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SAMPLE TITLE

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Abstract Sample abstract

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1. Introduction

In this sebsection we recall briefly the main concepts and conclusions about noncommutative L^p-spaces, Markov semigroup and associated Dirichlet form in this noncommutative setting, more details refer to [1]:

Let (A, τ) be a probability gage space, thus A is a finite von Neumann algebra and τ is a faithful, normal trace on it. For $1 \leqslant p < \infty$, $L^p(A, \tau)$ is the completion of A with respect to the norm $\|x\|_p = (\tau(|x|^p))^{1/p}, x \in A$, and $L^\infty(A, \tau) = A$ equipped with the operator norm. These spaces share all the functional analytic features of the classical L^p-spaces, such as the uniform convexity for $p \in [1, \infty)$, duality between $L^p(A, \tau)$ and $L^{p'}(A, \tau)$ with $p^{-1} + p'^{-1} = 1$, and Riesz-Thorin interpolation, Hölder's and Clarkson's inequalities.

1.1. Sample Sub section

Furthermore, the Markov semigroup and its associated Dirichlet form is based on the standard form $(A, L^2(A, \tau), L^2_+(A, \tau), J)$ of the von Neumann algebra A, where $L^2_+(A, \tau)$ is a closed convex cone in $L^2(A, \tau)$, inducing an anti-linear isometry J (the modular conjugation) on $L^2(A, \tau)$ which is the extension of the involution $a \to a^*$ of A. The subspace of J-invariant elements (called real) will be denoted by $L^2_h(A, \tau)$.

1.1.1. *H3 Level head*

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Table 1. *Insert table caption here*

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Theorem 1. *Let B be a cluster-tilted algebra. Then B is τ_B-tilting finite if and only if B is representation-finite.*

Proof. The sufficiency is obvious so we prove the necessity. Assume B is τ_B-tilting finite but representation-infinite. By Theorems, we know the transjective component of $\Gamma(\operatorname{mod} B)$ exists. Since B is representation-infinite, Theorem guarantees the transjective component must be infinite. By Proposition and the fact that the transjective component is infinite, we must have an infinite number of indecomposable transjective B-modules which lie on a local slice. Let M be such a B-module. Theorem guarantees there exists a tilted algebra C and a slice Σ such that M is a C-module and $M \in \Sigma$. It follows from parts (2) and (3) of the definition of a slice that M is τ_C-rigid. By Proposition, we know $\tau_C M \cong \tau_B M$. This implies M is τ_B-rigid. Since M was arbitrary, we have shown there exists an infinite number of indecomposable transjective B-modules which are τ_B-rigid. This is a contradiction to our assumption that B was τ_B-tilting finite and Lemma. We conclude B must be representation-finite. □

When a is real, the symbol $a \wedge 1$ will denote the projection onto the closed and convex subset $\{a \in L^2_+(A, \tau) : a \leqslant 1\}$, where 1 is the unit of A.

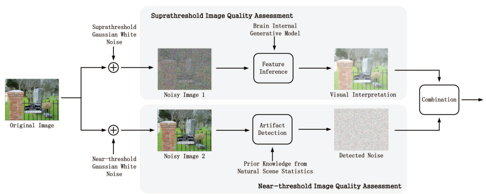

Figure 1. Insert figure caption here

Definition 1. A weak $*$- continuous semigroup $\{T_t\}_{t \geqslant 0}$ of bounded linear operators defined on $L^\infty(A, \tau)$ is said to be quantum Markov semigroup, if it satisfies the following conditions:

(1) (symmetric property): $\tau(T_t(x)y) = \tau(xT_t(y))$;

(2) (completely Markovian property): if $\{T_t \otimes I_n\}$ is Markovian on $L^\infty(A,\tau)\otimes M_n(\mathbb{C})$, that is, if $0 \leqslant x \leqslant 1 \otimes I_n$ implies that $0 \leqslant T_t \otimes I_n(x) \leqslant 1 \otimes I_n$, for all $n \in \mathbb{N}$, where 1 is the unit of A and I_n is the identity map on matrix algebra $M_n(\mathbb{C})$, respectively.

$$\begin{aligned}\frac{\mathrm{d}}{\mathrm{d}t}[\tau(T_tx)^{p(t)}]^{1/p(t)} &= \|T_tx\|_{p(t)}\frac{\mathrm{d}}{\mathrm{d}t}\left[\frac{1}{p(t)}\log\tau_q(T_tx)^{p(t)}\right]\\ &= \|T_tx\|_{p(t)}\left[-\frac{p'(t)}{p^2(t)}\log\|T_tx\|_{p(t)}^{p(t)} + \frac{1}{p(t)}\frac{1}{\|T_tx\|_{p(t)}^{p(t)}}\frac{\mathrm{d}\|T_tx\|_{p(t)}^{p(t)}}{\mathrm{d}t}\right],\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}}{\mathrm{d}t}\log\varphi(t) = -b'(t) + \frac{p'(t)}{p(t)^2}\frac{1}{\|T_tx\|_{p(t)}^{p(t)}}\mathrm{Ent}((T_tx)^{p(t)})\\ - \frac{1}{\|T_tx\|_{p(t)}^{p(t)}}\epsilon((T_tx)^{p(t)-1}, T_tx).\end{aligned} \tag{1}$$

(1) $\|T_tx\|_{p(t)} \leqslant e^{b(t)}\|x\|_p$ for all $x \in A,\ \forall p > 1,\ \forall t \geqslant 0$;

(2) $\mathrm{Ent}(|x|^2) \leqslant 2\ a\ \epsilon[x] + b\|x\|_2^2$ for all $x \in D(\epsilon)$.

In order to prove the above claim, using the above Corollary it suffices to prove the Dirichlet form $\epsilon[x] =< x, N^q x >_q, x \in D(\epsilon)$ is regular and satisfies the condition: $\epsilon[|J(x)|] = \epsilon[|x|]$ for all $x \in D(\epsilon)$, where the operator J ia an anti-linear isometry on $L^2(A,\tau)$ (see the above § 1.1 for the details).

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References

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