Description of the code sawmap.f

The purpose of this code is to simulate the quantum sawtooth map with noisy gates, in the limiting cases in which the dephasing angles affecting the ideal gates are static or memoryless (see [1] for details about the definition of the dephasing angles).

The input variables in the code (files sawmap.in and nqbit.in) are:

- NQ - number of qubits
- NTOT - number of map steps
- EMME - $L/2$, where L is the number of cells
- KC - classical kicking strength K
- NIN - position of the initial wave packet (momentum eigenstate)
- NMED - average over 2*NMED+1 initial momentum eigenstates around NIN
- EPSI - maximum dephasing angle for quantum gates
- CONF - if equal to 1 change dephasing at each step, otherwise static noisy gates
- NRUM1 - average over NRUM1 noise configurations
- FILE1 - output file containing the evolution of fidelity
- FILE2 - output file containing the exact wave function at time NTOT
- FILE3 - output file containing the noisy wave function at time NTOT
- FILE4 - output file containing the evolution of IPR and variance

An example of a run of the program is shown in Fig. 1.

References

[1] D. Rossini, G. Benenti and G. Casati, *Classical versus quantum errors in quantum computation of dynamical systems*, Phys. Rev. E. **70**, 056216 (2004).

[2] G. Benenti, G. Casati, S. Montangero and D.L. Shepelyansky, *Dynamical localization simulated on a few-qubit quantum computer*, Phys. Rev. A **67**, 052312 (2003).

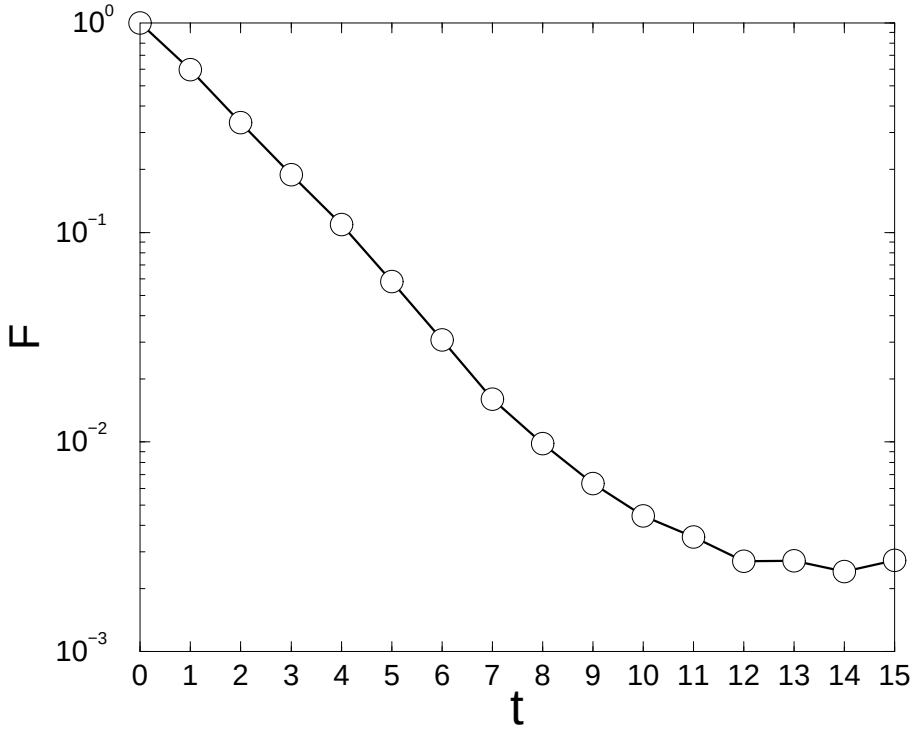

Figure 1: Fidelity F for NQ=9, NTOT=15, EMME=0.5 ($L = 1$), KC=0.2, NIN=0, NMED=4, EPSI=0.1, NRUM=5 and memoryless noisy gates.