Alessandro Portaluri

Curriculum Vitae

Largo Paolo Braccini, 2
10095 Grugliasco, Turin (Italy)
alessandro.portaluri@unito.it
https://portalurialessandro.wordpress.com/

Full Professor of Mathematics, Ph.D
University of Turin
Visiting Professor of Mathematics
New York University Abu Dhabi

Personal Information

Place and date of birth	Maglie (Lecce, Italy), October 29, 1975
Language skills	Italian (native), English and Portuguese (fluent), Spanish (Intermediate)
Citizenship	Italian citizen
Civil Status	Separated

Position held

Aug 2024 – present	*Visiting Professor of Mathematics.* New York University Abu Dhabi(Abu Dhabi, UAE)
Jan 2023 – present	*Full Professor of Mathematics.* University of Turin (Turin, Italy)
Mar 2016 – Dec 2022	*Associate Professor of Mathematics.* University of Turin (Turin, Italy)
Oct 2012 – Feb 2016	*Researcher of Mathematics.* University of Turin (Turin, Italy)
Jan 2009 – Sep 2012	*Researcher of Mathematics.* University of Salento (Lecce, Italy)
Jan 2005 – Dec 2008	*Postdoc position.* University of Milano-Bicocca (Italy)
Jun 2003 – Dec 2003	*Visiting position.* Universidade de São Paulo (Brazil)

Formation

Mar 2000 – May 2004	PhD student in Mathematics at the University of Genova. Advisor: Prof. Jacobo Pejsachowicz (Polythecnic of Turin). PhD degree obtained May 03, 2004. PhD thesis (in English): *Morse index theorem and bifurcation of semi-Riemannian geodesics.*
Oct 1994 – Jul 1999	Student of Mathematics at the University of Pisa. Advisor: Prof. M.K.V. Murthy. Laurea thesis (in Italian)*Stime di Strichartz per l'equazione delle onde con dati iniziali di energia finita.*

Grants

2023 (PRIN 2022). Research project: *" Stability in Hamiltonian dynamics and beyond".* PI. prof. Alfonso Sorrentino

2022 (GNAMPA 2022). Research project: *"Dinamica simbolica e soluzioni periodic he per problemi singolari della Meccanica Celeste".* PI. Dr. G. Canneori

2017 FFABR. Finanziamento Ricerca di Base. PI. Prof. A. Portaluri

2013 – 2018 (ERC Advanced Grant). Research Project *"Complex Patterns for Strongly Interacting Dynamical Systems (COMPAT).* PI. Prof. S. Terracini. Advanced Grant 2013, N. 339958

2017 – 2020 (PRIN 2015). Research Project *"Variational methods, with applications to problems in mathematical physics and geometry".* PI.Prof. A. Malchiodi

2014 – 2017 (PRIN 2012). Research project: *"Aspetti variazionali e perturbativi nei problemi differenziali nonlineari."* PI.Prof. S. Terracini

2012 (GNAMPA 2012). Research project: *"Indice e di Maslov per operatori differenziali in dimensione finita e infinita".* PI. Dr. Roberta Fabbri

2011 (5x1000) per la ricerca dell'University of Salento. Research project: *"Collisioni fra vortici puntiformi e fra filamenti di vorticità: singolarità, trasporto e caos".* PI Dr. A. Portaluri

2011 – 2013 (PRIN 2009). Research project: *"Equazioni ellittiche non lineari in mancanza di compattezza, dinamica simbolica e moti parabolici per il problema degli N corpi."* PI. Prof. S. Terracini

Mentoring

Visiting scholars

2022 – 2023 *Ran Yang*, "Quantal reflections of chaos and semi-classical trace formulas (QCSCTF)", East China University of Technology, Nanchang, Jiangxi, China

.

Postdocs

2016 – 2018 *Li Wu,* "Index theories for singular differential operators and trace formulae", Department of Mathematics of the Shandong University (Jinan, China). (Coadvisor prof. Xijun Hu, University of Shandong)

PhD Students

2017 – 2019 *Xing Qin,* Department of Mathematics of the Shandong University (Jinan, China). Title thesis: "Morse index and stability of the planar N-vortex problem". (Coadvisor prof. Xijun Hu, University of Shandong)

2015 – 2019 *Ran Yang,* Department of Mathematics of the Shandong University (Jinan, China). Title thesis: "G-equivariant Bott-type iteration formulae". (Coadvisor prof. Xijun Hu, University of Shandong)

2012 – 2015 *Riccardo D. Jadanza*, "Morse Index and Linear Stability of relative equilibria in singular mechanical systems". (Coadvisor prof.ssa Vivina L. Barutello, University of Turin)

