Quantum Physics

The general form of gamma-family of quantum relative entropies

Ryszard Paweł Kostecki

(Submitted on 11 Jun 2011 (v1), last revised 30 Aug 2011 (this version, v2))

We use the Falcone-Takesaki non-commutative flow of weights and the resulting theory of non-commutative Lp spaces in order to define the family of relative entropy functionals that naturally generalise the quantum relative entropies of Jencova-Ojima and the classical relative entropies of Zhu-Rohwer, and belong to an intersection of families of Petz relative entropies with Bregman relative entropies. For the purpose of this task, we generalise the notion of Bregman entropy to the infinite-dimensional non-commutative case using the Legendre-Fenchel duality. In addition, we use the Falcone-Takesaki duality to extend the duality between coarse-grainings and Markov maps to the infinite-dimensional non-commutative case. Following the recent result of Amari for the Zhu-Rohwer entropies, we conjecture that the proposed family of relative entropies is uniquely characterised by the Markov monotonicity and the Legendre-Fenchel duality. The role of these results in the foundations and applications of quantum information theory is discussed.

Subjects:	**Quantum Physics (quant-ph)**; Mathematical Physics (math-ph)
Journal reference:	Open Systems and Information Dynamics 18:2 (2011), 191-221
Cite as:	**arXiv:1106.2225 [quant-ph]**
	(or **arXiv:1106.2225v2 [quant-ph]** for this version)

Submission history

From: Ryszard Kostecki [view email]
[v1] Sat, 11 Jun 2011 10:44:13 GMT (43kb,D)
[v2] Tue, 30 Aug 2011 15:09:48 GMT (45kb,D)

Which authors of this paper are endorsers?