

# Paolo Gidoni

## Curriculum Vitæ

Dipartimento Politecnico di Ingegneria e Architettura  
Università degli Studi di Udine  
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### Posizione attuale

Ott 2022 – **Ricercatore a tempo determinato RTDb**, Dipartimento Politecnico di Ingegneria e Architettura, Università degli Studi di Udine, Italia, Settore scientifico disciplinare MAT/07 – Fisica Matematica

### Esperienze lavorative

- Gen 2020 – **Ricercatore (Vědecký pracovník)**, Department of Decision-Making Theory, Institute of Information Theory and Automation (ÚTIA) of the Czech Academy of Sciences, Praha, Czech Republic
- Ott 2022
- Giu 2019 – **Postdoc**, Department of Decision-Making Theory, Institute of Information Theory and Automation (ÚTIA) of the Czech Academy of Sciences, Praha, Czech Republic
- Dic 2019
- Giu 2018 – **Postdoc**, Unità I.N.d.A.M. del Dipartimento di Matematica, Università degli Studi di Padova, (posizione finanziata da Mathtech–CNR–INdAM)
- Mag 2019
- Gen 2017 – **Postdoc**, Centro de Matemática, Aplicações Fundamentais e Investigação Operacional (CMAF–CIO), Faculdade de Ciências da Universidade de Lisboa, Portugal
- Mag 2018

### Formazione

- Mag 2019 – **Abilitazione Scientifica Nazionale (Italiana) a Professore di II fascia**,  
Mag 2031 Settoe A1/04 – Fisica Matematica, valida fino al 02/05/2029,  
Settoe A1/03 – Analisi matematica, probabilità e statistica matematica, valida fino al 07/05/2031
- Ott 2012 – **Doctor Philosophiae in Analisi Matematica (PhD)**, SISSA – International School for Advanced Studies, Trieste, cum laude  
Set 2016  
Supervisor: Prof. Alessandro Fonda (Università di Trieste), Prof. Antonio DeSimone (SISSA)  
Titolo della tesi: *Two explorations in dynamical systems and mechanics. Avoiding cones conditions and higher dimensional twist – Directional friction in bio-inspired locomotion.*
- Gen 2015 – **Master in Complex Actions**, SISSA – International School for Advanced Studies,  
Set 2015 Trieste
- Oct 2007 – **Diploma della Scuola Superiore dell'Università degli Studi di Udine**, Università degli Studi di Udine, 110/110 e lode  
Apr 2013
- Ott 2010 – **Laurea Magistrale in Matematica**, Università degli Studi di Udine, 110/110 e lode  
Ott 2012  
Tesi: *Imitation dynamics for RPS games*  
Relatore: Prof. Fabio Zanolin  
Correlatore: Prof. Josef Hofbauer (Universität Wien, Austria)

- Feb 2012 – **Visiting student (Erasmus Program)**, *Technische Universität Graz, Austria*  
Lug 2012
- Ott 2007 – **Laurea Triennale in Matematica**, *Università degli Studi di Udine, 110/110 e*  
Ott 2010 *lode*  
Tesi: *Reticoli e sistemi di radici (Root systems and lattices)*  
Relatore: Prof. Pietro Corvaja

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## Titolarità di progetti

- 2021 – 2022 **GAČR Junior Star Project 21-09732M**, *Principal Investigator*,  
Titolo del progetto: *Advanced analytical methods for soft locomotion*,  
Finanziamento totale: 2 913 000 CZK (114 235 €), progetto 2021–25 interrotto  
per incompatibilità con la nuova posizione a UniUD

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## Partecipazione a progetti

- 2021 – 2023 **Membro**, *GAČR-FWF project, Scales and Shapes in Continuum Thermomechanics*  
(P.I.: M. Kružík e U. Stefanelli), partecipazione parziale in un progetto 2021–24
- 2020 **Membro**, *GAČR project, Localization phenomena in shape memory alloys: experi-*  
*ments & modeling* (P.I.: P. Sedlák, P. Šittner e M. Kružík), partecipazione parziale  
in un progetto 2018–20
- 2019 – 2021 **Membro**, *GAČR-FWF project, Large Strain Challenges in Materials Science* (P.I.:  
E. Davoli e M. Kružík)
- 2019 **Membro**, *GAČR project, Advanced mathematical methods for dissipative evolu-*  
*tionary systems* (P.I.: M. Kružík), partecipazione parziale in un progetto 2017–19
- 2017 – 2018 **Membro**, *progetto INdAM-GNAMPA, Problemi differenziali con peso indefinito:*  
*tra metodi topologici e aspetti dinamici* (coordinatore: Andrea Sfecci)
- 2016 – 2017 **Membro**, *progetto INdAM-GNAMPA, Problemi differenziali nonlineari: esistenza,*  
*molteplicità e proprietà qualitative delle soluzioni* (coordinatore: Maurizio Garrione)
- 2015 – 2016 **Membro**, *progetto INdAM-GNAMPA, Problemi al contorno associati ad alcune*  
*classi di equazioni differenziali nonlineari* (coordinatore: Franco Obersnel)
- 2014 – 2016 **Membro**, *ERC Advanced Grant, Micromotility*, (P.I. Antonio De Simone)

