Federico Zullo Curriculum Vitae

Personal Details

Date and Place of Birth: June 07, 1981, Campobasso (Italy).

Nationality: Italian

E-mail: federico.zullo@unibs.it

- Current position

From 12/22/2020: Professore di II fascia (Associate Professor) in Mathematical Physics at the Department of Civil Engineering, Architecture, Land, Environment and of Mathematics, University of Brescia, via Branze 38, 25123, Brescia, Italy.

From 31/05/2021: Italian National Scientific Habilitation (ASN) for the role of Full Professor in Mathematical Physics.

- Education

Ph.D. in Mathematical Physics at the Doctoral School in Mathematics and Physics, Physics Department, Roma TRE University, January 2011.

MSc (Laurea Magistrale) in Physics "cum Laude", Università "Roma Tre", September 2005.

BSc (Laurea) in Physics "cum Laude", Università "Roma Tre", July 2003

High School Diploma from Liceo Scientifico "A. Romita", Campobasso, 2000.

- Awards, Distinctions and Fellowships.

- Marie Curie INdAM-COFUND Fellowship (2012-2014).
- Winner of the "Premio Galluzzi per la Fisica" (2005).

- Research Experience.

✓ RTDB (tenure track researcher), in Mathematical Physics at the Department of Civil Engineering, Architecture, Land, Environment and of Mathematics, University of Brescia, via Branze 38, 25123, Brescia, Italy.

PostDoctoral Research:

- ✓ "Incarico occasionale di ricerca" (temporary research grant), Mechanical and Aerospace Engineering, Università of Roma "La Sapienza" July-September 2017.
- Researches on the extension of thermodynamic functions to non-equilibrium systems.
- ✓ "Incarico occasionale di ricerca" (temporary research grant), Mathematics and Physics Department, Roma Tre University. July 2016.
- Theory and application of the classical and quantum Backlund transformations to integrable systems.
- ✓ "Incarico occasionale di ricerca" (temporary research grant), Mathematics and Physics Department, Roma Tre University. From June to August 2015.
- Theory and application of the concept of "algebraic entropy" to discrete maps.
- "Assegnista di ricerca", Mathematics and Physics Department, Roma Tre University and INFN, Istituto Nazionale di Fisica Nucleare, Section of Roma Tre. January 2014 - January 2015.
- Painlevé equations. Partial results on the Mittag-Leffler expansion for solutions of Painlevé II and IV equations.
- Classical and quantum Bäcklund transformations. Results on the quantum Ablowitz-Ladik chain and the corresponding Baxter's Q operator.
- ✓ Marie Curie INdAM COFUND, School of Mathematics, Statistics and Actuarial Science, University of Kent and Mathematics and Physics Department, Roma Tre University. 2012-2014.
- Painlevé equations. Analytical and numerical works show the Mittag-Leffler expansion of solutions of Painlevé I equation, recurrences for the coefficients of the Taylor expansion of the τ function, symmetries of poles of particular solutions.
- Bäcklund transformations theory applied to integrable systems, ordinary and partial differential equations. Analytical and numerical works show how to obtain exact discretizations of the Toda lattice and Ablowitz-Ladik hierarchy with Bäcklund transformations; how, in simple cases, the Baxter's operator is linked with the Green's function of the Schrödinger operator.

Other Academic collaborations

- ✓ Department of Mechanical Engineering of the University of Roma "La Sapienza", 2010-present (with Prof. Enrico Sciubba).
- Development of population dynamics models on the basis of Thermodynamic principles with applications to sustainability. Construction of exergy-based models of population dynamics: analytical and numerical studies and comparison with experimental data confirm the relevance of Thermodynamics in applications to sustainability issues.
- ✓ Department of Basic and Applied Sciences for Engineering of the University of Roma "La Sapienza", 2017-present (with Prof. Sandra Carillo).
- Applications of the theory of Backlund transformations to nonlinear ordinary differential equations of second order, in particular to the Emden-Fowler equation and the Ermakov-Pinney equation.

Doctoral Research:

- ✓ Department of Physics, Roma Tre University, 2007-2011. (research advisor: Prof. Orlando Ragnisco).
- Bäcklund transformations theory applied to integrable systems and ordinary differential equations. Analytical and numerical works show how to obtain Bäcklund transformations for Gaudin models and how these transformations discretize the continuous equations.

- Editorship.