Administrative and Scientific responsibilities

Administrative responsibilities

2017 – present Member of the *Commissione per l'analisi dati relativi al monitoraggio indicatori ANVUR sulla qualità della didattica del DISAFA*, University of Turin (Turin)

2016 – present Member of the *Commissione per l'accertamento delle Abilità Informatiche*, DISAFA, University of Turin (Turin, Italy)

2014 – present Member of the *Commissione per il test di ammissione ai CdL a numero programmato*, DISAFA, University of Turin (Turin, Italy)

2017 E-learning administrator on the DISAFA Moodle e-learning platform: disafa.i-learn.unito.it (Turin, Italy)

2017 – 2018 Member of the *Commissione per la didattica*, DISAFA, University of Turin (Turin, Italy)

2015 – 2016 Member of the *Commissione per la didattica*, DISAFA, University of Turin (Turin, Italy)

2012 – 2016 E-learning administrator on the DISAFA Moodle UniTo e-learning platform (Turin, Italy)

Scientific responsibilities

2017 – present Member of the *Collegio dei docenti del Dottorato in Matematica Pura e Applicata*, University of Turin and Polytechnic of Turin (Turin)

2009 – 2011 Member of the *Collegio dei docenti del Dottorato di Ricerca in Matematica*, University of Salento (Lecce)

Editorial work

2022 – 2023 Editor of *Journal of Nonlinear Mathematical Physics*

2005 – present Reviewer for Math Reviews (MathSciNet)

2002 – present Referee for the following selected Mathematical Journals: Journal of Differential Equations, Zeitschrift für angewandte Mathematik und Physik, Communication in Mathematical Physics, Advances in Mathematics, Nonlinear Differential Equations and Applications NoDEA, ESAIM-COCV, Proc. Roy. Soc. Edin. Sect. A, Proceedings of the American Mathematical Society, Differential and Integral Equations, Advances in Differential Equations, Advances in Nonlinear Studies, Journal of Topology and Analysis

Grant Assessment

2022 Evaluator for VQR 2015 – 2019

2016 Evaluator of grant proposal for FARE 2016

2012 Evaluator of grant proposal for MIUR-CINECA

Conference organization

Sep 2018 Workshop "SIMAI-UMI, PTM 2018, Joint Meeting". Co-organizer of the session: *New perspectives in Singular Hamiltonian systems.* (Wroclaw, Poland)

Jul 2016 Workshop "11th AIMS Conference on Dynamical Systems, Differential Equations and Applications". Co-organizer of the session: *Celestial Mechanics and beyond.* (Orlando, USA)

Jan 2015 Workshop "Complex Patterns in Nonlinear Phenomena with a day deDec ated to Jacobo Pejsachowicz on the occasion of his 70th birthday" at University of Turin. (Turin, Italy). Member of the Scientific Committee

Jun 2013 Workshop "Mathematical Paradigms of Climate Science" at INDAM (Roma, Italy). Member of the Scientific Committee.

Jun 2013 Workshop "Giornate fiorentine su dinamica non autonoma e metodi topologici in equazioni differenziali" (GNAMPA project) (Florence, Italy). Member of the Scientific Committee

May 2013 "Workshop on Variational methods in N-body and Vortex Dynamics" at University of Salento (Lecce, Italy). Member of the Scientific Committee

Mar 2009 "Workshop on Index theory, nonlinear Dirac equations and Morse-Floer homology" at Polytechnic of Turin. (Turin, Italy). Member of the Scientific Committee

May 2007 "Workshop on Mathematical control theory" at Università di Milano-Bicocca (Milan, Italy). Member of the Scientific Committee

Mar 2005 Lecture of Prof. A. Mischenko on "Novikov conjecture and almost flat bundle" at University of Milano-Bicocca (Milan, Italy). Member of the Scientific Committee

Jul 2002 "Quattro lezioni introduttive alla topologia simplettica" at Polytechnic of Turin (Turin, Italy). Member of the Scientific Committee

Research

Research Interests

Index theory Spectral flow formulas for ordinary and partial differential operators through the Maslov index and Spectral flow. Index theory for singular differential operators and for homoclinic/heteroclinic and halfclinic solutions. Spectral flow formulae for quasiperiodic motions

Stability	Linear and nonlinear (in)stability of periodic and quasiperiodic solutions of Hamiltonian systems and their variational characterization through the Morse index. Stability of vortex cristals for the N-vortex problem and relative equilibria in the N-body problem
Singular variational problems	Existence, multiplicity and stability of singular Hamiltonian system through topological and variational methods
Bifurcation theory	Detecting the equivariant bifurcation for potential operators through symplectic invariants

Textbooks

[2] S. Barbero, Sunra J.N. Mosconi, A. Portaluri, *Matematica per le scienze. Con elementi di probabilità e statistica, ISBN: 8891915408* https://he.pearson.it/bundle/540?isbn=9788891915412

[1] S. Barbero, Sunra J.N. Mosconi, A. Portaluri, *Precorso di Matematica, ISBN: 9788891927422* https://he.pearson.it/bundle/513?isbn=9788891927439

Published/Accepted papers

[46] Y. Ou; A. Portaluri, *Morse index for homothetic motions in the gravitational n-body problem.*, J. Fixed Point Theory Appl. 27 (2025), no. 1, Paper No. 10, 19 pp. Preprint available at https://arxiv.org/abs/2410.04374.

