In Memoriam Professor Shuichi TASAKI (1958-2010)

Center for Nonlinear Phenomena and Complex Systems,
Université Libre de Bruxelles, Campus Plaine, Code Postal 231,
B-1050 Brussels, Belgium.
Pierre Gaspard[1]

Professor Shuichi Tasaki passed away unexpectedly on 6 June 2010 in Tokyo. He will be remembered for his theoretical achievements in condensed matter physics, in nonequilibrium statistical mechanics, and especially, in the mathematical theory of irreversibility.

Shuichi Tasaki was born on 26 April 1958 in Oita City, Japan. He obtained a BSc degree in physics from the Faculty of Science and Engineering of Waseda University in 1981 and a MSc degree in condensed matter physics from Kyoto University in 1983. He received his PhD thesis also from Kyoto University in 1989. The same year, Shuichi Tasaki arrived in Brussels to work with Professor Ilya Prigogine as postdoctoral research associate at the International Solvay Institutes for Physics and Chemistry. During his stay of four years at the Université Libre de Bruxelles, he opened up the way to new progress in nonequilibrium classical and quantum statistical mechanics. In 1993, Shuichi Tasaki returned to Japan as researcher at the Institute for Fundamental Chemistry founded in Kyoto by Professor Kenichi Fukui and, in 1997, he became associate Professor at Nara Women's University. In 2000, he took a position of associated Professor in the Department of Applied Physics at the Faculty of Science and Engineering of Waseda University, where he was promoted Professor in 2002.

Shuichi Tasaki was an outstanding theoretical and mathematical physicist. His research history is the following.

Early research

During his master thesis in 1982-83, Shuichi Tasaki worked on the electric conductivity in the charge-density-wave phase of $NbSe_3$, which is a quasi one-dimensional material. In this low-temperature phase, which was first predicted by Fröhlich, the electric conductivity shows several unexpected behaviors such as a nonlinear dependence on the applied field and the generation of periodic 'noise' under the application of a *dc*-field. Shuichi Tasaki gave a qualitative explanation of these phenomena based on a classical dynamical model by using the multiple scale method

[1]E-mail: gaspard@ulb.ac.be

of nonlinear oscillator theory. The results were published in *Progress of Theoretical Physics* **70** (1983) 920.

Thereafter, Shuichi Tasaki published a study in *Progress of Theoretical Physics* **75** (1986) 445 on the properties of the periodic *s-d* model. In some materials such as UPt_3, quasiparticles with very heavy effective mass appear as the result of the so-called *s-d* interaction between conduction and localized electrons and they are considered to be responsible for new-type superconductivity. In this context, Tasaki gave a mathematical justification to the theory by Tsuneto and Kato, in which the singlet state between a conduction and a localized electron is treated as a vacuum and their excitations as quasiparticles.

His Ph.D. thesis was devoted to the theory of the magnetic properties of adsorbed ^{3}He, which manifests a ferromagnetic behavior, although bulk ^{3}He does not. Shuichi Tasaki investigated this phenomenon based on a model where the indirect exchange mechanism by Ruderman, Kittel, Kasuya and Yoshida is responsible for the origin of ferromagnetism. The most important aspect of this model is that liquid layers are described as almost localized fermionic systems. Accordingly, the model predicts that the layer width strongly influences the Curie temperature, albeit the Curie constant and the susceptibility are weakly influenced. Both predictions are in very good agreement with experiments. Moreover, the same model predicts a new ordered state at very low magnetic field, which can explain observed NMR frequency shifts. The results were published in a series of papers: *Progress of Theoretical Physics* **79** (1988) 1311; *ibid.* **80** (1988) 922 E; *ibid.* **81** (1989) 946; *ibid.* **82** (1989) 1032; *Physica B* **165-166** (1990) 703.

Postdoctoral research with Professor Ilya Prigogine

During his stay of four years at the Université Libre de Bruxelles from 1989 until 1993, Shuichi Tasaki was postdoctoral research associate by Professor Ilya Prigogine at the International Solvay Institutes for Physics and Chemistry and he contributed to the theory of irreversibility thanks to his exceptional mastery of mathematical analysis and, especially, of functional analysis and the theory of C*-algebras.