Member of the Editorial Board of *Energies* (Topic Editor), <u>https://www.mdpi.com/journal/energies</u>

- Edited Journal Issues

Guest Editor (with Giorgio Gubbiotti, Orlando Ragnisco and Paolo Maria Santini) Special Issue in Memory of Professor Decio Levi, Open Communications in Nonlinear Mathematical Physics, 2024. https://ocnmp.episciences.org/page/special-issues

Patents

Patent n. 102021000018074 of 20/07/2023. Title Cassone Alare e Sistema e Metodo per il Monitoraggio del Cassone Alare.

Patent n. 102021000015437 of 04/09/2023. Title Diodo Termico.

- Selected Service Activities

Reviewer for different international journals, including: *Entropy* (in the Reviewer Board), *Journal of Physics A: Mathematical and Theoretical, Physics Letters A, Physics Scripta, PLOS ONE, AIMS Mathematics, International Journal of Heat and Mass Transfer, Mathematical Reviews, European Journal of Sustainable Development Research, European Physical Journal Plus.*

REPRISE expert (Register of Expert Peer Reviewers for Italian Scientific Evaluation), from 2018

- Teaching Experience.

University courses

2020-2021

Course "Meccanica Razionale" (Analytical Mechanics), University of Brescia, Department of Civil Engineering, Architecture, Land, Environment and of Mathematics.

Course "Probabilità e Statistica" (Probability and Statistics), University of Brescia, Department of Information Engineering.

Course "Probabilità e Statistica" (Probability and Statistics), University of Brescia, Department of Mechanical and Industrial Engineering

2019-2020

Course "Meccanica Razionale" (Analytical Mechanics), University of Brescia, Department of Civil Engineering, Architecture, Land, Environment and of Mathematics.

Course "Probabilità e Statistica" (Probability and Statistics), University of Brescia, Department of Information Engineering.

2018-2019

Course "Meccanica Razionale" (Analytical Mechanics), University of Brescia, Department of Civil Engineering, Architecture, Land, Environment and of Mathematics.

Course "Probabilità e Statistica" (Probability and Statistics), University of Brescia, Department of Information Engineering.

2017-2018

Course "Meccanica Razionale" (Analytical Mechanics), University of Brescia, Department of Civil Engineering, Architecture, Land, Environment and of Mathematics.

Course "Probabilità e Statistica" (Probability and Statistics), University of Brescia, Department of Information Engineering.

2016-2017

Teaching assistant for the course "Meccanica Razionale" (Analytical Mechanics), University of Roma La Sapienza, Department of Basic and Applied Sciences for Engineering

2015-2016

Teaching assistant for the graduate course "Complementi di Metodi Matematici della Fisica" (Mathematical methods of Physics) at Roma Tre University, Department of Mathematics and Physics.

2014-2015

Teaching assistant for the graduate course "Complementi di Metodi Matematici della Fisica" (Mathematical methods of Physics) at Roma Tre University, Department of Mathematics and Physics.

2012-2013:

University of Kent, School of Mathematics, Statistics and Actuarial Sciences, Canterbury (UK), teaching assistant for the course graduate course "Nonlinear Waves" (Spring term).

University of Kent, School of Mathematics, Statistics and Actuarial Sciences, Canterbury (UK), teaching assistant for the undergraduate course "Mathematics in Biology" (Spring term).

2011-2012:

Teaching assistant for the graduate course "Complementi di Metodi Matematici della Fisica" (Mathematical methods of Physics) at Roma Tre University, Department of Physics.

Teaching assistant for the undergraduate course "Elementi di Analisi per Ottici, parte A" (Elements of Analysis for Opticists, part A) at Roma Tre University, Department of Physics.

2010-2011

Teaching assistant for the graduate course "Complementi di Metodi Matematici della Fisica" (Mathematical methods of Physics) at Roma Tre University, Department of Physics.

2009-2010:

Teaching assistant for the graduate course "Complementi di Metodi Matematici della Fisica" (Mathematical methods of Physics) at Roma Tre University, Department of Physics.

Teaching assistant for the undergraduate course "Elementi di Analisi per Ottici, parte A" (Elements of Analysis for Opticists, part A) at Roma Tre University, Department of Physics.

Summer Schools

- 2012-2013: Instructor at the Summer School of Thermodynamics, University of Roma "La Sapienza, Roma, Italy (11 July-23 July 2013).
- 2011-2012: Instructor at the Summer School of Thermodynamics, University of Roma "La Sapienza, Anzio, Italy (24 June-6 July 2013).

