Quantum majorization in infinite dimensions

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REFERENCE:

Quantum majorization on semifinite von Neumann algebras,
Priyanga Ganesan, Li Gao, Satish K. Pandey and Sarah Plosker,
Journal of Functional Analysis, 279 (2020).

Majorization $\prec$

Compare "disorder"

- Classical majorization
  - Vector majorization : For $u, v \in \mathbb{R}^n$, $v \prec u$ if there exists a doubly stochastic matrix A such that $Au = v$
  - Matrix majorization :
  - Operator majorization : $V \prec U \iff$ there exists a mixed-unitary channel Φ such that $\Phi(U) = V$
- Quantum majorization: for quantum bipartite states
  - In finite dimensions : $\rho^{AB} \in \mathcal{B}(\mathcal{H}_{\mathcal{A}} \otimes \mathcal{H}_{\mathcal{B}})$, $\sigma^{AC} \in \mathcal{B}(\mathcal{H}_{\mathcal{A}} \otimes \mathcal{H}_{\mathcal{C}})$

$\sigma^{AC} \prec_q \rho^{AB}$ if there exists a quantum channel $\mathcal{E} : \mathcal{B}(\mathcal{H}_{\mathcal{B}}) \to \mathcal{B}(\mathcal{H}_{\mathcal{C}})$ such that $id \otimes \mathcal{E}(\rho^{AB}) = \sigma^{AC}$

Entropic chracterization via conditional min-entropy

  - In infinite dimensions : ? See poster !!