In collaboration with Prof. I. Prigogine and T. Petrosky, Shuichi Tasaki published in *Physics Letters A* **151** (1990) 109 and *Physica A* **170** (1991) 306, a study of the quantum Zeno effect motivated by the observation of this effect in a trapped ion system.

With furthermore Dr. H. Hasegawa, the collaboration found that, in the solvable Friedrichs model of decaying systems, the previously formulated subdynamics approach is equivalent to the complex eigenvalue problem for the Hamiltonian. The time ordering rule was incorporated with the usual perturbation scheme to obtain a complete set of eigenfunctions and corresponding complex eigenvalues, splitting the unitary time evolution of the system into two semigroups with broken time symmetry. The work was published in *Foundations of Physics* **21** (1991) 263;

Physica A **173** (1991) 175; and *Chaos, Solitons and Fractals* **1** (1991) 3.

In a paper by Lee and Tasaki published in *Physica A* **182** (1992) 59, the subdynamics formalism was generalized to driven systems with an explicit time dependence. A recursion formula was used to construct a complete set of projection operators, which significantly simplifies the calculation compared to previous formulations.

In this direction, Shuichi Tasaki obtained fundamental results in the complex spectral theory of time-evolution operators for quantum and classical systems. At the XXth Solvay Conference on Physics held 6-9 November 1991 in Brussels, he presented a second-quantization formalism based on complex instead of real frequencies with the aim to represent the time asymmetric evolution of systems.

Thereafter, Tasaki applied the complex spectral theory to two typical maps, i.e., the noninvertible β-adic Renyi map and the invertible β-adic baker transformation in order to obtain the complex set of eigenfunctions corresponding to the Pollicott-Ruelle resonances and describing the decay of time correlation functions. For these maps, a rigorous mathematical meaning was given to the formally obtained spectral decompositions with decaying eigenfunctions in terms of rigged Hilbert spaces. Moreover, in the case of the Renyi map, the conversion of the spectrum of the Frobenius-Perron operator from the unit disk to isolated eigenvalues was explained by changing the domain of definition of this operator. In the case of the baker map, the splitting of the unitary evolution into two semigroups was explicitly shown. This construction was later extended to other piecewise-linear maps.

Moreover, Shuichi Tasaki applied the second quantized version of the complex spectral theory to study the stability of flat space-time solutions in a cosmological model by Gunzig and Nardone.

Research at Kyoto's Institute for Fundamental Chemistry and Nara Women's University

In September 1993, Shuichi Tasaki took a position of researcher at the Institute for Fundamental Chemistry founded in Kyoto by Professor Kenichi Fukui, while continuing his collaboration with Brussels' group on nonequilibrium statistical mechanics.

At the end of his stay in Brussels, Shuichi Tasaki and myself had started a long lasting collaboration on spatially-extended models of diffusion called multibaker maps, justifying Fick's law on a fundamental ground by the explicit construction of the nonequilibrium steady states and the diffusive modes of relaxation towards the thermodynamic equilibrium state in consistency with microreversibility. In this collaboration, the nonequilibrium steady states of the multibaker map was shown to be given in terms of Takagi nondifferentiable functions while the spectral decomposition of the corresponding Frobenius-Perron operator could be expressed in terms of fractal de Rham functions. This study was later extended to a further multibaker model including an energy variable, in which the thermodynamic entropy production could be calculated. Moreover, the spectral decompositions of the Liouvillian time evolution of dissipative dynamical systems undergoing pitchfork or Hopf bifurcations were also constructed.

On the new advances – he contributed to so much – in our understanding of the arrow of time, Shuichi Tasaki wrote a Blue Backs book in Japanese entitled "Time's arrow from the viewpoint of chaos theory" which was published in 2000.

In parallel, Shuichi Tasaki worked on several aspects of the quantum dynamics of decaying systems. In collaboration with T. Harayama and A. Shudo, he published several papers on eigenvalue problems in classically chaotic quantum billiards. He also worked in collaboration with K. Maekawa and T. Yamabe on the effect of chirality on the optical properties of carbon nanotubes.

