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Education

PhD: University of Milan, Italy, in December 2004. Supervisor: Dr. F. Borgonovi and Dr. R. Bonifacio. Ph.D. Dissertation: “Long Range Interacting system: the Non-ergodicity Threshold”

BA plus Msc : University of Pavia, Italy, in 2001, (110/110) with the Dissertation: “Chaos and Thermalization in an interacting bosons system”. Supervisor: Dr. F. Borgonovi.

Accademic Positions

Tenure Track at the Assistant Professor level
Catholic University, Brescia, Italy **03/2012 – Present**
Assistant Professor in Theoretical Condensed Matter

Postdoctoral Fellowship
Catholic University, Brescia, Italy **8/2009 – 3/2012**
Supervisor Dr. F. Borgonovi

Postdoctoral Fellowship
Tulane University, New Orleans, USA **8/2007 – 8/2009**
Supervisor Dr. L. Kaplan

Postdoctoral Fellowship
BUAP, Puebla, Mexico **10/2005 – 8/2007**
Supervisor Dr. F. Izrailev

Postdoctoral Fellowship
Los Alamos National Laboratory **1/2005 – 10/2005.**
Supervisor: Dr. G.P. Berman, Theoretical Division (T13).
This research was cofounded by the Catholic University of Brescia (ITALY).

Visiting Positions

FAPESP visiting position
San Carlos, San Paolo, Brazil **29/10/2015 – 25/11/2015**
Scientific collaboration with R. Bachelard.

CNRS Researcher
INLN, CNRS, Nice, France **22/09/2015 – 22/10/2015**
Scientific collaboration with U. Kuhl and R. Kaiser.

**Research
interests
and
International
collaborations**

I am the group leader, together with Prof. F. Borgonovi, of the Quantum Biology group within the *Interdisciplinary Laboratories for Advanced Materials Physics* (iLAMP):
<http://centridiricerca.unicatt.it/ilamp-quantum-biology-research-2107>

My current Research interests are the following:

Quantum transport: From photosynthetic complexes to quantum devices:

Collaborations: Prof. Fausto Borgonovi (Catholic University, Italy),
Prof. L. Kaplan (Tulane University, Usa),
Prof. G.P. Berman (Los Alamos National Laboratory, Usa),
Prof. M. Sarovar (Sandia National Laboratories, USA)
Prof. T. Brandes (TU Berlin, Germany)

Superradiance and localization in cold atoms:

Collaborations: Prof. R. Kaiser (Institut Non Lineaire de Nice, CNRS, France),

Cooperative effects and out-of-equilibrium dynamics in many-body long range systems:

Collaborations: Prof. Lea Santos (Yeshiva University, USA),

My past research interest were the following:

Statistical theory of transport in mesoscopic systems:

Collaborations: Prof. V. Zelevinsky (Michigan State University, Usa),
Prof. F. Izrailev (Universidad Autonoma de Puebla, Mexico),
Prof. L. Kaplan (Tulane University, Usa),

Magnetism in nanosystems:

Collaborations: Prof. Fausto Borgonovi (Catholic University, Italy),
Prof. Stefano Ruffo (University of Florence, Italy),

Quantum Computation and Information:

Collaborations: Prof. G.P. Berman (Los Alamos National Laboratory, Usa),
Prof. T. Prosen (University of Ljubljana, Slovenia)

Chaos and Thermalization

Collaborations: Prof. F. Izrailev (Universidad Autonoma de Puebla, Mexico),
Prof. Fausto Borgonovi (Catholic University, Italy).

**Grants,
Professional
Societies and
Activities:**

P.I. Supercomputing LISA 2011-2012: Transport in Nanosystems. With this project we obtained 50.000 hours of computation time at CILEA Supercomputing Center.

P.I. Supercomputing LISA 2010-2012: Magnetization Dynamics in Nanosystems. With this project we obtained 270.000 hours of computation time at CILEA Supercomputing Center.

Co-Organizer “10th International Workshop on Disordered System”, Brescia (Italy), June 27 -

July 1, 2016 (web site under construction).

Main Organizer Conference on "Quantum Transport and Quantum Effects in Photosynthetic Systems", Brescia (Italy), 20-21 September 2012 (<http://centridiricerca.unicatt.it/ilamp2007.html>)

Co-Organizer Conference on "Non Hermitian Hamiltonians in Open Quantum Systems: Theory and Experiment", Porquerolles (France), 21-24 May 2013 (<http://toqs2013.sciencesconf.org/>).

