

Models of quantum logic in non-micro-domains of science

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Within the framework of the operational approach to quantum mechanics certain aspects related to the axiomatic structure can be traced back to the non-micro-domain. In this talk we present some of these models which allow for a full quantum description [1, 2]. This has led to more elaborated modifications which are also nonclassical but are only quantumlike to some extent. Some of these macroscopic models do not allow a full Hilbert space description with associated probability distributions, e.g. because Bell inequalities are violated, but in a nonquantum way [3, 4]. Others do not even allow a genuine quantum structure for their property lattice in the sense that some of the standard quantum axioms (e.g. weak modularity, covering law) cease to hold [5]. These are the very axioms that lie at the heart of the problematic description of compound systems [6, 7]. Therefore, the insights gained from these non-micro models could provide a better understanding of the applicability and meaning of these quantum axioms, and contribute to a more operationally motivated description of physical systems.

References

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