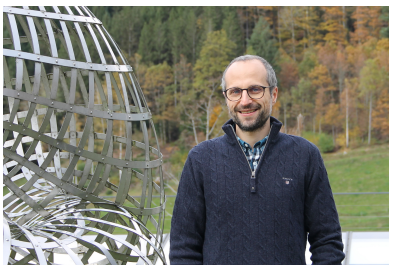
Giovanni S. Alberti

Curriculum Vitae



Contact info

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Personal info

Date of Birth: 6th August 1987
Nationality: Italian
Languages: English (fluent), French (fluent), Italian (mother tongue)

Employment

2024 – now	University of Genoa, Dept. of Mathematics, full professor
2022 – 2024	University of Genoa, Dept. of Mathematics, associate professor
2016 – 2022	University of Genoa, Dept. of Mathematics, assistant professor
2015 – 2016	ETH Zürich, Department of Mathematics, Postdoc
2014 – 2015	École Normale Supérieure, Paris, DMA, Postdoc

Education

2011 – 2014	Oxford University, Doctor of Philosophy in Mathematics
2006 – 2011	University of Genoa, BSc+MSc in Maths (110/110 *cum laude*)

Research interests

Partial differential equations, inverse problems, functional analysis, applied harmonic analysis, wavelets, compressed sensing, machine learning

Grants

2023 – 2026	AFOSR, Co-PI, $240K
2023 – 2025	PRIN 2022, PI, €190K
2022 – 2027	ERC Starting Grant 2021, PI, €1,2M
2021 – 2023	UniGe BIPE "Promoting Competitiveness", PI, €85K
2020 – 2023	AFOSR, Co-PI, $253K
2019 – 2021	UniGe starting grant "Curiosity driven", PI, €60K
2016 – 2018	ETH Postdoctoral Fellowship co-funded by ETH and Marie Curie actions (salary and research funding), PI, CHF 225K
2011 – 2015	EPSRC Doctoral Training Award (University of Oxford)

Honours & awards

2021	Abilitazione Professore I Fascia in Analisi Matematica
2021	Selected for "Emerging Talents 2021" of the journal *Inverse Problems*
2018	Eurasian Association on Inverse Problems Young Scientist Award
2017	Abilitazione Professore II Fascia in Analisi Matematica
2017	Premio "Gioacchino Iapichino" per l'Analisi Matematica
2015	IMA Lighthill-Thwaites Prize Finalist
2006	Bronze Medal – Italian Mathematical Olympiad

Updated on 1st August 2024.

PUBLICATIONS

Preprints

[P3] G.S.A., L. Ratti, M. Santacesaria and S. Sciutto, *Learning a Gaussian Mixture for Sparsity Regularization in Inverse Problems*, 2024.

[P2] G.S.A., A. Felisi, M. Santacesaria and S. I. Trapasso, *Compressed sensing for inverse problems and the sample complexity of the sparse Radon transform*, 2023.

[P1] G.S.A., M. Santacesaria and S. Sciutto, *Continuous Generative Neural Networks*, 2022.

Journal articles

[A28] G.S.A., J. Hertrich, M. Santacesaria and S. Sciutto, *Manifold Learning by Mixture Models of VAEs for Inverse Problems*, J. Mach. Learn. Res., 25(202),1–35, 2024.

[A27] G.S.A., R. Petit and M. Santacesaria, *Localization of point scatterers via sparse optimization on measures*, SIAM J. Imaging Sci., 17(3), 619–1649, 2024.

[A26] R. Alaifari, G.S.A. and T. Gauksson, *Localized adversarial artifacts for compressed sensing MRI*, SIAM J. Imaging Sci., 16(4), SC14–SC26, 2023.

[A25] G.S.A., Á. Arroyo and M. Santacesaria, *Inverse problems on low-dimensional manifolds*, Nonlinearity, 36, 734–808, 2023.

[A24] G.S.A., *Non-zero constraints in elliptic PDE with random boundary values and applications to hybrid inverse problems*, Inverse Probl. 38, 124005, 2022.

[A23] G.S.A. and M. Santacesaria, *Calderón's Inverse Problem with a Finite Number of Measurements II: Independent Data*, Appl. Anal., 101(10), 3636–3654, 2022.

[A22] G.S.A. and M. Santacesaria, *Infinite-dimensional inverse problems with finite measurements*, Arch. Rational Mech. Anal., 243(1), 1–31, 2022.

[A21] G.S.A. and Y. Capdeboscq, *Combining the Runge approximation and the Whitney embedding theorem in hybrid imaging*, Int. Math. Res. Notices, 2022(6), 4387–4406, 2022.