Referee of Physical Review Letters

Referee of Physical Review E

Referee of Physical Review A

Referee of Fortschritte der Physik - Progress of Physics

Other Activities: I have been involved in an international project commissioned by the Architectural Association, School of Architecture, London. This research project was entitled "Beyond Entropy, When Energy Becomes Form", and it promoted the collaboration of artists, architects and scientists on the theme of Energy, engaging in debates and designing prototypes which have been presented as part of the Venice Architecture Biennale in 2010. More information about the project can be found at <http://beyondentropy.aaschool.ac.uk>.

Publications:

(Citations: 356,
H-index: 11 (google
scholar))

- 34) *Non-Hermitian Hamiltonian approach to quantum transport in disordered networks with sinks: validity and effectiveness*
G.G. Giusteri, F. Mattiotti and **G. L. Celardo**
Phys. Rev. B **91**, 094301 (2015).
- 33) *A superradiance-based biological switch*
Fausto Borgonovi and **G.L.Celardo**
AIP Conf. Proc. **54**, 1619 (2014).
- 32) *Superradiance, disorder, and the non-Hermitian Hamiltonian in open quantum systems*
G.L.Celardo , A. Biella, G. G. Giusteri, F. Mattiotti, Y. Zhang and L. Kaplan AIP Conf. Proc. **64**, 1619 (2014).
- 31) *Cooperative robustness to dephasing: Single-exciton superradiance in a nanoscale ring to model natural light-harvesting systems*
G. L. Celardo, Paolo Poli, Luca Lussardi, and Fausto Borgonovi
Phys. Rev. B **90**, 085142 (2014).
- 30) *Cooperative robustness to static disorder: Superradiance and localization in a nanoscale ring to model light-harvesting systems found in nature*
G. L. Celardo, Giulio G. Giusteri, and Fausto Borgonovi
Phys. Rev. B **90**, 075113 (2014).
- 29) *A Quantum Biological Switch Based on Superradiance Transitions*
D. Ferrari, **G. L. Celardo** , G.P. Berman, R.T.Sayre, F. Borgonovi
The Journal of Physical Chemistry C **118**, 20 (2014).
- 28) *Subradiant hybrid states in the open 3D Anderson-Dicke model*
A. Biella, F. Borgonovi, R. Kaiser, **G.L. Celardo**