Research at Waseda University

In April 2000, Shuichi Tasaki got his position at Waseda University in the Department of Applied Physics, Faculty of Science and Engineering.

He then undertook research on nonequilibrium steady states in open quantum lattice systems using the mathematical formalism of C*-algebras. In collaboration with T. Matsui, he constructed the MacLennan-Zubarev nonequilibrium ensembles for a class of open large quantum systems and proved a version of the fluctuation theorem in this framework. More recently, Tasaki also worked with D. Andrieux, T. Monnai, and myself on the fluctuation theorem for currents in open quantum systems, publishing together in 2009 a proof of the steady-state version of this theorem by considering transient time-reversal symmetry relations in some appropriate long-time limit.

At Waseda University, Tasaki's research activities with his collaborators and his students became diversified on various topics of condensed matter theory and quantum physics. In particular, he contributed to the level-spacing statistics of classically integrable systems along the lines of the Berry-Robnik approach, to the control of coherence, to current fluctuations in an AB ring with a quantum dot, to the assumption of initial factorization in weakly coupled systems, as well as to equilibrium and nonequilibrium phase transitions. One of his last contributions is a theory of the nonequilibrium Peierls transition to interpret experimental observations of giant nonlinear conduction in charge-ordered organic materials. This theory was developed by combining condensed matter physics with nonequilibrium statistical mechanics and appears as a synthesis of Tasaki's deep insights into two of his favorite fields.

Shuichi Tasaki has also publications in dynamical systems theory on the spectral characterization of anomalous diffusion in periodic piecewise-linear intermittent maps and on the asymptotics beyond-all-orders approach for maps with reconnection of stable/unstable manifolds.

The sudden death of Professor Shuichi Tasaki came as a shock the 6th of June 2010. The communities working in nonequilibrium statistical physics and the theory of irreversible processes have lost a leading figure who has greatly influenced the development of these fields by his seminal contributions during the last two decades. We owe him profound and inspiring theoretical results he achieved with his extraordinary and unique mathematical virtuosity. He will be fondly remembered as an exceptionally brilliant scientist and also as a deeply humane gentle person.

Publications

1983

S. Tasaki, "Sliding Conductivity of Charge Density Waves", *Progress of Theoretical Physics* **70** (1983) 920-934.

1986

S. Tasaki, "Reformulation of Periodic *s-d* Model", *Progress of Theoretical Physics* **75** (1986) 445-447.

1988

S. Tasaki, "Theory of Surface-Induced Magnetism in Adsorbed ^{3}He Films", *Progress of Theoretical Physics* **79** (1988) 1311-1329; *Errata* **80** (1988) 922.

1989

S. Tasaki, "Theory of Surface-Induced Magnetism in Adsorbed ^{3}He Films II", *Progress of Theoretical Physics* **81** (1989) 946-959.

S. Tasaki, "Theory of Surface-Induced Magnetism in Adsorbed ^{3}He Films III", *Progress of Theoretical Physics* **82** (1989) 1032-1043.

1990

S. Tasaki, "Anisotropic magnetic order in adsorbed ^{3}He films", *Physica B* **165-166** (1990) 703-704.

T. Petrosky, S. Tasaki, and I. Prigogine, "Quantum Zeno effect", *Physics Letters A* **151** (1990) 109-113.

1991

T. Petrosky, S. Tasaki, and I. Prigogine "Quantum Zeno effect", *Physica A* **170** (1991) 306-325.

H. Hasegawa, T. Petrosky, I. Prigogine, and S. Tasaki, "Quantum Mechanics and the Direction of Time", *Foundations of Physics* **21** (1991) 263-281.

T. Petrosky, I. Prigogine, and S. Tasaki, "Quantum theory of non-integrable systems", *Physica A* **173** (1991) 175-242.

I. Prigogine, T. Petrosky, H. Hasegawa, and S. Tasaki, "Integration of Non-integrable Systems", in: *Solitons and Chaos*, I. Antoniou and F. Lambert, Editors, (Springer, Berlin, 1991) pp. 3-24.

