【Research Activity Report 2018】

Kazuya YUASA, Department of Physics, Waseda University

■Publications

1) Teruo Matsubara, Paolo Facchi, Vittorio Giovannetti, and Kazuya Yuasa, "Optimal Gaussian Metrology for Generic Multimode Interferometric Circuit," New Journal of Physics **21**, 033014 (2019).

■Presentations

1) Kazuya Yuasa, Jukka Kiukas, and Daniel Burgarth, "Remote Parameter Estimation Enhanced by Local Control," 11th Italian Quantum Information Science Conference (IQIS 2018) (University of Catania, Catania, Italy, September 17-20, 2018).

■Summary of Research Achievements

1) We are studying "**quantum metrology**," which makes use of quantum-mechanical features to achieve a measurement precision beyond the classical limit. We have clarified the precision limit in the quantum metrology of a generic multimode interferometric optical circuit with a general Gaussian probe light.

2) We have studied quantum metrology in the presence of an unknown background parameter. Entanglement between main probings and blank tests can efficiently remove the uncertainty in the estimation stemming from the uncertainty in the unknown background parameter.

3) We have discussed Maxwell demon controlling electric current flowing between electrodes through a quantum dot, and have derived inequalities bounding reversed current by the information acquired by the Maxwell demon or by the entropy released when the demon erases the acquired information.