Thesis supervisor:

- "Tesi Magistrale" in Physics, academic year 2012-2013, Università Roma Tre (together with two other advisors: A.N.W. Hone and O. Ragnisco).
- "Dissertation" in Mathematics, academic year 2012-2013, University of Kent.

Other teaching experience:

 2005-2016: Taught as temporary teacher of Mathematics, Science and Physics in different High Schools in Roma.

Workshop organization

- Co-organizer of the workshop "Hamiltonian Systems in finite and infinite dimensions" held at Roma Tre University in the October 2013.
- Organizer of the workshop "Three days on Painlevé equations and their applications" held at Roma Tre University in the December 2014.
- Co-organizer of the mini-symposium "Mathematical modelling in materials with memory and nonlinear phenomena" in MASCOT 2018, 15th Meeting on Applied Scientific Computation and Tools, held at Roma La Sapienza University, October 2018.
- Co-organizer (with S. Carillo and G. Filipuk) of the mini-symposium "Differential equations, dynamical systems and applications" VIII Congress of the European Mathematical Society, 6-12 July 2020 (postponed to 20-26 June 2021 for COVID)
- Co-organizer (with S. Carillo and G. Filipuk) of the special session "Nonlinear difference and differential problems, transformations, homogenization techniques & applications", ICDEA 2022, 27th International Conference on Difference Equations and Applications.
- Co-organizer (with S. Carillo and G. Filipuk) of the special session "Linear And Nonlinear Models In Applied Mathematics", IMACS 2023, 21th IMACS World Congress, 11-15 settembre 2023.

Grants, fellowships...

2017: Research fellowship (Incarico occasionale di ricerca) "Modelli di calcolo dell'exergia di nonequilibrio in sistemi macroscopici", Mechanical and Aerospace Engineering Department, La Sapienza University, two months. **2016**: Research fellowship (Incarico occasionale di ricerca) "Sistemi integrabili e super integrabili, classici e quantistici, continui e discreti e loro applicazioni", Mathematics and Physics Department, Roma Tre University, one months.

2015: Research fellowship (Incarico occasionale di ricerca) "Sistemi integrabili e super integrabili, classici e quantistici, continui e discreti e loro applicazioni", Mathematics and Physics Department, Roma Tre University, three months.

2014: Research Grant (Assegno di ricerca) "Sistemi hamiltoniani integrabili finito- e infinito-dimensionali", Mathematics and Physics Department, Roma Tre University and INFN, one year.

2012: INdAM (Istituto Nazionale di Alta Matematica) Fellowship in Mathematics for experienced researchers cofunded by Marie Curie actions, two years.

2009: INFN (Italian National Institute of Nuclear Physics) Fellowship for PhD students, two years.

The researches carried out at Roma Tre University from 2008 to 2011 were part of a MIUR (Italian Ministry for University and Research) project, PRIN, national coordinator B. Dubrovin.

Membershisps, Collaborations...

- From 2017: Member of the "Seminario Matematico di Brescia"
- 2013-2014: Junior Membership to the I.N.I. (Newton Institute for Mathematical Sciences), Cambridge.
- From January 2009: member of G.N.F.M. (Gruppo Nazionale di Fisica Matematica, Italian National Group of Mathematical Physics).
- 2008-2015 and since 2020: scientific association to I.N.F.N. (Istituto Nazionale di Fisica Nucleare, Italian national institute of nuclear physics).
- From 2006 to 2007: Research Spin Off at E.N.E.A. (Italian Agency for Energy & Environment) for the development of optical fiber bragg grating sensors.

✓ Publications

Research articles

- Ragnisco O., Zullo F.: "Continuous and Discrete (Classical) Heisenberg Spin Chain revised", SIGMA (Symmetry, Integrability and Geometry: Methods and Applications) 3, 033, (2007).
- Ragnisco O., Zullo F.: "Bäcklund Transformations for the Trigonometric Gaudin Magnet: first results" SIGMA (Symmetry, Integrability and Geometry: Methods and Applications) 6, 012, 6 pages, (2010).
- Ragnisco O., Zullo F.: "Bäcklund transformations as exact integrable time-discretizations for the trigonometric Gaudin model." *Journal of Physics A: Mathematical and Theoretical.* 43, 434029, (2010).
- Sciubba E., Zullo F.: Exergy based population dynamics: a thermodynamic view of the sustainability concept, *Journal of Industrial Ecology*, **15**, Issue 2, pp. 172–184, (2011).