- EuroPhys. Lett. **103**, 57009 (2013).
- 27) *Focusing in Multiwell Potentials: Applications to Ion Channels*
L. Ponzoni and **G. L. Celardo**, F. Borgonovi, L. Kaplan, A. Kargol
Phys. Rev. E **87**, 052137 (2013).
 - 26) *Enhancement of the magnetic anisotropy barrier in critical long range spin systems*
F Borgonovi, **G.L. Celardo**,
Journal of Physics: Condensed Matter 25 **10**, 106006 (2013).
 - 25) *Interplay of superradiance and disorder in the Anderson Model*
G.L. Celardo, A. Biella, L. Kaplan and F. Borgonovi,
Fortschritte der Physik **61**, 250 (2013),
Special Issue on "Quantum Physics with Non-Hermitian Operators: Theory and Experiment".
 - 24) *Superradiance Transition in Photosynthetic Light-Harvesting Complexes*
G.L.Celardo , F. Borgonovi, V.I. Tsifrinovich, M. Merkli and G.P. Berman,
The Journal of Physical Chemistry C, **116**, 22105 (2012).
 - 23) *From closed to open 1D Anderson model: Transport versus spectral statistics*
S.Sorathia, F.M.Izrailev, V.G.Zelevinsky, **G.L.Celardo** ,
Phys. Rev. E **86**, 011142 (2012).
 - 22) *Coherent transport in multi-branch circuits*
A. Ziletti, F. Borgonovi, **G.L. Celardo** , F.M. Izrailev, L. Kaplan and V.G. Zelevinsky,
Phys. Rev. B **85**, 052201 (2012).
 - 21) *Distribution of Resonance Widths and Dynamics of Continuum Coupling,*
G.L.Celardo , N. Auerbach, F.M. Izrailev, V.G. Zelevinsky,
Phys. Rev. Lett. **106**, 042501 (2011).
 - 20) *Transport through nanostructures with asymmetric coupling to the leads.*
G. L. Celardo, A. M. Smith, S. Sorathia, V. G. Zelevinsky, R. A. Senkov, and L. Kaplan,
Phys. Rev. B **82**, 165437 (2010).
 - 19) *Dynamics of random dipoles : chaos vs ferromagnetism.*
F.Borgonovi, **G.L.Celardo**,
Journal of Statistical Mechanics-Theory and Experiment, P05013, (2010).
 - 18) *Internal chaos in an open quantum system: From Ericson to conductance fluctuations.*
S. Sorathia, F. M. Izrailev, **G. L. Celardo**, V. G. Zelevinsky and G. P. Berman,
EuroPhys. Lett. **88** 27003, (2009).
 - 17) *Superradiance transition in one-dimensional nanostructures: An effective non-Hermitian Hamiltonian formalism.*
G.L.Celardo and L. Kaplan,
Phys. Rev. B **79**, 155108 (2009).
 - 16) *Continuum Shell Model: From Ericson to conductance fluctuations.*
G.L.Celardo , S. Sorathia, F. M. Izrailev, V.G. Zelevinsky and G. P. Berman,
AIP Conf. Proc. **75**, 995 (2008).
 - 15) *Magnetic Reversal Time in Open Long Range Systems.*
F.Borgonovi, **G.L.Celardo**, B. Goncalves, L. Spadafora,
Phys. Rev. E **77**, 061119 (2008).
 - 14) *Transition from isolated to overlapping resonances in the open system of interacting fermions.*
G.L.Celardo , F.M. Izrailev, V.G. Zelevinsky and G.P.Berman, Phys. Lett B, **659**, 170 (2008).
 - 13) *Open system of interacting fermions: Statistical properties of cross sections and fluctuations.*
G.L.Celardo , V. Zelevinsky, F. Izrailev and G.P.Berman,
Phys. Rev. E., **76** 031119 (2007).

- 12) *Novel approach for fluctuating cross sections in heavy nuclei in the region of strongly overlapping resonances.*
G.P.Berman, **G.L.Celardo** , F. Izrailev and V. Zelevinsky,
LAUR 064067 (2007).
- 11) *The Topological Non-connectivity Threshold and magnetic phase transitions in classical anisotropic long-range interacting spin system.*
R. Trasarti-Battistoni, F. Borgonovi, **G.L.Celardo** ,
EPJ B, Vol. 50, 69-72, Numbers 1-2, March, (2006).
- 10) *The Topological Non-connectivity Threshold in quantum long-range interacting spin systems.*
F. Borgonovi, **G.L.Celardo** , R. Trasarti-Battistoni,
EPJ B, Vol. 50, 27-31, Numbers 1-2, March, (2006).
- 9) *Topological Non-connectivity Threshold in long-range spin systems.*
F.Borgonovi, **G.L.Celardo** , A. Musesti, R.Trasarti-Battistoni and P. Vachal,
Phys. Rev. E 73, 026116 (2006).
- 8) *Time Scale for Magnetic Reversal and The Topological Non-connectivity Threshold.*
G.L.Celardo , J.Barre, F.Borgonovi, S.Ruffo,
Phys. Rev. E 73, 011108 (2006).
- 7) *Dynamics of two quantum entangled particles interacting with a potential barrier in an EPR experiment.*
V. Petrillo, G. Alberti, **G.L.Celardo** , F. Cerutti, S. Franchi, V. Mariani,
Central European Journal of Physics 4, 196 (2006).
- 6) *Quantum Signatures of The Classical Topological Non-connectivity Threshold.*
F. Borgonovi, **G.L.Celardo** , G.P. Berman ,
Phys. Rev. B 72, 224416 (2005).
- 5) *Stability of quantum Fourier transformation on Ising quantum computer.*
G.L.Celardo , C. Pineda and M. Znidaric,
International Journal of Quantum Information, 3, 3 (2005).
- 4) *Long Range Interacting system: the Non-ergodicity Threshold*
G.L.Celardo,
Ph.D. Thesis, University of Milan, 2004.
- 3) *Broken Ergodicity in classically chaotic spin systems.*
F.Borgonovi, **G.L.Celardo** , M.Maianti, E.Pedersoli,
Journal of Statistical Physics, Vol. 116, Nos. 1435, September (2004).
- 2) *Dynamical fidelity of a solid-state quantum computation.*
G. P. Berman, F. Borgonovi, **G.L.Celardo** , F. M. Izrailev, and D. I. Kamenev,
Phys. Rev. E 66, 056206 (2002).
- 1) *Semiquantal Approach to Finite Systems of Interacting Particles.*
F. Borgonovi, **G.L.Celardo** , F. M. Izrailev, and G. Casati,
Phys. Rev. Lett. 88, 054101 (2002).

