Open Quantum Dynamics

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The subgroup mainly concerned with *Non–Hermitian Dynamics and Open Systems* has focused its attention on the characterization of positive and completely positive maps and their physical interpretation, and in particular the subgroup studied the properties of general linear assignment maps, showing that the positivity axiom can be suitably relaxed, and proposing a new class of dynamical maps (generalized dynamics) [1]. Moreover, the relation between a given assignment map and system environment correlations was stressed.

Furthermore, the possibility was studied to use quantum dynamical processes in solving computational problems. As in the standard computation case, one has to quantify the various costs (for example, energy and time) that the desired calculation may require. Then, in [2] and [3] the subgroup studied some aspects of the *Quantum Brachistochrone Problem*, i.e. the identification of the optimal Hamiltonian that performs the desired evolution in a minimal time (with limited energy costs). Physical realizability of the faster pseudo Hermitian version of the problem was also discussed. This analysis, applied to simple quantum gates, supported an informational interpretation of the problem that is quasi Hermitian invariant.

Finally, since quantum entanglement plays a crucial role in all quantum informational process that have a significant speed up with respect to the analogous classical ones, the subgroup tackled the problem of the identification and the manipulation of entangled states, in particular, by a characterization of Entanglement witness, i.e. physical observables that identify entangled states.

REFERENCES

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