【Research Activity Report 2016】

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■Publications

1) Christian Arenz, Daniel Burgarth, Paolo Facchi, Vittorio Giovannetti, Hiromichi Nakazato, Saverio Pascazio, and Kazuya Yuasa, "Universal Control Induced by Noise," Physical Review A **93**, 062308 (2016) [Editors' Suggestion].

2) Takaaki Monnai and Kazuya Yuasa, "Typical Pure Nonequilibrium Steady States and Irreversibility for Quantum Transport," Physical Review E **94**, 012146 (2016).

3) Tohru Ozawa and Kazuya Yuasa, "Uncertainty Relations in the Framework of Equalities," Journal of Mathematical Analysis and Applications **445**, 998-1012 (2017)

■Presentations

1) Kazuya Yuasa, "Universal Control Induced by Noise," Resonance and Non-Hermitian Quantum Mechanics 2016 (Osaka, Japan, August 3-5, 2016).

2) Kazuya Yuasa, Daniel Burgarth, Vittorio Giovannetti, and Airi N. Kato, "Quantum Estimation via Sequential Measurements," 9th Italian Quantum Information Science Conference (IQIS 2016) (Roma, Italy, September 20-23, 2016).

■Summary of Research Achievements

1) We are studying "**quantum control**." In particular, we are interested in control strategies which make use of quantum measurement as a tool for quantum control. We have shown that relaxation processes, as well as quantum measurements, can exponentially enhance the complexity of quantum dynamics, and thus enhance the controllability over a given quantum system. This work has been selected as an "Editors' Suggestion" in Physical Review A.

2) We are discussing issues on the foundations of statistical mechanics, focusing on the "**quantum typicality**" of the quantum states of large quantum systems. We have shown that typical pure states of a certain Hilbert space can describe nonequilibrium steady states, for which the irreversibility of the system dynamics is important.

3) We have succeeded in formulating the uncertainty relationships on quantum mechanics in terms of equalities, rather than inequalities.