

## CURRICULUM VITAE

**Martin Horvat, PhD**

### **Personal data:**

Date of Birth: April 25, 1977 in Maribor, Slovenia  
Address: Ulica Nikola Tesla 9a, SI-1230 Domžale, Slovenia  
Marital status: Married  
Children: 1  
Nationality: Slovenian  
Languages: Slovene (native), English (active), German and Serbo-Croatian (passive)

### **Professional contact information:**

Affiliation:  
Faculty of mathematics and physics, Department of physics, University of Ljubljana.  
Address: Jadranska cesta 19, SI-1000 Ljubljana, Slovenia  
Web: <http://chaos.fmf.uni-lj.si/horvat>  
Email: martin.horvat@fmf.uni-lj.si  
Phone: +386 1 4766 588

### **Education:**

1992-1996 High school, 2. Gymnasium Maribor, Slovenia  
1996-2000 Undergraduate course at Faculty of Mathematics and Physics, Department of Physics, University of Ljubljana  
2001 B.S, Diploma thesis with the title: Nonlinear dynamical model of field and particle interaction (adviser: Tomaž Prosen)  
2001-2004 Postgraduate course in Condensed matter physics, Faculty of Mathematics and Physics, Department of Physics, University of Ljubljana  
2006 PhD, Doctoral thesis with the title: Uni-directional transport in billiard chains (adviser: Tomaž Prosen)

### **Work history:**

2001-2006 Teaching assistant at the Faculty of Mathematics and Physics, Physics Department, University of Ljubljana.  
2006-2007 Post-doc researcher at Department of Mathematics, University of Bologna, Italy.  
2007-2008 Researcher at the Faculty of Mathematics and Physics, Department of Physics, University of Ljubljana.

2008-2009 Researcher on a post-doc project entitled Classical and quantum transport in extended nano-structures financed by Slovenian Research Agency.

2009-2011 Researcher at the Faculty of Mathematics and Physics, Department of Physics, University of Ljubljana on various grants.

2011- Permanent position as a researcher and a teaching assistant at the Faculty of Mathematics and Physics, Department of Physics, University of Ljubljana.

**Teaching experience:**

2000 - 2002 Laboratory work (Auto Cad, Digital imaging)

2001 - 2004, 2005 - 2006 2007 - 2014 Physical laboratory course II

2004 - 2006, Basic course in applied mathematics

2007 - 2008, Physics I at Faculty of Natural sciences

2011 - 2014 Physics 2

2010 -, Physics for student of pharmacy

2015 -, Modern physics 1

2015 -, Theory of dynamical systems

**Computer related skills:**

Languages: basic assembler, (Free)Pascal, Delphi/Lazarus, C/C++, Bash/awk/perl scripting, basic Python

Computational: Mathematica, Matlab

Operating systems: MS Windows, Linux (RedHat, Debian, Ubuntu, ...)

HPC: administration of linux systems, planning, building and managing computing clusters

Singleboard computers/microcontrollers: pic micro-controllers, arduino, raspberry Pi

**Research interests:**

- classical and quantum non-linear dynamics
- transport properties in extended systems
- quantum-classical correspondence
- quantum mechanics on the classical phase space (theory and application)
- statistical mechanics and its origin in dynamics

- scientific computing: numerical methods, distributed computing/parallelism, GPU computing, clusters, etc.
- singleboard computers for measurement, computing and education
- general relativity and relativistic global navigation satellite system