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## Esperienza didattica

- Ott 2018 – **Analisi Matematica 1**, *per studenti della laurea triennale in Ingegneria aerospaziale,*  
*(codocenza di 3 CFU su 12 CFU complessivi)*, Università degli Studi di Padova
- Ott 2016 – **Attività formativa complementare**, *in supporto del corso di Analisi Matematica*  
Gen 2017 *1*, per studenti delle lauree triennali in Matematica ed in Fisica, Università degli  
Studi di Trieste
- Apr 2016 – **corso di L<sup>A</sup>T<sub>E</sub>X**, *per studenti della laurea triennale in Matematica* (1 CFU), Università  
Mag 2016 degli Studi di Trieste
- Gen 2011 – **Tutor**, *Scuola Superiore (classe scientifica)*, Università degli Studi di Udine  
Dec 2011 Fra le attività svolte: corso introduttivo a L<sup>A</sup>T<sub>E</sub>X, orientamento in ingresso, supporto  
organizzativo agli eventi della Scuola, counselling.

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## Premi e borse di studio

- 2021 **ÚTIA Best Paper Award 2021**, *categoria autori fino a 35 anni*, per l'articolo "A vanishing-inertia analysis for finite-dimensional rate-independent systems with nonautonomous dissipation and an application to soft crawlers" scritto con F. Riva
- 2016 **SIAM Student Chapter Certificate of Recognition**
- 2012 – 2016 **Borsa di studio**, *PhD student in Mathematical Analysis*, SISSA – International School for Advanced Studies
- 2007 – 2012 **Borsa di studio**, *Allievo della Classe Scientifico-Economica*, Scuola Superiore dell'Università di Udine

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## Pubblicazioni

### Papers

- [1] Paolo Gidoni, Giovanni Noselli, and Antonio DeSimone. Crawling on directional surfaces. *International Journal of Non-Linear Mechanics*, (61):65–73, 2014. (doi: 10.1016/j.ijnonlinmec.2014.01.012)
- [2] Alessandro Fonda and Paolo Gidoni. A permanence theorem for local dynamical systems. *Nonlinear Analysis: Theory, Methods & Applications*, (121):73–81, 2015. (doi: 10.1016/j.na.2014.10.011)
- [3] Antonio DeSimone, Paolo Gidoni, and Giovanni Noselli. Liquid crystal elastomer strips as soft crawlers. *Journal of the Mechanics and Physics of Solids*, (84):254–272, 2015. (doi: 10.1016/j.jmps.2015.07.017)
- [4] Alessandro Fonda and Paolo Gidoni. Generalizing the Poincaré–Miranda theorem: the avoiding cones condition. *Annali di Matematica Pura e Applicata*, (195):1347–1371, 2016. (doi: 10.1007/s10231-015-0519-6)
- [5] Alessandro Fonda, Maurizio Garrione, and Paolo Gidoni. Periodic perturbations of Hamiltonian systems. *Advances in Nonlinear Analysis*, (5):367–382, 2016. (doi: 10.1515/anona-2015-0122)
- [6] Paolo Gidoni and Antonio DeSimone. Stasis domains and slip surfaces in the locomotion of a bio-inspired two-segment crawler. *Meccanica*, (52):587–601, 2017. (doi: 10.1007/s11012-016-0408-0)
- [7] Alessandro Fonda and Paolo Gidoni. An avoiding cones condition for the Poincaré–Birkhoff theorem. *Journal of Differential Equations*, (262):1064–1084, 2017. (doi: 10.1016/j.jde.2016.10.002)
- [8] Paolo Gidoni and Antonio DeSimone. On the genesis of directional friction through bristle-like mediating elements. *ESAIM: Control, Optimization and Calculus of Variations*, (23):1023–1046, 2017. (doi: 10.1051/cocv/2017030)
- [9] Paolo Gidoni. Rate-independent soft crawlers. *Quarterly Journal for Mechanics and Applied Mathematics*, (71):369–409, 2018. (doi: 10.1093/qjmam/hby010)
- [10] Paolo Gidoni and Alessandro Margheri. Lower bound on the number of periodic solutions for asymptotically linear planar Hamiltonian systems. *Discrete & Continuous Dynamical Systems – A*, (39):585–605, 2019. (doi: 10.3934/dcds.2019024)
- [11] Paolo Gidoni, Giovanni Battista Maggiani and Riccardo Scala. Existence and regularity of solutions for an evolution model of perfectly plastic plates. *Communications on Pure and Applied Analysis*, (18):1783–1826, 2019. (doi: 10.3934/cpaa.2019084)
- [12] Guglielmo Feltrin and Paolo Gidoni. Multiplicity of clines for systems of indefinite differential equations arising from a multilocus population genetics model. *Nonlinear Analysis: Real World Applications* (54):103108, 2020. (doi: 10.1016/j.nonrwa.2020.103108)
- [13] Alessandro Fonda and Paolo Gidoni. Coupling linearity and twist: an extension of the Poincaré–Birkhoff Theorem for Hamiltonian systems. *Nonlinear Differential Equations and Applications NoDEA* (27):55, 2020. (doi: 10.1007/s00030-020-00653-9)

