

# Curriculum Vitae Liviu Petru Zarbo

<i>Loc de munca:</i> INCDTIM Cluj-Napoca Str. Donat nr. 67-103 400293 Cluj-Napoca România		<i>tel:</i> +40 264 58 40 37/196 <i>email:</i> liviu.zarbo@itim-cj.ro
---	--	--

## EDUCATIE

- Doctorat** 2007 Fizica, University of Delaware, USA.  
Conducator de doctorat: Prof. Branislav Nikolic.  
Titlul tezei: Mesoscopic Spin Hall Effect in Semiconductor Nanostructures.
- Masterat** 2001 Master in Teoria Starii Condensate,  
Universitatea Babes Bolyai din Cluj-Napoca, Romania.  
Conducator de teza: Prof. Ioan Grosu.  
Titlul tezei: Coexistenta Antiferomagnetismului si Supraconductivitatii in Compusi cu Fermioni Grei.
- Licenta** 2000 Licenta in Fizica,  
Universitatea Babes Bolyai din Cluj-Napoca, Romania.

## TEME DE CERCETARE

Nanoelectronica si spintronica. Noi materiale si dispozitive nanoelectronice. Modele computationale si testarea fiabilitatii dispozitivelor nanoelectronice emergente. Stocarea de hidrogen in materiale. Chimie cuantica.

## EXPERIENTA DE CERCETARE

- 2014-prezent:** *Cercetator stiintific, Cercetator stiintific II*  
INCDTIM Cluj-Napoca, Romania
- 2010-2014:** *Cercetator Postdoctoral.*  
Institutul de Fizica, Praga Republica Ceha, grupul lui Prof. Tomas Jungwirth.
- 2007-2010:** *Cercetator Postdoctoral.*  
Texas A&M University, Department of Physics, grupul lui Prof. Jairo Sinova.
- 2003-2007:** *Asistent Cercetator.*  
Department of Physics and Astronomy, University of Delaware, grupul lui Prof. Branislav Nikolic

## EXPERIENTA DIDACTICA UNIVERSITARA

- 2009 Toamna:** Instructor pentru cursul de Introducere in Fizica (PHYS201) la *Texas A&M University*.
- 2002 Toamna:** Asistent pentru cursul de Introducere in Fizica (PHYS201) la *University of Delaware*.

## PREMII

University of Delaware Disertation Fellowship (2006).

## AFILIERE PROFESIONALA

Membru, American Physical Society.

## LIMBI STRAINE:

Engleza, Franceza.

## ABILITATI COMPUTATIONALE

Linux, MS Windows;  
Fortran 90/95, F77, JAVA, C, C++;  
Parallel computing (MPI, OMP);  
Mathematica, Maple, Matlab;  
Origin, SigmaPlot.

## PROGRAME DE SIMULARE SCRISE

- program pentru simularea transportului cuantic electronic si spintronic in sisteme mezoscopice ca gas electronic bidimensional si grafena;
- program pentru calcularea densitatilor de current si de spin folosind formalismul functiilor Green de neechilibru;
- program Monte Carlo de transport pentru simularea transportului coerent de spin in dispozitive microscopice bazate pe gas electronic bidimensional;
- program k·p pentru calcularea momentelor de spin induse de curent in semiconductori feromagnetici ;
- program k·p pentru calcularea momentelor de spin induse de current in gaze electronice bidimensionale in prezenta corectiilor de vertex.

## PUBLICATII

1. B. K. Nikolic, S. Souma, L. P. Zarbo, and J. Sinova, *Nonequilibrium spin Hall accumulation in ballistic semiconductor nanostructures*, Phys. Rev. Lett. **95**, 046601 (2005).
2. B. K. Nikolic, L. P. Zarbo, and S. Welack, *Transverse spin-orbit force in the spin Hall effect in ballistic quantum wires*, Phys. Rev. B **72**, 075335 (2005).
3. B. K. Nikolic, L. P. Zarbo, and S. Souma, *Mesoscopic spin Hall effect in multiprobe spin-orbit coupled ballistic semiconductor bridges*, Phys. Rev. B **72**, 075361 (2005).
4. B. K. Nikolic, L. P. Zarbo, and S. Souma, *Imaging mesoscopic spin Hall flow: Spatial distribution of local spin currents and spin densities in and out of multiterminal spin-orbit coupled semiconductor nanostructures*, Phys. Rev. B **73**, 075303 (2006).
5. B. K. Nikolic and L. P. Zarbo, *Extrinsically Versus Intrinsically Driven Spin Hall Effect in Disordered Mesoscopic Multiterminal Bars*, Europhys. Lett. **77**, 47004 (2007).
6. L. P. Zarbo and B. K. Nikolic, *Spatial distribution of local currents of massless Dirac fermions in quantum transport through graphene nanoribbons*, Europhys. Lett. **80**, 47001 (2007).
7. Alexey A. Kovalev, Liviu P. Zarbo, Y. Tserkovnyak, G. E. W. Bauer, Jairo Sinova, *Piezospin Polarization of Currents in Nanostructures*, Phys. Rev. Lett. **101**, 036401 (2007).
8. R. L. Dragomirova, L. P. Zarbo and B. K. Nikolic, *Spin and Charge Shot Noise in Mesoscopic Spin Hall Systems*, Europhys. Lett. **84**, 37004 (2008).
9. B. K. Nikolic, L. P. Zarbo, and S. Souma, *Spin Currents in Semiconductor Nanostructures: A Nonequilibrium Green-Function Approach*, Chapter 24, page 814 in Volume I of "The Oxford Handbook on Nanoscience and Technology: Frontiers and Advances," Eds. A. V. Narlikar and Y. Y. Fu (Oxford University Press, Oxford, 2010).
10. J. Wunderlich, A. C. Irvine, Jairo Sinova, B. G. Park, L. P. Zarbo, X. L. Xu, B. Kaestner, V. Novak, T. Jungwirth, *Spin-injection Hall effect in a planar photovoltaic cell*, Nature Physics **5**, 675 (2009).
11. Liviu P. Zarbo, Jairo Sinova, Irena Knezevic, J. Wunderlich, T. Jungwirth, *Modeling of diffusion of injected electron spins in spin-orbit coupled microchannels*, Phys. Rev. B **82**, 205320 (2010).