I. Prigogine, T. Petrosky, H. Hasegawa, and S.Tasaki, "Integrability and chaos in classical and quantum mechanics", *Chaos, Solitons & Fractals* **1** (1991) 3-24.

1992

Lee Jing-Yee and S. Tasaki, "Poincaré's theorem and subdynamics for driven systems", *Physica A* **182** (1992) 59-99.

I. Antoniou and S. Tasaki, "Generalized spectral decompositions of the β-adic baker transformation and intrinsic irreversibility", *Physica A* **190** (1992) 303-329.

1993

I. Antoniou and S. Tasaki, "Spectral Decompositions of the Renyi Map", *Journal of Physics A: Mathematical & General* **26** (1993) 73-94.

I. Antoniou and S. Tasaki, "Generalized Spectral Decompositions of Mixing Dynamical Systems", *International Journal of Quantum Chemistry* **46** (1993) 425-474.

S. Tasaki, P. Nardone, and I. Prigogine, "Resonance and instability in a cosmological model", *Vistas in Astronomy* **37** (1993) 645-648.

S. Tasaki, I. Antoniou, and Z. Suchanecki, "Deterministic diffusion, de Rham equation and fractal eigenvectors", *Physics Letters A* **179** (1993) 97-102.

S. Tasaki, Z. Suchanecki, and I. Antoniou, "Ergodic properties of piecewise linear maps on fractal repellers", *Physics Letters A* **179** (1993) 103-110.

1994

S. Tasaki and I. Antoniou, "Generalized Spectral Decomposition for the r-adic Renyi Map", in: *Evolution Equations, Control Theory and Biomathematics*, Ph. Clément and G. Lumer, Editors, Lecture Notes in Pure and Applied Mathematics **155** (Marcel Dekker, New York, 1994) pp. 557-572.

I. Antoniou and S. Tasaki, "Intrinsic Irreversibility of Unstable Dynamical Systems", in: *On Self-Organization*, R. K. Mishra, D. Maass, and E. Zwierlein, Editors, Springer Series in Synergetics **61** (Springer, Berlin, 1994) pp. 256-269.

S. Tasaki, I. Antoniou, and Z. Suchanecki, "Spectral decomposition and fractal eigenvectors for a class of piecewise linear maps", *Chaos, Solitons & Fractals* **4** (1994) 227-254.

Z. Suchanecki, I. Antoniou, and S. Tasaki, "Nonlocality of the Misra-Prigogine-Courbage semigroup", *Journal of Statistical Physics* **75** (1994) 919-928.

S. Tasaki and P. Gaspard, "Fractal Distribution and Fick's Law in a Reversible Chaotic System", in: *Towards the Harnessing of Chaos*, M. Yamaguti, Editor (Elsevier Science, Amsterdam,

1994) pp. 273-288.

S. Tasaki, E. Eisenberg, and L. P. Horwitz, "Measurement Theory in Lax-Phillips Formalism", *Foundations of Physics* **24** (1994) 1179-1194.

1995

S. Tasaki, "Spectral Properties of the Frobenius-Perron Operator of the Multibaker Transformation", in: *Dynamical Systems and Chaos* **2**, Y. Aizawa, S. Saito, and K. Shiraiwa, Editors (World Scientific, Singapore, 1995) pp. 83-89.

P. Gaspard, G. Nicolis, A. Provata, and S. Tasaki, "Spectral signature of pitchfork bifurcation: Liouville equation approach", *Physical Review E* **51** (1995) 74-94.

S. Tasaki, "Specific Heat of He Adsorbed on Y-Zeolite", *Progress of Theoretical Physics* **93** (1995) 857-869.

S. Tasaki and P. Gaspard, "Fick's law and fractality of nonequilibrium stationary states in a reversible multibaker map", *Journal of Statistical Physics* **81** (1995) 935-987.

S. Tasaki, "Eigenvalue problem of evolution operators and dissipation in conservative systems", 京都大学数理解析研究所講究録 No. 923「ガウス空間上の作用素解析と量子確率論」(1995) pp. 230-252.