- [14] Giovanni Colombo and Paolo Gidoni. On the optimal control of rate-independent soft crawlers. *Journal de Mathématiques Pures et Appliquées* (146):127–157, 2021. (doi: 10.1016/j.matpur.2020.11.005)
- [15] Paolo Gidoni and Filippo Riva. A vanishing inertia analysis for finite dimensional rate-independent systems with nonautonomous dissipation and an application to soft crawlers. *Calculus of Variations and Partial Differential Equations*, (60): art. 191, 2021. (doi: 10.1007/s00526-021-02067-6)
- [16] Giovanni Colombo, Paolo Gidoni and Emilio Vilches. Stabilization of periodic sweeping processes and asymptotic average velocity for soft locomotors with dry friction. *Discrete & Continuous Dynamical Systems – A*, (42):737–757, 2022 (doi: 10.3934/dcds.2021135)

## Preprints

- [17] Paolo Gidoni. A topological degree theory for rotating solutions of planar systems. *Preprint available at arxiv.org/abs/2109.04971*.
- [18] Paolo Gidoni. Existence of a periodic solution for superlinear second order ODEs. *Preprint available at arxiv.org/abs/2108.13722*.

## Identificatori bibliografici

ORCID 0000-0003-1636-8419  
 ResearcherID F-3625-2017  
 Scopus 56050191600  
 Author ID

## Altre attività

- 2021 **Organizzatore**, *Nonlinear meeting 2021*, Online event, 22–23 March 2021
- 2014 – **Associazione Alumni della Scuola Superiore dell'Università degli Studi di Udine**, *Presidente (2018–2020), Membro del Consiglio Direttivo (2014–2017)*
- 2020 **Organizzatore**, *Understanding locomotion: Nature-inspired mathematical models*, Online event, 11 December 2020
- 2019 **Organizzatore**, *Primo Ritrovo Matematico degli Alumni della Scuola Superiore dell'Università degli Studi di Udine*, Udine, 21 December 2019
- 2015 – 2016 **SISSA SIAM Student Chapter**, *Presidente*
- 2016 **Organizzatore**, *A Day in Applied Mathematics. First joint meeting of the PoliMi and SISSA Student Chapters of SIAM*, SISSA, Trieste, 21 April 2016
- 2016 **Organizzatore**, *Boundary Value Problems in FVG. Final open meeting of the GNAMPA project*, SISSA, Trieste, 4 February 2016
- 2014 – 2016 **Ph.D students representative**, *Mathematics Area Council and School Council*, SISSA – International School for Advanced Studies
- Referee**, *Acta Applicandae Mathematicae, Communications in Pure and Applied Analysis, Journal of Dynamical and Control Systems, Journal of Fixed Point Theory and Applications, Journal of Mathematical Analysis and Applications, Journal of Optimization Theory and Applications, Nonlinear Analysis – Real World Applications, Topological Methods in Nonlinear Analysis*

## Seminari a conferenze o su invito

- 2022 **A topological degree theory for rotating solutions of planar systems**, *contributed talk at Equadiff 15*, Brno, 11–15 July 2022