Book Chapters:

- 1) *Lorenz Strange Attractor.*
G.L.Celardo,
Chapter from the book: "Frattali in fisica", S.P. Ratti, Scientifica Acta, Pavia, 2005.

Preprints:

- 2) *Optimal efficiency of quantum transport in structured disordered systems with applications to light-harvesting complexes*
G. G. Giusteri, **G.L.Celardo** and F. Borgonovi
arXiv:1508.01613

- 1) *Cooperative Zeno shielding in many-body spin systems with long-range interaction: localization and light cone*
 L. Santos, F. Borgonovi and **G.L.Celardo**
 arXiv:1507.06649

**Teaching
experience**

- 2014/2015 Physics of Nuclei and Particles, Catholic University, Brescia, Italy.
- 2014/2015 Quantum Mechanics (Exercises), with Dr. F. Borgonovi, Catholic University, Brescia, Italy.
- 2013/2014 Physics of Nuclei and Particles, Catholic University, Brescia, Italy.
- 2013/2014 Quantum Mechanics (Exercises), with Dr. F. Borgonovi, Catholic University, Brescia, Italy.
- 2012/2013 Physics of Nuclei and Particles, Catholic University, Brescia, Italy.
- 2012/2013 Quantum Mechanics (Exercises), with Dr. F. Borgonovi, Catholic University, Brescia, Italy.
- 2011/2012 Physics of Nuclei and Particles, Catholic University, Brescia, Italy.
- 2007/2008 Classical Mechanics (Exercises), with Dr. L. Kaplan at Tulane University, USA.
- 2005/2006 Classical Mechanics (Exercises), with Dr. F. Izrailev at BUAP, Puebla (Mexico).
- 2003/2004 Mathematical Methods for Physics (Exercises), with Dr. G. Nardelli at Catholic University of Brescia, Italy.
- 2003/2004 Physics of Nuclei and Particles (Exercises), with Dr. A.Giuliani at Catholic University of Brescia, Italy.
- 2002/2003 Physics of Nuclei and Particles (Exercises), with Dr. G.Nardelli at Catholic University of Brescia, Italy.
- Supervisor, Undergraduate students: Valentina Pusceddu (Catholic University, 2004, Italy), Diego Ferrari (Catholic University, 2010, Italy), Francesco Mattiotti (Catholic University, 2013, Italy), Elisa Bernardelli (Catholic University, 2014, Italy), Eugenio Guarneri (Catholic University, 2014, Italy), Mattia Angeli (Catholic University, 2015, Italy).
- Supervisor, Master Students : Emanuele Pedersoli (Catholic University, 2002, Italy), Marco Maianti (Catholic University, 2002, Italy), Stefania Mazzoni (Catholic University, 2003, Italy), Luca Baldini (Catholic University, 2003, Italy), Angelo Ziletti (Catholic University, 2010, Italy), Luca Ponzoni (Catholic University, 2011, Italy), Alberto Biella (Catholic University, 2011, Italy), Diego Ferrari (Catholic University, 2012, Italy), Paolo Poli (Catholic University, 2013, Italy), Damiano Archetti (Catholic University, 2014, Italy), Francesco Mattiotti (Catholic University, 2015, Italy), Eugenio Guarneri (Catholic University, 2015, Italy), Mattia Angeli (Catholic University, 2015, Italy).