[45] S. Baranzini; A. Portaluri; R. Yang, *Morse index of circular solutions for attractive central force problems on surfaces.*, J. Math. Anal. Appl. 537 (2024), no. 1, Paper No. 128250, 33 pp. Preprint available at https://arxiv.org/abs/2305.18134.

[44] B. Booß-Bavnbek; Y. Ji, A. Portaluri; C. Zhu, *The dichotomy of forms and operators and the role of Green's forms.*, Springer, Cham, 2023, 53–70. ISBN: 978-3-031-44987-1; 978-3-031-44990-1; 978-3-031-44988-8.

[43] A. Portaluri, L. Wu, R. Yang, *A generalized index theory for non-Hamiltonian system.*, J. Differential Equations **369** (2023), 180–214. Preprint available at https://arxiv.org/abs/2301.06900.

[42] L. Asselle; A. Portaluri, *Morse theory for S-balanced configurations in the Newtonian n-body problem.*, J. Dynam. Differential Equations **35** (2023), no. 1, 907–946. Preprint available at https://arxiv.org/abs/2009.10118.

[41] L. Asselle, M. Fenucci, A. Portaluri, *Bifurcations of balanced configurations for the Newtonian n-body problem in $\mathbb{R}^4$*, J. Fixed Point Theory Appl. 24 (2022), no. 2, Paper No. 22, 25 pp. Preprint available at https://arxiv.org/abs/2011.09291.

[40] L. Asselle, A. Portaluri, L. Wu, *Spectral stability, spectral flow and circular relative equilibria for the Newtonian n-body problem.*, J. Differential Equations **337** (2022), 323–362. Preprint available at https://arxiv.org/abs/2105.15009.

[39] A. Portaluri, L. Wu, R. Yang, *Linear instability of periodic orbits of free period Lagrangian systems,* Electron. Res. Arch. 30 (2022), no. 8, 2833–2859. Preprint available at https://arxiv.org/abs/2109.12022.

[38] V. L. Barutello, D. Offin, A. Portaluri, L. Wu, *Sturm theory with applications in geometry and classical mechanics*, Math. Z. 299 (2021), no. 1-2, 257–297. Preprint available at https://arxiv.org/abs/2005.08034.

[37] A. Portaluri, L. Wu, R. Yang, *Linear instability for periodic orbits of non-autonomous Lagrangian systems*, Nonlinearity 34 (2021), no. 1, 237–272. Preprint available at https://arxiv.org/abs/1907.05864.

[36] H. Kavle, D. Offin, A. Portaluri, *Keplerian orbits through the Conley-Zehnder index*, Qual. Theory Dyn. Syst. 20 (2021), no. 1, Paper No. 10, 27 pp. Preprint available at https://arxiv.org/abs/1908.00075.

[35] X. Hu, A. Portaluri, Q. Xing, *Morse index and stability of the planar N-vortex problem*, Qual. Theory Dyn. Syst. 19 (2020), no. 2, Paper No. 76, 39 pp. Preprint available at https://arxiv.org/abs/1905.05297.

[34] A. Portaluri, L. Wu, *Spectral flow, Brouwer degree and Hill's determinant formula*, J. Differential Equations 269 (2020), no. 9, 7253–7286. Preprint available at https://arxiv.org/abs/2006.00956.

[33] V.L. Barutello, X. Hu, A. Portaluri, Alessandro, S. Terracini, *An index theory for asymptotic motions under singular potentials*, Adv. Math. 370 (2020), 107230, 57 pp. Preprint available at https://arxiv.org/abs/1705.01291.

[32] X. Hu, A. Portaluri, R. Yang *A dihedral Bott-type iteration formula and stability of symmetric periodic orbits*, Calc. Var. Partial Differential Equations 59 (2020), no. 2, Paper No. 51, 40 pp. Preprint available at https://arxiv.org/abs/1705.09173.

[31] X. Hu, A. Portaluri, R. Yang *Instability of semi-Riemannian closed geodesics*, Nonlinearity 32 (2019), no. 11, 4281–4316. Preprint available at http://arxiv.org/pdf/1706.07619.pdf.

[30] X. Hu, A. Portaluri *Bifurcation of heteroclinic orbits via an index theory*, Math. Z. 292 (2019), no. 1-2, 705–723. Preprint available at http://arxiv.org/pdf/1704.06806.pdf.

