Daniel Loss

Daniel Loss received a Ph.D. in Theoretical Physics at the University of Zurich in 1985 under the supervision of Prof. A. Thellung. He stayed there as postdoctoral researcher for four more years before moving to the US in 1989. From 1989 to 1991 he worked as postdoctoral researcher in the group of Prof. A. J. Leggett, Urbana, and from 1991 to 1993 at IBM Research Center, NY (USA). In 1993 he moved to Vancouver (Canada) to become Assistant and then Associate Professor of Physics at Simon Fraser University. In 1996 he returned to Switzerland to become full Professor of Theoretical Physics at the University of Basel. Loss is director of the Basel Center for Quantum Computing and Quantum Coherence (QC2), and co-director (2006) of the Swiss National Center of Competence and Research (NCCR) in Nanoscale Science at the University of Basel. He received several prestigious fellowships, is a Fellow of the American Physical Society, and has been awarded the Humboldt Research Prize in 2005. He is married and has two sons.

Loss's research interests include many aspects of the theory of condensed matter systems with a particular focus on spin-dependent and phase-coherent phenomena (‘mesoscopics’) in semiconducting nanostructures and molecular magnets. A major portion of Loss's current research involves the theory of spin dynamics, spin coherence, spintronics in two-dimensional electron gases, and spin-related phenomena in semiconducting quantum dots--artificial atoms and molecules. Part of this work is related to quantum information processing (QIP)--quantum computing and quantum communication in solid state systems with focus on spin qubits, where Loss and collaborators made seminal contributions. Their theoretical predictions and proposals have stimulated many further investigations, and in particular many experimental programs on spin qubits worldwide. Current research includes spin relaxation and decoherence in quantum dots due to spin-orbit and hyperfine interaction; non-Markovian spin dynamics in bosonic and nuclear spin environments; generation and characterization of non-local entanglement with quantum dots, superconductors, Luttinger liquids or Coulomb scattering in interacting 2DEGs; spin currents in magnetic insulators and in semiconductors; spin Hall effect in disordered systems; spin orbit effects in transport and noise; asymmetric quantum shot noise in quantum dots; entanglement transfer from electron spins to photons; QIP with spin qubits in quantum dots and molecular magnets; macroscopic quantum phenomena (spin tunneling and coherence) in molecular and nanoscale magnetism.