DAMOP07-2007-000708

Abstract for an Invited Paper
for the DAMOP07 Meeting of
the American Physical Society

Frontiers in quantum feedback control

HIDEO MABUCHI, California Institute of Technology

Feedback control of open quantum systems is an intriguing new topic for both fundamental and applied research. In this talk I will discuss our group's ongoing theoretical and experimental work in this area. Our current activity in measurement-feedback control focuses on the development of new methods for quantum precision measurement and sensing. In particular we are trying to understand the utility of feedback control methods in enabling novel quantum metrology protocols, and to elucidate corresponding performance-robustness-complexity tradeoffs. Coherent feedback is an emerging new paradigm for quantum control, in which scattered quantized fields are processed unitarily (without conversion into classical information) and then directed back into the system. We are just beginning a program of research on this topic, aimed at experimental validation of the basic theory.