1077-49-349 **Thomas Schulte-Herbrueggen*** (tosh@tum.de), Dept. Chem. OC-II, TU-Munich, Lichtenbergstrasse 4, 85747 Garching, Germany. *Symmetry Principles in Quantum Systems Theory with Applications in Simulation and Control.*

Elucidating quantum systems theory in terms of symmetry principles has triggered us in a number of recent advances: (i) it leads to a new controllability criterion, (ii) it guides the design of universal quantum hardware, (iii) it governs which quantum system can simulate another one given, and (iv) it specifies the limit between time-optimal control and relaxation-optimised control of open systems.

How principles turn into practice is illustrated by practical applications in solid-state devices and circuit-qed. – The algorithmic tools are presented in a unified programming framework. (Received August 25, 2011)