12. J. Wunderlich, B. G. Park, A. C. Irvine, L. P. Zarbo, E. Rozkotova, P. Nemeč, V. Novak, Jairo Sinova, T. Jungwirth, *Spin Hall effect transistor*, Science **330**, 1801 (2010).
13. D. Fang, H. Kurebayashi, J. Wunderlich, K. Vyborny, L. P. Zarbo, R. P. Campion, A. Casiraghi, B. L. Gallagher, T. Jungwirth, and A. J. Ferguson, *Spin-orbit driven ferromagnetic resonance*, Nature Nanotechnology **6**, 413 (2011).
14. C. Ciccarelli, L. P. Zarbo, A. C. Irvine, R. P. Campion, B. L. Gallagher, J. Wunderlich, T. Jungwirth, A. J. Ferguson, *Spin gating electrical current* APL **101**, 122411 (2012).
15. H. Kurebayashi, Jairo Sinova, D. Fang, A. C. Irvine, J. Wunderlich, V. Novak, R. P. Campion, B. L. Gallagher, E. K. Vehstedt, L. P. Zarbo, K. Vyborny, A. J. Ferguson, T. Jungwirth, *An anti-damping spin-orbit torque originating from the Berry curvature*, Nature Nanotechnology **9**, 211 (2014).
16. Gonzalez-Zalba, MF, Ciccarelli, C., Zarbo, LP, Irvine, AC, Campion, RC, Gallagher, BL, Jungwirth, T, Ferguson, AJ, Wunderlich, J., *Reconfigurable Boolean Logic Using Magnetic Single-Electron Transistors*, PLOS ONE, **10**, 4, e0125142 (2015).
17. Hang Li, H. Gao, Liviu P. Zârbo, K. Výborný, Xuhui Wang, Ion Garate, Fatih Doğan, A. Čejchan, Jairo Sinova, T. Jungwirth, and Aurélien Manchon, *Intraband and interband spin-orbit torques in noncentrosymmetric ferromagnets*, Phys. Rev. B **91**, 134402 (2015).

## PREZENTARI

- *Vibrations in Glasses Encounter Quantum Chaos.*  
APS March Meeting 2003, Austin, Texas.
- *Pure and Impure Spin Currents in Mesoscopic Four-Probe Semiconductor Nanostructures with Rashba and Dresselhaus Spin-Orbit Couplings.*  
APS March Meeting 2005, Los Angeles, California.
- *Mesoscopic Spin Hall Currents and Spin Densities in Multiprobe Ballistic Semiconductor Nanostructures.*  
SPINTECH III, Awaji Island, JAPAN August 1-5, 2005.
- *Imaging Stationary Flow of Spin Hall Effect-Induced Spin Densities in Mesoscopic Nanostructures.*  
APS March Meeting 2006, Baltimore, Maryland.
- *Imaging massless Dirac fermion flow in graphene nanoribbons.*  
APS March Meeting 2008, New Orleans, Louisiana.
- *Monte Carlo Simulation of Spin-Injection Hall Effect.*  
APS March Meeting 2009, Pittsburgh, Pennsylvania.
- *Monte Carlo Simulation of Spin-Injection Hall Effect in Spintronic Devices.*  
Techcon 2009, Austin, Texas.
- *Modeling of diffusion of injected electron spins in spin-orbit coupled microchannels.*  
APS March Meeting 2011, Dallas, Texas.
- *Current Induced Spin Torque in Uniform Semiconducting Ferromagnets.*  
2nd Advanced Workshop on Spin and Charge Properties of Low Dimensional Systems, Brasov, Romania, 2011.
- *Current Induced Spin Torque in Uniform Semiconducting Ferromagnets.*  
Frontiers of Quantum and Mesoscopic Thermodynamics 2011, Prague, Czech Republic.
- *Spin-gating of a conventional aluminum single electron transistor.*  
APS March Meeting 2012, Boston, Massachusetts.
- *Antidamping Spin Orbit Torque in Semiconducting Ferromagnets.*  
Frontiers of Quantum and Mesoscopic Thermodynamics 2013, Prague, Czech Republic.
- *Spin-Orbit Torques in Semiconductor Ferromagnets*  
Processes in Isotopes and Molecules 2015, Cluj-Napoca, Romania.