**Conferences, Lectures, Seminars and other presentations:**

- International Summer School/Conference at Maribor, Slovenia, Let's face chaos through nonlinear dynamics, 30 June - 14 July 2002, Poster presentation: Wigner function statistics of quantum maps
- European advanced studies conference IV, Chaos and Complex Systems, 9 May 2003 - 1 June 2003, Monastery of Novacella, Italy, Poster presentation: Wigner function statistics of quantum maps
- Seminars: 2nd Slovenia - Japan Seminars, 28 June - 5 July 2003, Maribor, Slovenia, Lecture: Uni-directional transport properties of a serpent billiard
- International Conference, Dynamical Chaos in Classical and Quantum Physics, Budker Institute of Nuclear Physics, August 4-9, 2003, Novosibirsk, Russia, Poster: Uni-directional transport properties of a serpent billiard
- Conference: Quantum Mechanics and Chaos, 12-14 Nov. 2003 at Kyoto University, Japan, Poster: Uni-directional transport properties of a serpent billiard
- Seminars: 3rd Slovenia - Japan Seminar, 4-5 and 10-11 November 2003, Tokyo and Kyoto, Japan, Poster: Wigner function statistics in classically chaotic systems
- Seminars: 2. Christmas physics symposium physics of the University of Maribor, 18-19 December 2003, Maribor, Slovenia, Lecture: Uni-directional transport properties of a serpent billiard (in Slovene)
- Workshop: I. SOCRATES Workshop in University of Marburg, 13-17 September, Marburg, Germany, 2004
- International Conference/Summer School, Complexity in science and society, 14 - 26 July 2004 Patras and Ancient Olympia, Greece, Poster: Uni-directional transport properties of a serpent billiard
- Workshop: II. SOCRATES Workshop in University of Maribor, 13-17 September 2004, Maribor, Slovenia, Lecture: Dynamical approach to chains of scatterers
- International Summer School/Conference at Maribor, Slovenia, Let's face chaos through nonlinear dynamics, 26 June - 10 July 2005, Maribor, Slovenia, Lecture: The serpent billiard and its transport properties, Poster: The quantum-classical correspondence in classical phase space revisited
- Research days on Bled for high school students, 13. - 16. September 2005, Bled, Slovenia, Lecture: Introduction to numerics and theory of chaos to high school students

- Novacella autumn conference 2006, Chaos and Complex Systems, 9-12th October 2006, Monastery of Novacella, Italy, Lecture: Unidirectional motion in billiard chains (parts of PhD thesis)
- 8th Japan - Slovenia seminar on nonlinear science, 2 - 6 July 2007, Maribor, Slovenia, Lecture: Quantum-classical correspondence on the torus
- Japan-Slovenian seminars in Japan (Osaka, Nara, Kyoto in Tokyo) 9 - 23 November 2007 with lectures: Ergodic properties of the triangle map (Osaka City University), Quantum-classical correspondence in chaotic systems on compact phase spaces using the Weyl-Wigner representation (Nara Women's University) in The dynamical approach to the abstract linear chains of quantum scatterers (Waseda university)
- International Summer School/Conference at Maribor, Slovenia, Let's face chaos through nonlinear dynamics, 29 June - 13 July 2008, Lecture: Triangle map and its ergodic properties
- Japan-Slovenian seminars in Japan (Tokyo, Nara), 8 - 22 November with lectures: Serpent billiard in the quantum and classical picture (Nara Women's University) in Unidirectional hard-walls billiards (University of Tokyo, Komaba Campus)
- Working session in the frame of Advanced Study Group 2010 (Dresden, Germany) 15 August - 20 September 2010 entitled Quantum Thermodynamics of Finite Systems.
- Working visit in Lancaster, UK during 9 September - 11 October 2010 on international travel for collaboration grant "Nonlinear classifiers of coupled oscillators in cardiovascular dynamics" funded by the Royal Society.
- Meeting/Collaboration in Como (Italy) Nov 2011, Feb 2012 on the project entitled Thermoelectric Efficiency in Stochastic Classical Models.
- 4th International Colloquium Scientific and Fundamental Aspects of the Galileo Programme, 4. -6. December 2013, Prague, Czech

## Bibliography

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- (2004). "Uni-directional transport properties of a serpent billiard". In: *J. Phys. A: Math. Gen* **37**, pp. 3133–3145. eprint: [nlin.CD/0601055](#).
- Horvat, Martin, Tomaž Prosen, and Mirko Degli Esposti (2006). "Quantum-classical correspondence on compact phase space". In: *Nonlinearity* **19**, pp. 1–23. eprint: [quant-ph/0601139](#).
- Žnidarič, Marko and Martin Horvat (2006). "Exponential complexity of an adiabatic algorithm for an NP-complete problem". In: *Phys. Rev. A* **73**, p. 022329. eprint: [quant-ph/0509162](#).
- Horvat, Martin and Mirko Degli Esposti (2007). "The Egorov property in perturbed cat maps". In: *J. Phys. A: Math. Theor.* **40**, pp. 9771–9781. eprint: [arXiv:0706.4397v2\[quant-ph\]](#).

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- Horvat, Martin, Tomaž Prosen, and Giulio Casati (2009). “An exactly solvable model of a highly efficient thermoelectric engine”. In: *Phys. Rev. E* **80**, p. 010102. eprint: [arXiv:0905.3997v2](https://arxiv.org/abs/0905.3997v2) [cond-mat.stat-mech].
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