[29] G. Marchesi; A. Portaluri; N. Waterstraat. *Not every conjugate point of a semi-Riemannian geodesic is a bifurcation point,* Differential Integral Equations 31 (2018), no. 11-12, 871–880. Preprint available at http://arxiv.org/pdf/1703.10483.pdf.

[28] A. Portaluri; N. Waterstraat *Corrigendum to: A Morse-Smale index theorem for indefinite elliptic systems and bifurcation,* [J. Differential Equations **258** (5) (2015) 1715–1748]. J. Differential Equations **264** (2018), no. 4, 3067–3069.

[27] X. Hu, A. Portaluri, *Index theory for heteroclinic orbits of Hamiltonian systems*, Calc. Var. Partial Differential Equations **56** (2017), no. 6, 56:167, 1–24 Preprint available at https://arxiv.org/abs/1703.03908.

[26] A. Portaluri, N. Waterstraat, *A K-theoretical invariant and bifurcation for homoclinics of Hamiltonian systems*, J. Fixed Point Theory Appl. **19** (2017), no. 1, 833–851. Preprint available at https://arxiv.org/abs/1605.08402.

[25] V. Barutello, R. D. Jadanza, A. Portaluri, *Morse Index and Linear Stability of the Lagrangian Circular Orbit in a Three-Body-Type Problem Via Index Theory*, Arch. Ration. Mech. Anal. **219** (2016), no. 1, 387–444. Preprint available at http://arxiv.org/pdf/1406.3519.pdf.

[24] A. Portaluri, N. Waterstraat, *Yet another proof of the Morse index theorem*, Expo. Math. 33 (2015), no. 3, 378–386. Preprint available at http://arxiv.org/pdf/1312.5291.pdf.

[23] A. Portaluri,N. Waterstraat, *A Morse-Smale index theorem for indefinite elliptic systems and bifurcation*, J. Differential Equations **258** (2015), no. 5, 1715–1748. Preprint available at http://arxiv.org/pdf/1408.1419.pdf.

[22] V. Barutello, R. D. Jadanza and A. Portaluri, *Linear instability of relative equilibria for n-body problems in the plane*, Barutello, Vivina L.; Jadanza, Riccardo D.; Portaluri, Alessandro J. Differential Equations **257** (2014), no. 6, 1773–1813. Preprint available at http://arxiv.org/pdf/1310.8318v3.pdf.

[21] N. Waterstraat, A. Portaluri, *On bifurcation for semilinear elliptic Dirichlet problems on geodesic balls,* J. Math. Anal. Appl. **415** (2014), no. 1, 240–246. Preprint available at http://arxiv.org/abs/1305.3078.

[20] N. Waterstraat, A. Portaluri, *Bifurcation results for critical points of families of functionals,* Differential Integral Equations **27** (2014), no. 3-4, 369–386. Preprint available at http://arxiv.org/abs/1210.0417.

[19] N. Waterstraat, A. Portaluri, *On bifurcation for semilinear elliptic Dirichlet problems and the Morse–Smale index theorem,* J. Math. Anal. Appl. **408** (2013), no. 2, 572–575.

[18] R. Castelli, F. Paparella, A. Portaluri, *Singular dynamics under a weak potential on a sphere*, NoDEA Nonlinear Differential Equations Appl. **20** (2013), no. 3, 845–872. Preprint available at http://arxiv.org/abs/1109.1128.

[17] D. L. Ferrario, A. Portaluri, *Dynamics of the dihedral four body problem,* Discrete Contin. Dyn. Syst. Ser. S **6** (2013), no. 4, 925–974. Preprint available at http://arxiv.org/abs/1112.4623.

[16] F. Paparella, A. Portaluri, *Geometry of stationary solutions for a system of vortex filaments: a dynamical approach,* Discrete Contin. Dyn. Syst. **33** (2013), no. 7, 3011–3042. Preprint available at http://arxiv.org/abs/1112.1789.

[15] F. Paparella, A. Portaluri, *Dynamics of (4+1)–Dihedrally Symmetric Nearly Parallel Vortex Filaments,* Acta Applicandae Math., **122** (2012), 349–366. DOI 10.1007/s10440–012–9748–5.

[14] F. Dalbono, A. Portaluri, *Morse-Smale index theorems for elliptic boundary deformation problems,* J. Differential Equations **253** (2012), no. 2, 463–480.

[13] A. Portaluri, *A K-theoretical invariant and bifurcation for a parameterized family of functionals*. J. Math. Anal. Appl. **377** (2011), no. 2, 762–770. Preprint available at http://arxiv.org/abs/0905.3897.