田崎秀一、「カオスと非可逆性」、岩波「科学」65 巻 12 号、pp. 802-810、1995 年.

1996

M. Castagnino, E. Gunzig, P. Nardone, I. Prigogine, and S. Tasaki, "Quantum Cosmology and Large Poincaré Systems", in: *Quantum Physics and the Universe*, M. Namiki, Editor (AIP Press, New York, 1996) pp. 3-20.

Z. Suchanecki, I. Antoniou, S. Tasaki, and O. F. Bandtlow, "Rigged Hilbert Spaces for Chaotic Dynamical Systems", *Journal of Mathematical Physics* **37** (1996) 5837-5847.

S. Tasaki and P. Gaspard, "Eigenvalue Problem of Evolution Operators and Dissipation in Conservative Maps", Japanese title: "保存的マップにおける発展方程式の固有値問題と散逸", *Bussei Kenkyu Research Report in Condensed-Matter Theory* 物性研究 vol. 66, No. 1 (1996) pp. 21-44.

I. Antoniou, I. Prigogine, and S. Tasaki, "New Spectral Representations of Mixing Dynamical Systems", in: *World Congress of Nonlinear Analysts '92 (Proceedings of the First World Congress of Nonlinear Analysts, Tampa, Florida, August 19-26, 1992)* V. Lakshmikantham, Editor (Walter de Gruyter, Berlin, 1996) pp. 2069-2080.

1997

V. V. Kocharovsky, Vl. V. Kocharovsky, and S. Tasaki, "Non-Adiabatic Crossing of Decaying Levels", *Advances in Chemical Physics* **99** (1997) 333-368.

田崎秀一「カオスと非可逆性の問題」、数理科学、1997年12月号、pp. 44-50.

V. V. Kocharovsky, Vl. V. Kocharovsky, E. A. Derishev, S. A. Litvak, I. A. Shereshevsky, and S. Tasaki, "Nonstationary dressed states and effects of decay in nonadiabatic crossing of decaying levels", *Computers & Mathematics with Applications* **34** (1997) 727-750.

S. Tasaki, T. Harayama, and A. Shudo, "Interior Dirichlet eigenvalue problem, exterior Neumann scattering problem, and boundary element method for quantum billiards", *Physical Review E* **56** (1997) R13-R16.

I. Antoniou, Z. Suchanecki, R. Laura, and S. Tasaki, "Intrinsic irreversibility of quantum systems with diagonal singularity", *Physica A* **241** (1997) 737-772.

S. Tasaki, J. Levitan, and J. Mygind, "A new method to detect geometrical information by the tunneling microscope", *Journal of Applied Physics* **82** (1997) 4148-4152.

1998

S. Tasaki, K. Maekawa, and T. Yamabe, "π-band contribution to the optical properties of carbon nanotubes: Effects of chirality", *Physical Review B* **57** (1998) 9301-9318.

S. Tasaki, Th. Gilbert, and J. R. Dorfman, "An Analytical Construction of the SRB Measures for Baker-type Maps", *Chaos* **8** (1998) 424-443.

1999

T. Harayama, A. Shudo, and S. Tasaki, "Semiclassical Fredholm determinant for strongly chaotic billiards", *Nonlinearity* **12** (1999) 1113-1149.

I. Antoniou, Z. Suchanecki, and S. Tasaki, "Series Representations of the Complex Delta Function", in: *Generalized functions, operator theory, and dynamical systems*, I. Antoniou and G. Lumer, Editors (Chapman & Hall/CRC, Boca Raton, 1999) pp. 130-143.

S. Tasaki and P. Gaspard, "Thermodynamic Behavior of an Area-Preserving Multibaker Map with Energy", *Theoretical Chemistry Accounts* **102** (1999) 385-396.

2000

S. Tasaki, "Nonequilibrium Stationary States for a Quantum 1-D Conductor", in: *Statistical Physics, the Proceedings of the 3rd Tohwa University Conference on Statistical Physics*, M. Tokuyama and H. E. Stanley, Editors, *AIP Conference Proceedings* **519** (AIP, New York, 2000) pp. 356-358.