- Sciubba E., Zullo F.: Is Sustainability a Thermodynamic concept?, *International Journal of Exergy*, 8, No.1 pp. 68 85 (2011).
- Ragnisco O., Zullo F.: "Bäcklund Transformation for the Kirchhoff Top" SIGMA (Symmetry, Integrability and Geometry: Methods and Applications), 7, 001, 13 pages, (2011).
- Zullo F.: "Bäcklund Transformation for the elliptic Gaudin model and a Clebsch system", *Journal of Mathematical Physic*, 52, 073507 (2011).
- Ragnisco O., Zullo F.: "Quantum Bäcklund Transformation: some ideas and examples", contribution to the conference *Solitons in 1+1 and 2+1 dimensions, DS, KP and all that,* Lecce, 2011 September 13-14, in *Theoretical and Mathematical Physics*, **172** (2): 1159-1170 (2012).
- Sciubba E., Zullo F.: "An Exergy-Based Model for Population Dynamics: Adaptation, Mutualism, Commensalism and Selective Extinction", *Sustainability*, 4 (10), 2611-2629, doi:10.3390/su4102611, (2012).
- Sciubba E., Zullo F.: "Stability and periodic solutions in an exergy-based model of population dynamics", contribution to Proceedings of ECOS 2012, 25th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems June 26-29, 2012, Perugia, Italy. Published in *Energy*, 58, 1, pp. 202–209, (2013).
- Zullo F.: "Bäcklund transformations and Hamiltonian flows", *Journal of Physics A: Mathematical and Theoretical*, 46, 145203, doi:10.1088/1751-8113/46/14/145203, (2013).
- Sciubba E., Zullo F.: "On the Optimal use of shared exergy resources." contribution to Proceedings of *ECOS 2013*, International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems June 16-19, Guilin, China (2013).
- Hone A.N.W., Ragnisco O., Zullo F.: "Properties of the series solution for Painlev'e I" *Journal of Nonlinear Mathematical Physics*, Special Issue "The Geometry of the Painlevé Equations", 20, Supplement 1, doi:10.1080/14029251.2013.862436, (2013)
- Zullo F.: "On an integrable discretisation of the Ablowitz-Ladik hierarchy", *Journal of Mathematical Physics*, 54, 053515 (2013).
- Sciubba E., Zullo F.: "An Exergy-based analysis of the co-evolution of different species sharing common resources", *Ecological Modelling*, 273, pp 277–283, (2014).
- Zullo F.: A q-difference Baxter's operator for the Ablowitz-Ladik chain. J. Phys. A: Math. Theor. 48 125205 doi:10.1088/1751-8113/48/12/125205. (2015)
- Hone A., Ragnisco O., Zullo F.: Algebraic entropy for algebraic maps. Under review for J. Phys. A: Math. Theor.
- F. Zullo: "Entropy Production in the Theory of Heat Conduction in Solids", *Entropy*, **18** (3), 87; doi:10.3390/e18030087, 2016
- Sciubba E., Zullo F: Minimum Exergy Flow of Isolated Populations: Theory and Experiments, International Journal of Thermodynamics, Vol. 19 (No. 4), pp. 226-233, 2016, doi: 10.5541/ijot.5000205311.
- Sciubba E. Zullo F: Exergy Dynamics of Systems in Thermal or Concentration Non-Equilibrium, Entropy 2017, 19(6), 263; doi:10.3390/e19060263

- E. Sciubba, F. Zullo: A novel derivation of the time evolution of the entropy for macroscopic systems in thermal non-equilibrium, *Entropy* 2017, 19(11), 594; doi:10.3390/e19110594
- Hone A.N.W, Zullo F.: A Hirota bilinear equation for Painlevé transcendents PIV, PII and PI, Random Matrices: Theory and Applications, Vol. 7, No. 2, (2018) 1840001 (15 pages). doi:10.1142/S2010326318400014
- Carillo S., Zullo F: Ermakov-Pinney and Emden-Fowler equations: new solutions from novel Bäcklund transformations, *Theoretical and Mathematical Physics*, September 2018, Volume 196, Issue 3, pp 1268–1281, doi:10.1134/S0040577918090027. Russian version in *Teoreticheskaya i Matematicheskaya Fizika*, Vol. 196, No. 3, pp. 373–389, 2018.
- Carillo S., Zullo F.: The Gross–Pitaevskii equation: Bäcklund transformations and admitted solutions, in *Ricerche di Matematica*, 2018, doi:10.1007/s11587-018-0422-8.
- Sciubba E., Zullo F.: On the quantification of non-equilibrium exergy for thermodynamic systems evolving according to Cattaneo's equation, *International Journal of Thermodynamics*, 22 (1), 19-24, 2019, DOI: 10.5541/ijot.515606
- Zullo F.: On the solutions of the Airy equation and their zeros, accepted for publication in *De Gruyter Proceedings in Mathematics*
- E. Sciubba, Zullo F.: A general model for the evolution of non-equilibrium systems, Energy, 2019, https://doi.org/10.1016/j.energy.2019.05.178