- 2022 **A topological degree theory for rotating solutions of planar systems**, *invited talk at the Portugal-Italy Conference on Nonlinear Differential Equations and Applications*, Évora, 4-6 July 2022
- 2022 **On the optimal control for the locomotion of rate-independent soft crawlers**, *invited talk at the Workshop on Optimal Control Theory*, Rouen, 24 June 2022
- 2022 **Stabilization of periodic sweeping processes and asymptotic average velocity for a model of soft crawler**, *contributed talk at MURPHYS 2022: Interdisciplinary Conference on Multiple Scale Systems, Systems with Hysteresis*, Ostravice, 2 June 2022
- 2022 **Multiplicity of periodic solutions for asymptotically linear planar systems**, *Institute of Mathematics of the Czech Academy of Sciences*, 12 May 2022
- 2022 **The slow-actuation limit for a rate-independent model of crawling locomotion**, *University of Pavia*, 3 May 2022
- 2022 **Asymptotic stability of running-periodic solutions in some dynamic models of crawling locomotion**, *Second Mini-Workshop on Differential Equations and Dynamical Systems*, Foz do Arelho, 21 April 2022
- 2021 **A mathematical perspective on the quasi-static approximation for crawling locomotion**, *University of Padova*, 20 December 2021
- 2021 **Existence of a periodic solution for superlinear second order ODEs**, *DEG1 webinar*, 29 September 2021
- 2021 **The quasistatic limit for crawling locomotion: a mathematical perspective**, *Applied Analysis Seminar of the University of Graz*, Online, 23 February 2021
- 2021 **A vanishing inertia analysis for finite dimensional rate-independent systems and an application to soft crawlers**, *Lisbon Webinar in Analysis in Differential Equations*, Online, 18 February 2021
- 2020 **An adventure in the modelling of soft crawlers**, *Workshop on the Intersection of Set-Valued Analysis, Plasticity, and Friction*, Online workshop, 2 December 2020
- 2019 **Existence of rotating solutions using topological degree**, *DEG1 Christmas meeting*, Udine, 20 December 2019
- 2019 **An introduction to the modelling of soft crawling locomotors**, *Politecnico di Torino*, 17 October 2019
- 2019 **On the optimal control for the locomotion of rate-independent soft crawlers**, *invited talk at Control of State-Constrained Dynamical Systems*, Valparaiso, 24 September 2019
- 2019 **An introduction to rate-independent soft crawlers**, *contributed talk at Calculus of Variations on Schiermonnikoog 2019*, Schiermonnikoog, 2 July 2019
- 2019 **An introduction to the modelling of soft crawling locomotors**, *Nečas seminar on continuum mechanics*, Charles University, Praha, Praha, 29 April 2019
- 2018 **On the modelling of crawling locomotion with sweeping processes**, *Minisymposium talk at Emerging Trends in Applied Mathematics and Mechanics*, Krakow, 21 June 2018
- 2018 **From Poincaré–Birkhoff Theorem to Maslov index: searching for more periodic solutions**, *invited talk at eXtraOrdinary Differential Equations*, Foz do Arelho, 29 March 2018
- 2017 **An introduction to rate-independent soft crawlers**, *invited talk at the conference Control of state constrained dynamical systems*, Padova, 28 September 2017
- 2017 **Multiplicity of periodic solutions for Hamiltonian Systems via a generalized Poincaré–Birkhoff Theorem**, *special session talk at the conference ICDDEA 2017*, Amadora, 5 June 2017
- 2016 **Locomotion of a bio-inspired crawler: stasis domains and sweeping processes**, *contributed talk at the conference Patterns of dynamics*, Berlin, 25 July 2016
- 2016 **Stasis Domains in the Locomotion of a Bio-Inspired Crawler**, *contributed talk at the SIAM Annual Meeting 2016*, Boston, 13 July 2016
- 2016 **Twist conditions for a higher dimensional Poincaré–Birkhoff Theorem: an avoiding cones formulation**, *special session talk at the 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications*, Orlando, 4 July 2016
- 2016 **On the genesis of directional dry friction through bristle-like mediating elements**, *special session talk at the 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications*, Orlando, 3 July 2016

- 2016 **Twist conditions for a higher dimensional Poincaré-Birkhoff Theorem: an avoiding cones formulation**, *University of Granada*, 11 February 2016
- 2016 **An avoiding cones condition for the Poincaré–Birkhoff fixed point theorem**, *Boundary Value Problems in FVG*, SISSA, Trieste, 4 February 2016
- 2016 **Quasi-static evolution, friction and crawling motility**, *invited talk at An afternoon of nonlinear problems*, University of Milano–Bicocca, Milano, 27 January 2016
- 2016 **An introduction to crawling motility and quasi-static modelling**, *University of Helsinki*, Helsinki, 20 January 2016
- 2015 **Generalizing the Poincaré–Miranda’s Theorem: the avoiding cones condition**, *contributed talk at the VII Symposium on Nonlinear Analysis*, Toruń, 15 September 2015
- 2015 **Survival "à la Poincaré–Birkhoff" of periodic solutions: a higher dimensional perspective**, *University of Trieste*, Trieste, 9 July 2015
- 2015 **Alcune generalizzazioni del Teorema di Poincaré–Miranda**, *University of Udine*, Udine, 10 March 2015
- 2014 **A permanence theorem for dynamical systems**, *contributed talk at Variational Methods in Elliptic Equations and Systems*, Lisboa, 8 January 2014