T. Harayama, A. Shudo, and S. Tasaki, "A Functional Equation for Semiclassical Fredholm Determinant for Strongly Chaotic Billiards", *Progress of Theoretical Physics, Supplement* **139** (2000) 460-469.

S. Tasaki and P. Gaspard, "Entropy Production and Transports in a Conservative Multibaker Map with Energy", *Journal of Statistical Physics* **101** (2000) 125-144.

田崎秀一、「カオスから見た時間の矢」、ブルーバックス、2000年4月号、S. Tasaki, "Time's arrow from the viewpoint of chaos theory" (Blue Backs, 2000) *254 pages*, ISBN 978-4-06-257287-3.

2001

田崎秀一、「スピン・エコーとLoschmidtの魔」、数理科学、2001年7月号、pp. 37-42.

S. Tasaki, "Nonequilibrium stationary states of noninteracting electrons in a one-dimensional lattice", *Chaos, Solitons & Fractals* **12** (2001) 2657-2674.

S. Tasaki, "Current Fluctuations in Nonequilibrium Steady States for a One-dimensional Lattice Conductor", in: *Quantum Information III*, T. Hida and K. Saito, Editors (World Scientific, Singapore, 2001) pp. 157-176.

P. Gaspard and S. Tasaki, "Liouvillian dynamics of the Hopf bifurcation", *Physical Review E* **64** (2001) 056232 *(17 pages)*.

S. Tasaki, "On steady-state entropy production of a one-dimensional lattice conductor", 京都大学数理解析研究所講究録 No. 1227 「無限次元解析と量子確率論」(2001) pp. 199-208.

2002

S. Tasaki, "Irreversibility in reversible multibaker maps", *Advances in Chemical Physics* **122** (2002) 70-107.

H. Honda, S. Tasaki, A. Chiba, and H. Ogura, "Relaxation Phenomenon measured as dynamical specific heat in first-order phase transition of molecular crystal", *Physical Review B* **65** (2002) 104112 *(9 pages)*.

S. Tasaki and P. Gaspard, "Spectral Properties of a Piecewise Linear Intermittent Map", *Journal of Statistical Physics* **109** (2002) 803-820.

S. Tasaki, "Thermodynamic Behaviors of Large Dynamical Systems - Quantum 1d Conductor and Classical Multibaker Map", in: *Dynamics of Dissipation*, P. Garbaczewski and R. Olkiewicz, Editors, Lecture Notes in Physics **597** (Springer, Berlin, 2002) pp. 395-412.

2003

H. Honda, H. Ogura, S. Tasaki, and A. Chiba, "Two-phase coexisting state of n-hexatriacontane in the first-order phase transition", *Thermochimica Acta* **405** (2003) 51-60.

S. Tasaki and T. Matsui, "Fluctuation Theorem, Nonequilibrium Steady States and MacLennan-Zubarev Ensembles of a Class of Large Quantum Systems", in: *Fundamental Aspects of Quantum Physics*, L. Accardi and S. Tasaki, Editors (World Scientific, Singapore, 2003) pp. 100-119.

H. Makino and S. Tasaki, "Level spacing statistics of classically integrable systems: Investigation along the lines of the Berry-Robnik approach, *Physical Review E* **67** (2003) 066205 *(8 pages)*.

S. Tasaki and P. Gaspard, "Spectral characterization of anomalous diffusion of a periodic piecewise linear intermittent map", *Physica D* **183** (2003) 205-219.

M. Fujiyoshi and S. Tasaki, "Friedrichs model with singular continuous spectrum", *Journal of Physical Society of Japan* **72**, *Supplement C* (2003) 73-76.

H. Makino and S. Tasaki, "Deviation from Berry-Robnik distribution caused by spectral accumulation", *Journal of Physical Society of Japan* **72**, *Supplement C* (2003) 97-100.

H. Makino and S. Tasaki, "Non-Poissonian Level Spacing Statistics of Classically Integrable Quantum Systems Based on the Berry-Robnik Approach", *Progress of Theoretical Physics, Supplement* **150** (2003) 376-380.