[12] L. Abatangelo, A. Portaluri, *Morse theory for a fourth order elliptic equation with exponential nonlinearity,* NoDEA Nonlinear Differential Equations Appl. **18** (2011), no. 1, 27–43. Preprint available at http://arxiv.org/abs/0911.2563.

[11] A. Capietto, F. Dalbono, A. Portaluri, *A multiplicity result for a class of strongly indefinite asymptotically linear second order systems*, Nonlinear Anal. **72** (2010), no. 6, 2874–2890. Preprint available at http://arxiv.org/abs/0906.0172.

[10] A. Portaluri, *On a generalized Sturm theorem,* Adv. Nonlinear Stud. **10** (2010), no. 1, 219–230. Preprint available at http://arxiv.org/abs/0705.3516.

[9] A. Portaluri, *Indefinite Sturm theory.* (Russian) Funktsional. Anal. i Prilozhen. **43** (2009), no. 4, 91–96; translation in Funct. Anal. Appl. **43** (2009), no. 4, 316–319. Preprint available at http://arxiv.org/abs/0812.1933.

[8] A. Abbondandolo, A. Portaluri, M. Schwarz, *The homology of path spaces and Floer homology with conormal boundary conditions*, J. Fixed Point Theory Appl. **4** (2008), no. 2, 263–293. Preprint available at http://arxiv.org/abs/0810.1977.

[7] D. L. Ferrario, A. Portaluri, *On the dihedral n-body problem*, Nonlinearity **21** (2008), no. 6, 1307–1321.Preprint available at http://arxiv.org/abs/0707.3598.

[6] A. Portaluri, *Maslov index for Hamiltonian systems,* Electron. J. Differential Equations (2008), **09**, 10 pp. Preprint available at http://arxiv.org/abs/math/0405153.

[5] M. Musso, J. Pejsachowicz, A. Portaluri, *Morse index and bifurcation of p-geodesics on semi Riemannian manifolds*, ESAIM Control Optim. Calc. Var. **13** (2007), no. 3, 598–621.

[4] M. Musso, J. Pejsachowicz, A. Portaluri, *A Morse index theorem for perturbed geodesics on semi-Riemannian manifolds*, Topol. Methods Nonlinear Anal. **25** (2005), no. 1, 69–99. Preprint available at http://arxiv.org/abs/math/0311147.

[3] P. Piccione, A. Portaluri, *A bifurcation result for semi-Riemannian trajectories of the Lorentz force equation*, J. Differential Equations **210** (2005), no. 2, 233–262.

[2] R. Giambò, P. Piccione, A. Portaluri, *Computation of the Maslov index and the spectral flow via partial signatures*, C. R. Math. Acad. Sci. Paris **338** (2004), no. 5, 397–402.

[1] P. Piccione, A. Portaluri, D. V. Tausk, *Spectral flow, Maslov index and bifurcation of semi-Riemannian geodesics*, Ann. Global Anal. Geom. **25** (2004), no. 2, 121–149. Preprint available at http://arxiv.org/abs/math/0211091.

Submitted papers

Preprints

[1] R. Giambò, P. Piccione, A. Portaluri, *On the Maslov index of Lagrangian paths that are not transversal to the Maslov cycle. Semi-Riemannian index theorem in the degenerate case.* Preprint available at http://arxiv.org/abs/math/0306187.

Monographs

[1] F. Ancona, P. Cannarsa, C. Jones and A. Portaluri, *Mathematical Paradigms for Climate Sciences.* Springer INDAM Series 15

Other publications

Published/accepted papers

[3] F. Paparella, C. Ferracini, A. Portaluri, A. Manzo, A. Alma *Biological control of the chestnut gall wasp with* T. sinensis*: a mathematical model.* Ecological Modelling (2016), pp. 17–36. DOI : 10.1016/j.ecolmodel.2016.07.023 Preprint available at http://arxiv.org/pdf/1512.06255.pdf.

[2] F. Lessio, A. Portaluri, F. Paparella, A. Alma, *A Mathematical Model of Flavescence Dorée Epidemiology*, Ecological Modelling **312** (2015), 41–53. Preprint available at http://arxiv.org/pdf/1407.4003.pdf.

[1] M. G. Bergomi, R. D. Jadanza and A. Portaluri, *Una geometrizzazione dello spazio degli accordi*, Ithaca **III** (2014), 33-45.

