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On ring-like structures occurring in axiomatic quantum mechanics

One of the problems with the lattice-theoretic approach to quantum logics is that the lattice-theoretic join does not allow a direct logical and hence physical interpretation. However, if the logic is a Boolean lattice the logic corresponds to a Boolean ring whose operations can be directly interpreted. This is the starting point for introducing ring-like partial algebras which are in one-to-one correspondence to bounded lattices with an involutory anti-automorphism and give rise to general classes of quantum logics. Various ways of extending the partial algebras to full algebras and relations to the corresponding lattices are presented. Most of these results were obtained jointly with H. Länger and M. Maczynksi.