Quantum logics defined by sets of numerical events

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Abstract

Various notions of quantum logics commonly known in literature are unified under a single concept called event structure. Event structures are linked to sets of measurements of a physical system obtained through the following process: Let S be a set of states of the physical system and p(s) the probability of an occurrence of an event when the system is in state $s \in S$. The function p from S to [0,1] is called a numerical event or a multidimensional probability, more precisely, S-probability. Posets of numerical events constitute relational structures which are identified as ranges of event structures and this way justified to be considered as quantum logics. Moreover, these posets are algebraically characterized by means of the states they might have. In particular, so-called generalized fields of events and algebras of S-probabilities are allocated and identified, among them the well known concrete logics.