**Invited Talks
and
Presentations**

- IBS, PCS workshop, South Korea 07/2015
 Cooperative Zeno shielding in many-body spin systems with long-range interaction: localization and light cone
- CCT15, Chaos, complexity and transport, 06/2015
 Marseille, France
 Zeno dynamics and Cooperative Shielding from long range hopping in disordered models for quantum transport
- IQIS2014, Salerno, Italy 09/2014
 Robustness of Collective Properties to Disorder: The Case of Superradiance. Applications to Light

Harvesting Systems

Echoes in Complex Systems, Dresden, Germany Robustness of collective properties to disorder: The case of Superradiance	09/2014
COSCALI Meeting, Porquerolles, France Towards Anderson localization in cold atom clouds: interplay of opening and disorder	09/2014
9IWDS, S. Antonio, USA Robustness of Collective Properties to Disorder: The Case of Superradiance. Applications to Light Harvesting Systems	08/2014
ETC workshop, Trento, Italy Robustness of collective properties to disorder: the case of Superradiance	06/2014
Scuola Normale Superiore, Pisa, Italy Robustness of coherent emergent properties to disorder: the case of Superradiance.	02/2014
Porquerolles, TOQS, France Subradiant hybrid states in the open 3D Anderson-Dicke model	05/2013
ETC workshop, Trento, Italy Superradiance transition in light harvesting photosynthetic systems	09/2012
COSCALI Meeting, Tübingen, Germany Interplay of Superradiance and localization: from the Anderson Model to Cold Atoms.	07/2012
CNRS, INLN, Sophia-Antipolis (Nice), France Interplay of Superradiance and localization in coherent quantum transport	01/2012
Analytic and algebraic methods in physics IX, Vila Lanna, Prague Superradiance transition in coherent quantum transport: photosynthetic complexes	12/2011
Quantum Physics with Non-Hermitian Operators, Dresden MPI Superradiance transition and Transport through nanostructures	6/2011
4-th Workshop on Quantum Chaos: Theory and Applications, Castro Urdiale, Spain Superradiance transition and Transport through nanostructures	9/2010

Dynamics Days Asia Pacific (DDAP6), Sidney, Australia Ergodicity Breaking and Magnetism in Nanosystems	7/2010
NSCL, Michigan State University Superradiance and electron transport through nanosystems	8/2009
APS, March Meeting Superradiance and electron transport through nanosystems	3/2008
Dynamics and Thermodynamics of systems with long range interactions, Assisi, Italy Relevance of the Topological non-connectivity threshold in finite magnetic systems in contact with an heat bath.	7/2007
III International Puebla Workshop on complex Systems at Instituto de Fisica, BUAP, Puebla Non-Hermitian effective Hamiltonian approach to Open Quantum Systems.	8/2006
NSCL, Michigan State University Non-Hermitian effective Hamiltonian approach to Open Quantum Systems: Statistical properties of cross sections.	7/2006
LANL, T-16 Nuclear Physics Group Seminar Non-Hermitian effective Hamiltonian approach to Open Quantum Systems: Statistical properties of cross sections.	9/2005
LANL, Quantum-Lunch Seminar, T-Division Disconnected Phase Space in Long Range interacting spin systems and the emergence of Macroscopic Quantum Phenomena	6/2005
91st Statistical Mechanics Conference, Rutgers University, Broken Ergodicity and Phase Transitions in Classical and Quantum Systems with Long-Range Interaction	5/2004
XXIII Convegno di Fisica Teorica e Struttura della Materia , Fai della Paganella, Trento (Italy) Long Range interaction and Phase Transitions	2004
Como, Italy, "Fault Tolerance and Stability in Quantum Information Processing" Minimization of Errors in an Ising Spin Quantum Computer	2003

	Cic AC, Cuernavaca, Mexico, “Stability of Quantum Computation” Dynamical fidelity of a solid-state quantum computation	2003
	Cic AC, Cuernavaca, Mexico, “Chaos in Few and Many Body Problems” Chaos and Thermalization in an interacting Boson system	2002
Schools	WE-Heraeus Summer School Fast Methods for Long-Range Interactions in Complex Systems	2010
	Cic AC, Cuernavaca, Mexico Stability of Quantum Computation	2003
	Les Houches, Summer School Quantum entanglement and Information processing	2003
	Cic AC, Cuernavaca, Mexico Chaos in Few and Many Body Problems	2002
	CAMTP, University of Maribor, Slovenia Let’s face chaos through nonlinear dynamics	2002

References

Prof. Fausto Borgonovi
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Prof. Lev Kaplan
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Av. San Claudio y 18 Sur, 72570, Puebla, Mexico
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Prof. Vladimir G. Zelevinsky
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