



ERATO-SORST Quantum Computation and Information Project

Project Overview

• Research Strategy

- develop new quantum computing paradigms by investigating and unifying advanced methodologies in quantum computation and quantum information to overcome the current barriers of information processing.
- unite different disciplines, mathematics, physics, information science, and computer science to construct basic concepts, and methods for quantum information technology.
- advance our investigation toward architecture for quantum information systems. The research will be focused on quantum computation and quantum cryptography, based on the studies on quantum complexity, quantum estimation, and quantum information theory. The project will expand the achievements in the ERATO project with close connection between theory and experiment.

• Facts

- Five year project (2005. Oct. - 2011. March)
- 31 Researchers and Students
- 818.7 M JPY (in total)
- 68 papers published, 15 submitted. 225 presentations. 53 invited talks. 7 patent pending. (up to 2010. March)

Research Groups and Subjects

(1) Quantum Computing Group (2) Quantum Information Theory Group (3) Quantum Information Experiment Group

Efficiency

Security

Distributed Computing

Communication Systems

Quantum Security
(non-QKD)

QKD

Leader Election(*)

Network Coding

Quantum Codes

Bell inequalities

Code theory

quantum
optimal receiver

quantum circuits

photon detection(*)

entanglement

Interactive Proof(*)

Oblivious transfer

Information-disturbance trade-off

Eavesdropping
(cloning)

Key distillation
protocols

**Security
certification on
real systems (*)**

Algorithm using Group Theoretic Structures(*)

bound entanglement and security(*)

(*) presented in today's poster