- F. Zullo: On the dynamics of the zeros of solutions of the Airy equation, *Mathematics and Computers in Simulation*, 2019, DOI: 10.1016/j.matcom.2019.07.002
- MG. Naso, E. Vuk, F. Zullo: On the optimization of heat rectification in graded materials, International Journal of Heat and Mass Transfer, Volume 143, 2019, 118520
- F. Zullo: A Numerical Method to Estimate the Peak of New Infected and the SARS-CoV-2 Outbreak in Italy, Organisms, Vol. 4, No. 2 (2020) ISSN: 2532-5876, DOI: 10.13133/2532-5876/16990
- I. Bochicchio, M.G. Naso, E. Vuk, F. Zullo: Convecting-radiating fins: Explicit solutions, efficiency and optimization, <u>Applied Mathematical Modelling</u>, <u>Volume 89, Part 1</u>, January 2021, Pages 171-18
- C. Giorgi, F. Zullo: Entropy Rates and Efficiency of Convecting-Radiating Fins, *Energies* 2021, 14(6), 1643; https://doi.org/10.3390/en14061643
- Carillo, S., Chichurin, A., Filipuk, G., Zullo F: A short note on the Painlevé XXV–Ermakov equation, Applied Mathematics Letters, 2022, 131, 108064
- Zullo F., Giorgi C.: On the Optimal Shape and Efficiency Improvement of Fin Heat Sinks. ENERGIES, vol. 16, ISSN: 1996-1073, 2023, doi: 10.3390/en16010316
- Carillo, S., Chichurin, A., Filipuk, G., Zullo F: Schwarzian derivative, Painlevé XXV–Ermakov, equation, and Bäcklund transformations, Mathematische Nachrichten, 2023, DOI: 10.1002/mana.202200180
- A. N. W. Hone, J. A. G. Roberts, P. Vanhaecke, and F. Zullo: Integrable maps in 4D and modified Volterra lattice, Open Communications in Nonlinear Mathematical Physics, Special Isuue in memory of Decio Levi, 2024.

Proceedings

- Sciubba E., Zullo F: "Stability and periodic solutions in an exergy-based model of population dynamics" Proceedings of the 25th International Conference on Efficiency, Cost, Optimization and Simulation of Energy Conversion Systems and Processes, ECOS 2012. Aabo Akademi University, Vol. 8, p. 179-192 14 p., 2012.
- Sciubba E., Zullo F: "An exergy-based model for population dynamics: cooperative vs. parasitic behavior", *Proceedings of the ASME 2012 International Mechanical Engineering Congress & Exposition IMECE2012*, November 9-15, 2012, Houston, Texas, USA.
- Sciubba E., Zullo F: "On the optimal use of shared exergy resources" Proceedings of the 26th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems, ECOS 2013. China International Conference Center for Science and Technology.
- Sciubba E., Zullo F: "A contribution to the systematic quantification of the resource flow needed to sustain a given population dynamics" *Proceedings of the 27th International Conference on*

Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems, ECOS 2014. June 15-19, 2014, Turku, Finland.

