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Mathematical Physics

Haag duality and the distal split property for cones in the toric code

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(Submitted on 21 Jun 2011 (v1), last revised 2 Jul 2012 (this version, v2))

We prove that Haag duality holds for cones in the toric code model. That is, for a cone Lambda, the algebra R_Lambda of observables localized in Lambda and the algebra R_{Lambda^c} of observables localized in the complement Lambda^c generate each other's commutant as von Neumann algebras. Moreover, we show that the distal split property holds: if Lambda_1 \subset Lambda_2 are two cones whose boundaries are well separated, there is a Type I factor N such that R_{Lambda_1} \subset N \subset R_{Lambda_2}. We demonstrate this by explicitly constructing N.

Comments:	15 pages, 2 figures, v2: extended introduction
Subjects:	**Mathematical Physics (math-ph)**; Operator Algebras (math.OA); Quantum Physics (quant-ph)
MSC classes:	`81R15 (Primary) 46L60, 81T05, 82B20 (Secondary)`
Journal reference:	Lett. Math. Phys. 101 (2012), 341-354
DOI:	10.1007/s11005-012-0572-7
Cite as:	**arXiv:1106.4171** **[math-ph]**
	(or **arXiv:1106.4171v2** **[math-ph]** for this version)

Submission history

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