Mathematical Physics

Discrete Quantum Processes

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A discrete quantum process is defined as a sequence of local states ρ_t, $t=0,1,2,...$, satisfying certain conditions on an L_2 Hilbert space H. If $\rho =\lim\rho_t$ exists, then ρ is called a global state for the system. In important cases, the global state does not exist and we must then work with the local states. In a natural way, the local states generate a sequence of quantum measures which in turn define a single quantum measure μ on the algebra of cylinder sets $\cscript$. We consider the problem of extending μ to other physically relevant sets in a systematic way. To this end we show that μ can be properly extended to a quantum measure $\mutilde$ on a "quadratic algebra" containing $\cscript$. We also show that a random variable f can be "quantized" to form a self-adjoint operator $\fhat$ on H. We then employ $\fhat$ to define a quantum integral $\int fd\mutilde$. Various examples are given

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