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SOME PROPERTIES OF QUANTUM LÉVY AREA IN FOCK AND NON-FOCK QUANTUM STOCHASTIC CALCULUS

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Abstract: We consider the analogue of Lévy area, defined as an iterated stochastic integral, obtained by replacing two independent component one-dimensional Brownian motions by the mutually non-commuting momentum and position Brownian motions P and Q of either Fock or non-Fock quantum stochastic calculus, which are also stochastically independent in a certain sense. We show that the resulting quantum Lévy area is trivially distributed in the Fock case, but has a non-trivial distribution in non-Fock quantum stochastic calculus which, after rescaling, interpolates between the trivial distribution and that of classical Lévy area in the "infinite temperature" limit. We also show that it behaves differently from the classical Lévy area under a kind of time reversal, in both the Fock and non-Fock cases.

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