

In the thesis we deal with a binary operation that acts as abstract “symmetric difference”. We endow orthocomplemented lattices with this operation and obtain a new class of algebras. We call these algebras orthocomplemented difference lattices (ODLs). We first see that the ODLs form a class that contains Boolean algebras and is contained in orthomodular lattices (OMLs). In the subsequent analysis we study algebraic properties of ODLs (identities valid in classes of ODLs, peculiarities connected with free ODLs, etc.) and find a characterization of set-representable ODLs. We then ask a natural question of which OML can be made (resp. can be enlarged to) an ODL. We exhibit several constructions - quite involved in places - that deepen the understanding of intrinsic properties of ODLs. As a rather surprising result in this line we find a connection with  $\mathbb{Z}_2$ -valued measures. In the end we relax the lattice condition imposed on ODLs. We obtain orthocomplemented difference posets. We then formulate and clarify several questions related to non-lattice “quantum logics”.