

# Alessandro Portaluri

## Curriculum Vitae

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🌐 <https://sites.google.com/view/alessandro-portaluri/home>

## Full Professor of Mathematics, PhD University of Turin

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### 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 Married

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### Position held

Jan 2023 – present *Full Professor in Mathematics (MAT05) at DISAFA*. University of Turin (Turin, Italy)  
Mar 2016 – Dic 2022 *Associate Professor in Mathematics (MAT05) at DISAFA*. University of Turin (Turin, Italy)  
Oct 2012 – Feb 2016 *Researcher in Mathematics (MAT/05)*. University of Turin (Turin, Italy)  
Jan 2009 – Sep 2012 *Researcher in Mathematics (MAT/05)*. 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)

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### Formation

Mar 2000 – May 2004 PhD student in Mathematics at the University of Genova. Advisor: Prof. Jacobo Pejsachowicz (Polytechnic 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*.

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### 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 periodiche 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 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

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## 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)

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## Administrative and Scientific responsibilities

### Administrative responsibilities

- 2017 E-learning administrator on the DISAFA Moodle e-learning platform: [disafa.i-learn.unito.it](http://disafa.i-learn.unito.it) (Turin, Italy)
- 2012 – 2016 E-learning administrator on the DISAFA Moodle UniTo e-learning platform (Turin, Italy)
- 2015 – 2016 Member of the *Commissione per la didattica*, DISAFA, University of Turin (Turin, Italy)
- 2017 – 2018 Member of the *Commissione per la didattica*, 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)
- 2016 – present Member of the *Commissione per l'accertamento delle Abilità Informatiche*, DISAFA, University of Turin (Turin, Italy)
- 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)

### 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 – present 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 dedicated 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

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## Research

### Research Interests

- Index theory Ordinary and partial differential operators through the Maslov index and Spectral flow. Index theory for singular differential operators and for heteroclinic 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 crystals 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

### Monographs

- [2] S. Barbero, Sunra J.N. Mosconi, A. Portaluri, *Matematica per le scienze. Con elementi di probabilità e statistica*, ISBN: 8891915408 <https://www.pearson.it>
- [1] S. Barbero, Sunra J.N. Mosconi, A. Portaluri, *Precorso di Matematica*, ISBN: 9788891927422 <https://www.pearson.it>

### Published/Accepted papers

- [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, 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>.
- [40] 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>.
- [39] 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>.
- [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>.

Research books

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



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## 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.

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## Teaching

### Teaching books

- [1] S. Barbero, Sunra J.N. Mosconi, A. Portaluri, *Precorso di Matematica*, ISBN: 9788891927422 <https://www.pearson.it>

### (Under)graduate courses

- 2020 – present *Mathematical modeling and food science* at the DISAFA, University of Turin (Turin, Italy)
- 2012 – present *Mathematics* at the DISAFA, University of Turin (Turin, Italy)
- 2009 – 2012 *Calculus I and Calculus 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

- 2009 – 2011 IX Certamen Nazionale Fisico-Matematico “Fabiana d’Arpa”. Member of the selection board. Maglie (LE). <http://www.liceodavincimaglie.gov.it/index.php/252-certamen/976-certamen>
- 2011 – 2019 XI-XVIII Certamen Nazionale Fisico-Matematico “Fabiana d’Arpa”. Member of the Committee for the preparation of the final competition. <http://www.liceodavincimaglie.gov.it/index.php/252-certamen/976-certamen>

- 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)

#### 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 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)

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#### 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, Italy). 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 Colloquium 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 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 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 of Milano-Bicocca (Milan, Italy). Title: *A generalized Sturm theory II*
- Mar 2005 Analysis Seminars at Università di Milano-Bicocca (Milan, Italy). Title: *A Morse index theorem in semi-Riemannian geometry*

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## 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, December 27, 2023

Signature  
Alessandro Portaluri