UNIVERSITÀ DI PAVIA
Dipartimento di Fisica
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AVVISO DI SEMINARIO

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Aula 202

Unambiguous cloning of two unitary channels

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We investigate the perfect probabilistic cloning of qubit phase gates, addressing a fundamental question of how well quantum transformations can be cloned when perfect deterministic cloning is forbidden. Using the framework of quantum combs, we formulate the optimal cloning of a phase gate from a single use to two perfect copies, where the gate is chosen from a known set of two, and derive the optimal average success probability as a function of the relative angle, alpha, between the gates. Our analysis reveals two distinct behaviours depending on the angle alpha. For large angles ($\alpha \geq \pi/4$), the optimal strategy reduces to "measure and prepare", achieving the same success probability as unambiguous discrimination of these gates. For smaller angles, $\alpha \leq \pi/4$, the optimal success probability strictly exceeds the unambiguous discrimination bound.