Teaching

(Under)graduate courses

2024 – 2026 *Multivariable Calculus with Applications to Science and Engineering* at New York University Abu Dhabi (Abu Dhabi, UAE)

2024 – 2026 *Calculus with Applications to Science and Engineering* at New York University Abu Dhabi (Abu Dhabi, UAE)

2023-present *Matematica e principi di statistica* at the DISAFA, University of Turin (Turin, Italy)

2020 – 2023 *Mathematical modeling and food science* at the DISAFA, University of Turin (Turin, Italy)

2012 – 2022 *Matematica* at the DISAFA, University of Turin (Turin, Italy)

2009 – 2012 *Analisi Matematica I e Analisi Matematica II* at University of Salento (Lecce, Italy)

2006 – 2008 *Algebraic topology.* Tutoring at University of Milano-Bicocca (Milan, Italy)

2005 – 2008 *Geometry and Topology.* Tutoring for undergraduate class at University of Milano-Bicocca. (Milan, Italy)

2001 – 2004 *Calculus I, Calculus II, Matlab, Linear Algebra, General Topology.* Tutoring at Polytechnic of Turin (Turin, Italy)

Mathematics Competitions for high school students

2018 – present Membro della Commissione di Logica per la preparazione dei test di Accesso (CISIA) (Pisa, Italy)

2018 – present Responsabile della Commissione di Matematica per la preparazione dei test di Accesso alla Facoltà di Agraria (CISIA) (Pisa, Italy)

2011 – 2019 XI-XVIII Certamen Nazionale Fisico-Matematico "Fabiana d'Arpa". Member of the Committee for the preparation of the final competition.

2009 – 2011 IX Certamen Nazionale Fisico-Matematico "Fabiana d'Arpa". Member of the selection board. Maglie (LE).

Invited PhD and research-level courses

2018 – 2019 "MATH 943, Symplectic Topology and Dynamics" at Queen's University of Kingston, (Ontario, Canada)

2015 – 2016 "Aspects of stability theory in Hamiltonian Dynamics" at University of Turin, (Turin, Italy)

2013 – 2014 "Modelli matematici nelle scienze applicate" at University of Turin, (Turin, Italy)

2012 – 2013 "Grado topologico, indice e di Maslov e flusso spettrale con applicazioni a ODEs e PDEs" at University of Turin, (Turin, Italy)

2009 – 2010 Virtual Coordinator of the 13th International Internet Seminar on "Gradient Systems" (Germany)

May 2009 Intensive INDAM bimester on "New connections between dynamical systems and Hamiltonian PDEs" at University of Naples (Naples, Italy)

2007 – 2008 "Introduzione alla teoria di Morse in spazi di Hilbert e applicazioni" at University of Milano-Bicocca, Milano (Italy)

Invitations and communications

Invited lectures (Selected)

Jun 2022 Conference on " Theory, models and simulations in Celestial Mechanics". Invited talk: *An index theory for asymptotic motions in the gravitational N-body problem"*, (Pisa, Italy)

Feb 2022 Conference on "Mathematics of Wave Phenomena 2022". Invited talk: *A generalized index theory for non-Hamiltonian systems*, (Karlsruhe, Germany)

Aug 2019 Conference on "V AMMCS International Conference". (Waterloo, Canada). Invited talk: *A symplectic sightseeing tour on Singular Hamiltonian Systems*

Jul 2018 Conference on "Mathematics of Wave Phenomena". (Karlsruhe, Germany). Invited talk: *Index and stability of closed semi-Riemannian geodesics*

Jun 2018 Conference on "Perspectives in Hamiltonian Dynamics" (Venezia, Italy). Invited talk: *Index and stability of closed semi-Riemannian geodesics"*

Sep 2017 Conference on " The Seventh International Meeting on Celestial Mechanics (CELMEC VII)" at San Martino al Cimino (Viterbo, Italy). Invited talk: *Stability dreams (with a symplectic friend) in Celestial Mechanics*

Jul 2017 Conference on " Mathematical Congress of the Americas". (Montreal, Canada). Invited talk: *Index and stability of closed semi-Riemannian geodesics*

Jul 2017 Conference on " Mathematical Congress of the Americas" (Montreal, Canada). Invited talk: *Index theory, Maslov index, Spectral flow, Colliding trajectories, Parabolic motions, Homothetic orbits*

Sep 2015 Conference on " Jahrestagung der Deutschen Mathematiker-Vereinigung 2015 in Hamburg" (Hamburg, Germany). Invited talk: *Index theory in Celestial Mechanics:recent results and new perspectives*

Sep 2015 Conference on "Hamiltonian systems and Celestial Mechanics, CMO-BIRS (Oaxaca, Mexico). Invited talk: *An index theory for colliding solutions in Celestial Mechanics*

Jun 2015 Conference on "2015 AMMCS-CAIMS Congress" (Waterloo, Canada). Invited talk: *Index theory in Celestial Mechanics: recent results and new perspectives*

Jun 2014 Conference on "Hamiltonian Systems and Celestial Mechanics (Bellaterra,Spain). Plenary talk: *Index theory in Celestial Mechanics: recent results and new perspectives*