Y. Okada, A. Shudo, T. Harayama, and S. Tasaki, "Can One Determine the Shape of a Quantum Billiard Table through the Eigenenergies and Resonances?", *Progress of Theoretical Physics, Supplement* **150** (2003) 397-400.

2004

田崎秀一、「統計力学と「時間の矢」」、数理科学、2004 年 7 月号、pp. 18-23.

S. Tasaki, A. Tokuse, P. Facchi, and S. Pascazio, "Control of decoherence: dynamical decoupling vs quantum Zeno effect", *International Journal of Quantum Chemistry* **98** (2004) 160-172.

S. Tasaki, "On Prigogine's approaches to irreversibility - A case study by the baker map", *Discrete Dynamics in Nature and Society* **2004**, issue 1 (2004) 251-272.

2005

P. Facchi, S. Tasaki, S. Pascazio, H. Nakazato, A. Tokuse, and D. A. Lidar, "Control of decoherence: Analysis and comparison of three different strategies", *Physical Review A* **71** (2005) 022302 *(22 pages)*.

Y. Okada, A. Shudo, S. Tasaki, and T. Harayama, "'Can one hear the shape of a drum?': revisited", *Journal of Physics A: Mathematical & General* **38** (2005) L163-L170.

J. Takahashi and S. Tasaki, "Nonlinear Transport and Current Fluctuation in an AB Ring with a Quantum Dot", *Journal of Physical Society of Japan, Supplement* **74** (2005) 261-264.

H. Makino and S. Tasaki, "Long-Range Spectral Statistics of Classically Integrable Systems", *Progress of Theoretical Physics* **114** (2005) 929-941.

S. Tasaki and T. Matsui, "Nonequilibrium Steady States with Bose-Einstein Condensates", in: *Stochastic Analysis: Classical and Quantum*, T. Hida, Editor (World Scientific, Singapore, 2005) pp. 211-227.

Y. Okada, A. Shudo, S. Tasaki, and T. Harayama, "On the boundary element method for billiards with corners", *Journal of Physics A: Mathematical & General* **38** (2005) 6675-6688.

2006

S. Tasaki, "On Entropy Production of a One-dimensional Lattice Conductor", in: *Quantum Information V*, T. Hida and K. Saito, Editors (World Scientific, Singapore, 2006) pp. 203-217.

J. Takahashi and S. Tasaki, "Nonequilibrium current fluctuation in an AB ring with a quantum dot", Proceedings of the 16th International Conference on Electronic Properties of Two-Dimensional Systems (EP2DS-16), *Physica E: Low-Dimensional Systems and Nanostructures* **34** (2006) 651-654.

S. Ajisaka and S. Tasaki, "Method of asymptotics beyond all orders and restriction on maps", *Nonlinear Phenomena in Complex Systems* **9** (2006) 173-177.

S. Tasaki, "Thermodynamics of a class of large quantum systems", *Journal of Physics: Conference Series* **31** (2006) 35-42.

S. Ajisaka and S. Tasaki, "Analytical study for reconnection of stable/unstable manifolds of the Harper map", *Journal of Physics: Conference Series* **31** (2006) 227-228.

S. Tasaki and L. Accardi, "Nonequilibrium steady states for a harmonic oscillator interacting with two Bose fields - stochastic limit approach and C* algebraic approach", in: *Quantum Information and Computing*, L. Accardi, M. Ohya, and N. Watanabe, Editors (World Scientific, Singapore, 2006) pp. 332-351.

P. Facchi, H. Nakazato, S. Pascazio, and S. Tasaki, "Control of Decoherence via Quantum Zeno Subspaces", *International Journal of Modern Physics B* **20** (2006) 1408-1420.

J. Takahashi and S. Tasaki, "Nonequilibrium Steady States and Fano-Kondo Resonances in an AB Ring with a Quantum Dot", *Journal of Physical Society of Japan* **75** (2006) 094712 *(12 pages)*.

