within different contexts of physical problems are described. A numerical event is defined as a function p from a set S of states of a physical system to $[0,1]$ such that $p(s)$ is the probability of the occurrence of an event when the system is in state $s \in S$. In particular, the question is answered whether a given (small) set of numerical events will give rise to the assumption that one deals with a classical physical system or a quantum mechanical one.