Jun 2013 Conference on "Giornate fiorentine su dinamica non autonoma e metodi topologici in equazioni differenziali" (Firenze, Italy). Invited talk: *Linear (in)stability for relative equilibria in singular Lagrangian systems*

Jan 2011 Conference on "Variational and perturbative Methods for nonlinear differential equations" (Venezia, Italy). Invited talk: *Global dynamics for the dihedral four body problem"*

Sep 2011 XIX Congresso UMI (Bologna, Italy). Invited talk: *Dinamica globale per un problema singolare con vincolo di simmetria diedrale*

Sep 2010 Conference on "Group Actions in Topology and Analysis. The Fourth Group Action Forum Conference" at UNiversity of Milano-Bicocca (Milan, Italy). Invited talk: *On the dihedral four body problem"*

Jun 2010 Conference on "13th Internet Seminar on Gradient Systems" Kacov, Czech Republic.Virtual Coordinator of Project 12

Apr 2010 Conference on "Topological and Set-valued Methods for Nonlinear Differential Problems" (Messina, Italy). Invited talk: *Morse theory for a fourth order elliptic equation with exponential nonlinearity*

Jul 2007 Conference on "Fixed point theory and its applications" (Bedlewo, Poland). Invited talk: *On the dihedral n-body problem*

Jun 2007 Conference on "SPT 2007" (Otranto, Itay). Invited talk: *On the dihedral n-body problem*

Aug 2005 Conference on "Fixed point theory and its applications. International Conference in memory of Jim Dugundji", (Bedlewo, Poland). Invited talk: *Generalized Maslov index and bifurcation of kissing manifolds*

Jun 2005 Conference on "Dynamical Systems and Nonlinear Analysis" (Voronezh, Russia). Invited talk: *Estimate from below for the number of conjugate points along a semi-Riemannian geodesic*

Mar 2005 Conference on "Topological methods in nonlinear Analysis" (Bedlewo, Poland). Invited talk: *Bifurcation of Lagrangian submanifolds"*

Feb 2005 Conference on "Two weeks in Global Analysis"(Pisa, Italy). Invited Talk: *The Morse index and Atiyah-Singer Theorem"*

Jun 2003 Conference on "Topological and Variational Methods in Nonlinear Analysis (Bedlewo, Poland). Invited talk: *Bifurcation of semi-Riemannian geodesics*

Invitations (Selected)

May 2022 Mathematical Analysis Seminars at the Mathematics Department, University of Turin (Turin, Italy). Title: *Spectral stability, spectral flow and circular relative equilibria for the Newtonian N-body problem*

Mar 2022 Mathematical Analysis Seminars at SISSA (Trieste, Italy). Title: *Spectral stability, spectral flow and circular relative equilibria for the Newtonian N-body problem*

May 2022 Symplectic Seminars at the University of Bochum (Bochum, Germany). Title: *An index theory for asymptotic motions in the gravitational N-body problem*

May 2018 Augsburg University (Augsburg, Germany) Title: *Index and stability of closed semi-Riemannian geodesics.* Invited by Prof. Urs Frauenfelder

Mar 2018 Chern Institute (Nankai,China). Title: *Index and stability of closed semi-Riemannian geodesics.* Invited by Proff. Chaofeng Zhu, Yiming Long

Mar 2018 Shandong University (Jinan, China). Title: *Index and stability of closed semi-Riemannian geodesics.* Invited by Prof. Xijun Hu

Mar 2017 Shandong University (Jinan (China). Title: *Spectral flow and Maslov index: a common computational root.* Invited by Prof. Xijun

Feb 2017 New York University Abu-Dhabi (Abu Dhabi, Emirates). Title: *Stability dreams (with a symplectic friend) in Celestial Mechanics.* Invited by Prof. Francesco Paparella

Mar 2016 Shandong University (Jinan, China). Title: *Amazing orbits in Celestial Mechanics.* Invited by Prof. Xijun

Mar 2016 Capital Normal University (Beijing, China. Title: *A new counting index of conjugate points along semi-Riemannian geodesics.* Invited by Prof. Shanzhong Sun

Sep 2015 Instituto, Tecnológico Autónomo de México (Mexico City, Mexico). Invited talks:

- Collisions, Variational Regularisation and Stability in Celestial Mechanics
- Symmetries, homographic solutions and Choreographies in Celestial Mechanics

Nov. 2014 Bochum University (Bochum, Germany). Title: *Index theory in Celestial Mechanics: recent results and new perspectives"* Invited by Prof. Alberto Abbondandolo

Jun 2014 Shandong University (Jinan, China). Title: *Linear Stability and Morse index theorem of the Lagrangian circular orbit in a three-body type problem.* Invited by Prof. Xijun Hu

