

# Quantum Logic Modelled by Non-Orthomodular Lattices

Mladen Pavičić\*†

We prove that there is a (possibly infinite) series of disjoint non-orthomodular lattice models for quantum logic and that quantum logic is sound and complete with respect to all of them. As opposed to our previous results, these new models do not include the Hilbert lattices by which the standard quantum logic is also modelled. We show that quantum computers cannot be founded on quantum logic modelled by the former lattices but at the same time we find a procedure that goes around this problem. In particular, we obtain that the syntax of quantum logic follow the syntax of non-Hilbert lattices more closely than the one of Hilbert lattices what enables mapping of non-Hilbert model properties onto propositional quantum logic and a subsequent re-mapping to the standard Hilbert model that can be implemented in a quantum computer. We present several algorithms and programs that provide us with new results along the latter approach.

## References

- [1] M. Pavičić, *Quantum Computation and Quantum Communication: Theory and Experiments*, Springer, New York, 2005.
- [2] M. Pavičić and N. D. Megill, *Is Quantum Logic a Logic?*, in *Handbook of Quantum Logic and Quantum Structures: Quantum Logic*, edited by K. Engesser, D. Gabbay, and D. Lehmann, pages 31–54, Elsevier, Amsterdam, 2008.
- [3] M. Pavičić and N. D. Megill, *Quantum Logic and Quantum Computation*, in *Handbook of Quantum Logic and Quantum Structures: Quantum Structures*, edited by K. Engesser, D. Gabbay, and D. Lehmann, pages 751–787, Elsevier, Amsterdam, 2007.

---

\*Physics Chair, Faculty of Civil Engineering, University of Zagreb, Croatia;  
e-mail: [pavicic@grad.hr](mailto:pavicic@grad.hr); url: <http://m3k.grad.hr/pavicic>

†Supported by the Ministry of Science, Education, and Sport of Croatia through the project No. 082-0982562-3160.