- Sciubba E Zullo F: Exergy dynamics of systems in thermal non-equilibrium, *Conference on Energy Systems*, Istanbul 2015, 23-25 December 2015, Yildiz Technical University, ISBN: 978-605-65907
 0-2, proceedings available at http://www.ices2015conference.com/ProceedingsCD/ICES2015 Proceedings.pdf
- Sciubba E Zullo F: "Exergy dynamics of a sphere undergoing a non-equilibrium concentration transient", 29th international conference on Efficiency, Cost, Optimisation, Simulation and Environmental Impact of Energy Systems June 19. - 23. 2016, Portorož, Slovenia
- Sciubba E., Zullo F.: Exergy and entropy of non-equilibrium systems, 30th international conference on Efficiency, Cost, Optimisation, Simulation and Environmental Impact of Energy Systems, July 2-9, 2017, San Diego, CA, USA
- Sciubba E., Zullo F.: Exergy for systems in thermal non-equilibrium evolving according to Cattaneo's equation. 31th international conference on Efficiency, Cost, Optimisation, Simulation and Environmental Impact of Energy Systems, June 17-21 2018, Guimaraes, Portugal.
- C. Giorgi, F. Zullo: On the entropy production of fins, *Proceedings of the First World Energy Forum*, Roma, Italy, 14.09-05.10 2020 (online conference).
- S. Carillo, M.G. Naso, E. Vuk, and F. Zullo: Non rectification of heat in graded Si-Ge alloys, to appear in Advances in Nonlinear Dynamics - Proceedings of the Second International Nonlinear Dynamics Conference (NODYCON 2021), V.1
- G. Filipuk, T. Kecker, F. Zullo: On a regularization of a nonlinear differential equation related to the non-homogeneous Airy equation, to appear in the Proceedings of the Contemporary Mathematics in Kielce 2020, Jan Kochanowski University in Kielce, Poland

Popular Science articles.

- F. Zullo: "Solitoni e fibre ottiche" in "Quaderni di scienza e scienziati molisani" n. 1, Settembre 2006.
- F. Zullo: "Una nuova generazione di sensori" in "Quaderni di scienza e scienziati molisani" n. 2, Marzo 2007.
- F. Zullo: "Sull'utilità del concetto di varietà in fisica" in "Quaderni di scienza e scienziati molisani" n. 3 Settembre 2007.
- F. Zullo: "L'equazione di Korteweg de Vries" in "Quaderni di scienza e scienziati molisani" n. 4 Marzo 2008.
- F. Zullo: "Matematica, teoria dei gruppi e realtà fisica" in "Quaderni di scienza e scienziati molisani" n. 5 Settembre 2008.
- F. Zullo: "Uno sguardo alla teoria del caos: come si fanno le previsioni del tempo?" in "Quaderni di scienza e scienziati molisani" n. 6 Marzo 2009.

- F. Zullo: "Sostenibilità, Exergia e modelli di Lotka-Volterra" in "Quaderni di scienza e scienziati molisani" n. 8 Marzo 2010.
- F. Zullo: "Dimensioni, frattali e traiettorie quantistiche" in "Quaderni di scienza e scienziati molisani" n. 9 Settembre 2010.
- F. Zullo: "Sulle trasformazioni di Bianchi Bäcklund" in "Quaderni di scienza e scienziati molisani" n. 10 marzo 2011.
- F. Zullo: "Teoria di Hamilton-Jacobi, trasformazioni di Bianchi-Bäcklund e meccanica quantistica" n 12, Marzo 2012.
- F. Zullo: "Un viaggio tra le funzioni di Weierstrass e Painlevé. I." in "Quaderni di scienza e scienziati molisani" n 14, Marzo 2013.
- F. Zullo: "Un viaggio tra le funzioni di Weierstrass e Painlevé. II." in "Quaderni di scienza e scienziati molisani" n 15, Settembre 2013.
- F. Zullo: "Dall'analisi matematica alla geometria attraverso ricorrenze numeriche" in "Quaderni di scienza e scienziati molisani" 17-18, Settembre 2014.
- F. Zullo: Sulla produzione di entropia nei sistemi fisici, in"Quaderni di scienza e scienziati molisani", 2017

✓ Main Workshops, Conferences, Invited Talks...