Mar 2014 Humboldt Universität (Berlin, Germany). Invited talk: *Linear stability in the relative equilibria in the N-body type problem, via index theory.* Invited by Prof. Nils Waterstraat

Jun 2012 CMAF, (Lisboa, Portugal). Invited talk: *Towards an index theorem for semilinear wave equation.* Invited by Prof. Francesca Dalbono

Jun 2011 Bilbao BCAM (Bilbao, Spain). Invited talk *Global dynamics for the dihedral 4-body problem.* Invited by Prof. R. Castelli

Nov 2009 Warwick University (Warwick, England). Invited talk: *The homology of path space and Floer homology with conormal boundary conditions.* Invited by Prof. Chris Jones

May 2008 Bonn University (Bonn, Germany). Invited talk *The homology of path space and Floer homology with conormal boundary conditions".* Invited by Prof. Dr. Werner Müller

Jan 2004 Leipzig University (Leipzig, Germany) Invited talk: *The semi-Riemannian Morse index theorem and bifurcation of geodesics.* Invited by Prof. Dr. Matthias Schwarz

Sep 2003 São Paulo (Brazil). Invited talk: *Maslov Index and spectral flow via partial signatures.*Invited by Prof. P. Piccione

Jul 2003 São Paulo (Brazil). Invited talk *The Morse Index Theorem on semi-Riemannian manifolds.* Invited by Prof. P. Piccione

Research seminars (Selected)

Mar 2019 Seminar Dynamics, Geometry, & Groups Seminar, Department of Mathematics and Statistics, Queen's University, Kingston (Canada). Invited talk: *Visiting Kepler with a couple of symplectic friends*

Mar 2019 Colloquim at the Department of Mathematics and Statistics, Queen's University, Kingston (Canada). Invited talk: *Existence and stability results in Celestial Mechanics*

Dec 2016 Mathematical Analysis Seminars at the Mathematics Department, University of Turin (Turin, Italy). Title: *Index, stability and hyperbolicity of closed geodesics*

Feb 2014 ERC Project: Complex Patterns for Strongly Interacting Dynamical Systems (COMPAT) — First Meeting at University of Turin (Turin, Italy). Title: *Index theory in Celestial Mechanics: recent results and new perspectives*

Nov 2012 Analysis Seminars at University of Milano-Bicocca (Milan, Italy). Title: *An index theorem for an ill-posed hyperbolic problem*

Nov 2012 Analysis Seminars at University of Salento (Lecce, Italy). Title: *An index theorem for an ill-posed hyperbolic problem*

Jun 2012 Seminars on ordinary differential equations at CMAF (Lisboa, Portugal). Title: *Morse-Smale index theorem for an elliptic boundary deformation problems*

Jun 2012 Seminars on ordinary differential equations at CMAF (Lisboa, Portugal). Title: *Global dynamics for the dihedral singular logarithmic potential*

Jun 2012 Seminars on ordinary differential equations at Universidade Nova (Lisboa, Portugal). Title *Towards an index theorem for semilinear wave equation*

May 2012 Analysis Seminars at University of Salento (Lecce, Italy). Title: *Geometria della varietà Lagrangian Grassmanniana e indice e di Maslov*

Jun 2011 Analysis Seminars at University of Milano-Bicocca (Milan, Italy). Title: *Global dynamics for the dihedral four vortex problem*

Jun 2011 Analysis Seminars at BCAM (Bilbao, Spain). Title: *Global dynamics for the dihedral four body problem*

Jan 2010 Analysis Seminars at University of Bari (Bari, Italy). Title: *Teoremi indice e in geometria semi-Riemanniana*

Dec 2008 Analysis Seminars at University of Naples (Naples, Italy). Title: *Il problema degli N-corpi con vincolo di simmetria diedrale*

Nov 2006 Analysis Seminars at University of Milano-Bicocca (Milan, Italy). Title: *A generalized Sturm theory I*

Nov 2006 Analysis Seminars at University diof Milano-Bicocca (Milan, Italy). Title: *A generalized Sturm theory II*

Mar 2005 Analysis Seminars at Università of Milano-Bicocca (Milan, Italy). Title: *A Morse index theorem in semi-Riemannian geometry*

Various

Scientific Membership

2000 – present Member of GNAMPA (National Group of Mathematical Analysis, Probability and Applications).

2008 – 2013 Member of UMI (Unione Matematica Italiana).

2008 – 2014 Member of AMS (American Mathematical Society).

Computer Skills

Operating systems	Mac OS X, Windows, Linux
Scientific software	Matlab, Maple, Mathematica, Maple TA, GeoGebra, Sage
Programming languages	C, C++, Python
Typesetting software	LaTeX, XeLaTeX, Lualatex
Common software	MS Office, iWork, Open Office
E-learning platform	Moodle

Turin, June 14, 2025

Signature
Alessandro Portaluri