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11. Mathematical Physics

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Quantum stochastic model of gravitational wave interferometer detector

The quantum model of gravitational wave detector is described by the oscillator perturbed by a periodic potential. The evolution of the system is described by the Wigner function. **Theorem.** *The Wigner function and the position of the perturbed quantum oscillator can be represented by the mathematical expectation of functionals of the Poisson jump process associated to the periodic potential.*

This stochastic representation [1-2] is used for the Monte-Carlo simulation of the Wigner function and for the Fourier analysis of the dynamics of the measuring device. We evaluate the output signal of a gravitational detector like LIGO project and analyze the influence of the noise.

[1] Chebotarev A. M. et al. *Probabilistic representation of solutions of the Cauchy problem for Schrödinger, Pauli and Dirac equations*, Russ. Math. Surv. , 1990, **45**, N6, p. 3–24.

[2] Chebotarev A. M., Quezada-Batalla R. *Stochastic approach to time-dependent tunneling*, Russ. J. Math. Phys. , 1996, **4**, N3, p. 275–286.