- 19/02/2009-21/02/2009 Workshop Nonlinear Waves and Integrable Systems, Physics Department, Roma Tre University, Roma Tre (Italy).
- From 14/09/09 to 19/09/09: XXXIV Summer School of Mathematical Physics, Ravello, Italy.
- From 01/10/09 to 03/10/09: National Meeting of the Italian Group of Mathematical Physics (GNFM), Montecatini Terme, Italy. Talk "*Bäcklund Transformations for the trigonometric Gaudin model*".
- From 17/06/2010 to 19/06/2010: XIXth International Colloquium on Integrable Systems and Quantum symmetries, Prague, Czech Republic, Plenary talk "An exact time discretization for the partially anisotropic Clebsh system via Bäcklund transformation for the trigonometric Gaudin Model".
- From 19/07/2010 to 23/07/2010 "London Mathematical Society and EPSRC Short Instructional Course on Classical & Quantum Integrable Models", Canterbury, University of Kent.
- 21/10/2010: Invited talk "*Bäcklund transformations for the elliptic Gaudin magnet*", University of "Milano-Bicocca", Department of Mathematics, Milano Italy.
- From 18/07/2011 to 22/07/2011: Workshop *Discrete Integrable Systems*, Leiden, Holland, Lorentz Center. Talk: "*Bäcklund transformation and time-discretizations for the elliptic Gaudin Model*".
- From 26/07/2011 to 29/07/2011: Conference Finite Dimensional Integrable Systems in Geometry and Mathematical Physics, Jena, Germany. Talk: "Separation of variables, Bäcklund transformations and "spectrality property" for finite dimensional integrable systems".

- From 27/09/2011 to 01/10/2011: Bi-Hamiltonian Systems and All That, Conference in honour of Franco Magri's 65th birthday, University of "Milano-Bicocca", Department of Mathematics, Milano Italy. Talk: "Exact time discretisations via Bäcklund transformations: general ideas and examples".
- 15/12/2011: Invited talk "*Exergy-driven population dynamics*", Dep. of Electronic Engineering, Dep. of Physics & INFN (Italian National Institute of Nuclear Physics), Roma Tre University.
- From 16/04/2012 to 19/04/2012: British Mathematical Colloquium & Mathematical Physical Workshop, University of Kent, Canterbury, Kent.
- From 10/07/2012 to 15/07/2012: *Euroscience Open Forum & Marie Curie Actions Conference*, Dublin, Ireland.
- From 4/10/2012 to 6/10/2012: National Meeting of the Italian Group of Mathematical Physics (GNFM), Montecatini Terme, Italy. Talk "*Backlund transformations and hamiltonian flows*."
- 12/10/2012: Invited talk: "Backlund Transformations and exact discretization, some ideas and an example", University of Leeds, Faculty of Mathematics and Physical Sciences, Leeds (UK).
- From 3/12/2012 to 7/12/2012: Conference "Algebraic Structures in Integrable Systems", Moscow (Russia). Poster "*Properties of the series solution for Painlevé I*".
- From 6/02/2013 to 8/02/2013: Conference "Nonlinear Waves and Integrable Systems", Trieste, SISSA (Italy). Talk "Bäcklund transformations and exact discretisation: a Hamiltonian perspective".
- From 15/03/2013 to 16/03/2013: Workshop "Integrable Algorithms: New Frontiers in Numerical Analysis" University of Leeds, Faculty of Mathematics and Physical Sciences, Leeds (UK).
- From 12/06/2013 to 15/06/2013: "Third International Conference Nonlinear Waves, Theory and Applications", Beijing (China). Invited talk: "*Hamiltonian flows from Bäcklund Transformations: an application to the Ablowitz-Ladik hierarchy.*"
- From 8/07/2013 to 12/07/2013: "Discrete Integrable Systems A Follow-up Meeting", Cambridge (UK), Isaac Newton Institute for Mathematical Sciences.
- From 24/10/2013 to 25/10/2013: "Hamiltonian Systems in finite and infinite dimensions", Roma, Roma Tre University, Math. And Phys. Dept., Talk: "Properties of series solution for Painlevé I".
- From 18/11/2013 to 21/11/2013: research visitor at SISSA (Scuola Internazionale Superiore di Studi Avanzati), Trieste. Invited talk: "Properties of series solution for Painlevé I and beyond".
- From 15/05/2014 to 17/05/2014: National Meeting of the Italian Group of Mathematical Physics (GNFM), Montecatini Terme, Italy. Talk "Alcune proprietà delle soluzioni delle equazioni di Painlevé"
- From 18 to 20 June 2014: "Geometric and Analytic Aspects of Integrable and nearly-Integrable Hamiltonian Systems" Milano-Bicocca University. Talk: *Properties of the series solutions for Painlevé transcendent*.
- From 14 to 18 July 2014: XXXth International Colloquium on Group Theoretical Methods in Physics, Ghent University, Belgium. Talk: Properties of the series solutions for Painlevé transcendents: from P_{IV} to P_I through P_{XXXIV}.