S. Tasaki and T. Matsui, "Note on MacLennan-Zubarev Ensembles and QuasiStatic Processes", 京都大学数理解析研究所講究録　No. 1507「量子解析におけるミクロ・マクロ双対性」(2006) pp. 118-134.

S. Ajisaka and S. Tasaki, "Reconnection of Unstable/Stable Manifolds of the Harper Map - Asymptotics-Beyond-All-Orders Approach", *Progress of Theoretical Physics* **116** (2006) 631-668.

S. Tasaki and J. Takahashi, "Nonequilibrium Steady States and MacLennan-Zubarev Ensembles in a Quantum Junction System", *Progress of Theoretical Physics, Supplement* **165** (2006) 57-77.

2007

S. Tasaki, K. Yuasa, P. Facchi, G. Kimura, H. Nakazato, I. Ohba, and S. Pascazio, "On the assumption of initial factorization in the master equation for weakly coupled systems I: General framework", *Annals of Physics* **322** (2007) 631-656.

K. Yuasa, S. Tasaki, P. Facchi, G. Kimura, H. Nakazato, I. Ohba, and S. Pascazio, "On the assumption of initial factorization in the master equation for weakly coupled systems II: Solvable models", *Annals of Physics* **322** (2007) 657-676.

2008

K. Yuasa, P. Facchi, H. Nakazato, I. Ohba, S. Pascazio, and S. Tasaki, "Lateral effects in fermion antibunching", *Physical Review A* **77** (2008) 043623 *(18 pages)*.

M. Fujiyoshi and S. Tasaki, "Anomalous Decay of an Unstable State coupled with Singular Continuous States, *Progress of Theoretical Physics* **119** (2008) 883-911.

2009

F. Sawano, T. Suko, T. S. Inada, S. Tasaki, I. Terasaki, H. Mori, T. Mori, Y. Nogami, N. Ikeda, M. Watanabe, and Y. Noda, "Current-Density Dependence of the Charge-Ordering Gap in the Organic Salt θ-(BEDT-TTF)$_2$CsM(SCN)$_4$ (M = Zn, Co, and Co$_{0.7}$Zn$_{0.3}$)", *Journal of the Physical Society of Japan* **78** (2009) 024714 *(5 pages)*.

H. Makino, N. Minami, and S. Tasaki, "Statistical properties of spectral fluctuations for a quantum system with infinitely many components", *Physical Review E* **79** (2009) 036201 *(10 pages)*.

D. Andrieux, P. Gaspard, T. Monnai, and S. Tasaki, "Fluctuation theorem for currents in open quantum systems", *New Journal of Physics* **11** (2009) 043014 *(25 pages)*.

S. Ajisaka, H. Nishimura, S. Tasaki, and I. Terasaki, "Nonequilibrium Peierls Transition", *Progress of Theoretical Physics* **121** (2009) 1289-1319.

K. Yuasa, P. Facchi, R. Fazio, H. Nakazato, I. Ohba, S. Pascazio, and S.Tasaki, "Entanglement of electrons field-emitted from a superconductor", *Physical Review B* **79** (2009) 180503(R).

M. Fujiyoshi and S. Tasaki, "Anomalous Decay of Unstable State and Wave Propagation in the Friedrichs Model Consisting of a Discrete State and the Fibonacci Lattice", *Progress of Theoretical Physics* **122** (2009) 1095-1109.

2010

I. Terasaki, S. Tasaki, S. Ajisaka, Y. Nogami, N. Hanasaki, M. Watanabe, H. Mori, and T. Mori, "Nonequilibrium charge ordering in θ-(BEDT-TTF)$_2MM'$(SCN)$_4$ (M = Rb, Cs; M' = Co, Zn)", *Physica B* **405**, *Supplement* **1** (2010) S217-S220.

2011

S. Ajisaka, S. Tasaki, and I. Terasaki, "Polaron formation as a genuine nonequilibrium phenomenon", *Physical Review B* **83** (2011) 212301 *(4 pages)*.

M. Tashima and S. Tasaki, "Multifractal Wave Functions of a System with a Monofractal Energy Spectrum", *Journal of the Physical Society of Japan* **80** (2011) 074004 *(8 pages)*.