- From 1 to 5 September 2014: "Recent Advances in Quantum Integrable Systems 2014", Institut de Mathématiques de Bourgogne, Dijon, France. Talk: "A q-difference Baxter's operator, Backlund transformations and the Ablowitz-Ladik chain".
- From 18 to 19 September 2014: "Integrable systems and all that", Dipartimento di Matematica e Fisica E. De Giorgi, Università del Salento. Talk: "*Baxter's operator and quantum Bäcklund transformations for the Ablowitz-Ladik chain*".
- From 18 to 20 December 2014: "Three days on Painlevé equations and their applications", Dipartimento di matematica e Fisica, Università Roma Tre. *Introductory talk to the discussion*.
- From 13 to 17 February 2017: Asymptotic and computational aspects of complex differential equations, Pisa, Italy. With the support of the Centre de recherches mathématiques Université de Montréal. Invited speaker.
- From 25 May to 27 May, 2017: Continuum physics: a "rational" approach, in celebration of Angelo Morro's 70th birthday and in honour of his contributions to continuum physics, Brescia, Italy. Invited speaker
- From 2 to 6 July, 2018: congress of the Italian Society of Applied and Industrial Mathematics (SIMAI). Talk: *Properties and applications of Backlund transformations to a class of nonlinear ODES*.
- From 10 to 15 of September 2018: Complex Differential and Difference Equations, CDDE 2018, Będlewo, Poland. Talk: *On the solutions of the Airy equation*
- From 2 to 5 October 2018: MASCOT 2018, 15th Meeting on Applied Scientific Computation and Tools. Talk: On the zeros of entire functions.
- From 20 to 24 May 2019: International Conference on Elliptic and Parabolic Problems, Gaeta, Italy. Talk: *On the optimization of heat rectification in graded materials*.
- From 16th to 20th September 2019: DEA 2019, Dynamics equations and applications, Krakow, Polonia. Talk: On the dynamics of the zeros of solutions of Airy equation (and beyond)
- From 29th to 30th June, 2020: Formal and analytic solutions of diff. equations on the Internet (FASnet20), School of Architecture of the University of Alcalá, online conference. Talk: Notes on the zeros of the solutions of the nonhomogeneous Airy's equation
- From 14th September to 5th October, 2020: First World Energy Forum: Current and Future Energy Issues, La Sapienza University, Roma, online conference. Slides presentation: "On the entropy production of fins.
- From 16 to 19 Febbraio 2021: NODYCON 2021, Second International Non-Linear Dynamics Conference (online), Roma, Sapienza University. talk: Non-heat rectification ingraded Si-Ge alloys.
- From 18 to 25 May 2021: ARA focus week on Painlevé equations and related conformal theories, Isaac Newton Institute, Cambridge (UK)
- From 14 to 18 June 2021: JETC 2021, Joint European Conference on Thermodynamics, Praga, (online), talk: Convecting-radiating fins: explicit solutions and efficiency.
- From 20 to 26 June 2021: 8th European Congress of Mathematics, Portorose, Slovenia (online), talk: Non-linear convecting radiating fins: solutions, efficiency, entropy.

- From 28 June to 02 July 2021: Formal and analytic solutions of diff. equations on the Internet (FASnet20), School of Architecture of the University of Alcalá, conferenza online. Talk: The trigonometric Airy functions (homogeneous and inhomogeneous.
- From 28 June to 02 July 2021: Integrable Systems in Geometry and Mathematical Physics, Conference in Memory of Boris Dubrovin (online), SISSA, Trieste.
- Talk: Thermal diodes from graded materials, "Inter-University Meeting in Math Phys", Brescia, 04/07/2022
- Talk: Recursions and evolutions for zeros of entire functions, ICDEA 2022, 27th International Conference on Difference Equations and Applications 18-22 July 2022, Paris-Saclay, France (online)
- Talk: Schwarzian derivative, PXXV-Ermakov equation and Bäcklund transformations, Workshop "Mathematical Methods of Nonlinear Physics", Otranto 18-21 September 2022.
- Talk: Schwarzian derivative, PXXV-Ermakov equation and Bäcklund transformations, alla conferenza "International Conference on Nonlinear Analysis and Applications", ADBU, Guwahati, India, Assam Don Bosco University, il 22-23 November 2022
- Talk: Entropy, efficiency and optimization of fin heat sinks, JETC 2023, Joint European Thermodynamic conference, Salerno, 12-17 June 2023.
- Talk: About the zeros of the Lommel functions, IMACS 2023, 21th IMACS World Congress, Roma, 11-15 september 2023,

Brescia, 01/2024