[A20] G.S.A., P. Campodonico and M. Santacesaria, *Compressed sensing photoacoustic tomography reduces to compressed sensing for undersampled Fourier measurements*, SIAM J. Imaging Sci., 14(3), 1039–1077, 2021.

[A19] G.S.A. and M. Santacesaria, *Infinite dimensional compressed sensing from anisotropic measurements and applications to inverse problems in PDE*, ACHA, 50, 105–146, 2021.

[A18] G.S.A., Y. Capdeboscq and Y. Privat, *On the randomised stability constant for inverse problems*, Math. in Engineering, 2(2): 264–286, 2020.

[A17] G.S.A., F. Bartolucci, F. De Mari and E. De Vito, *Unitarization and Inversion Formulae for the Radon Transform between Dual Pairs*, SIAM J. Math. Anal., 51(6), 2019.

[A16] G.S.A. and M. Santacesaria, *Calderón's Inverse Problem with a Finite Number of Measurements*, Forum Math. Sigma, 7, e35, 2019.

[A15] G.S.A., H. Ammari, F. Romero and T. Wintz, *Dynamic Spike Superresolution and Applications to Ultrafast Ultrasound Imaging*, SIAM J. Imaging Sci., 12(3), 1501–1527, 2019.

[A14] G.S.A., M. Brown, M. Marletta and I. Wood, *Essential spectrum for Maxwell's equations*, Ann. Henri Poincaré, 20(5), 1471–1499, 2019.

[A13] G.S.A., *Hölder regularity for Maxwell's equations under minimal assumptions on the coefficients*, Calc. Var. Partial Differential Equations, 57(3), 71, 2018.

[A12] G.S.A., G. Bal and M. Di Cristo, *Critical Points for Elliptic Equations with Prescribed Boundary Conditions*, Arch. Rational Mech. Anal., 226(1), 117–141, 2017.

[A11] G.S.A., S. Dahlke, F. De Mari, E. De Vito and S. Vigogna, *Continuous and discrete frames generated by the evolution flow of the Schrödinger equation*, Anal. Appl., 2017.

[A10] G.S.A., H. Ammari, F. Romero and T. Wintz, *Mathematical Analysis of Ultrafast Ultrasound Imaging*, SIAM J. Appl. Math., 77(1), 1–25, 2017.

[A9] G.S.A. and H. Ammari, *Disjoint sparsity for signal separation and applications to hybrid inverse problems in medical imaging*, ACHA, 42(2), 319–349, 2017.

[A8] G.S.A., H. Ammari, B. Jin, J.-K. Seo and W. Zhang, *The Linearized Inverse Problem in Multifrequency Electrical Impedance Tomography*, SIIMS, 9(4), 1525–1551, 2016.

[A7] G.S.A., *Absence of Critical Points of Solutions to the Helmholtz Equation in 3D*, Arch. Rational Mech. Anal., 222(2), 879–894, 2016.

[A6] G.S.A., *Enforcing local non-zero constraints in PDEs and applications to hybrid imaging problems*, Comm. PDE, 40(10), 1855–1883, 2015.

[A5] G.S.A., *On multiple frequency power density measurements II. The full Maxwell's equations*, J. Differ. Equations, 258(8), 2767–2793, 2015.

[A4] G.S.A. and Y. Capdeboscq, *Elliptic regularity theory applied to time harmonic anisotropic Maxwell's equations with less than Lipschitz complex coefficients*, SIMA, 46(1), 2014.

[A3] G.S.A., F. De Mari, E. De Vito and L. Mantovani, *Reproducing subgroups of $SP(2,\mathbb{R})$. Part II: Admissible Vectors*, Monatsh. Math., 173(3), 261–307, 2014.

[A2] G.S.A., *On multiple frequency power density measurements*, Inverse Probl., 29(11), 115007, 2013.

[A1] G.S.A., L. Balletti, F. De Mari and E. De Vito, *Reproducing subgroups of $SP(2,\mathbb{R})$. Part I: Algebraic Classification*, J. Fourier Anal. and Appl., 19(4), 651–682, 2013.

Books

[B1] G.S.A. and Y. Capdeboscq, *Lectures on elliptic methods for hybrid inverse problems*, Cours Spécialisés 25, Société Mathématique de France, 2018.

Book chapters and proceedings

[C7] G.S.A., E. De Vito, M. Lassas, L. Ratti and M. Santacesaria, *Learning the optimal regularizer for inverse problems*, NeurIPS 2021.

[C6] G.S.A., F. Bartolucci, F. De Mari and E. De Vito, *Radon Transform: Dual Pairs and Irreducible Representations*, Appl. Numer. Harmon. Anal., 1–28, 2020.

[C5] R. Alaifari, G.S.A. and T. Gauksson, *ADef: an Iterative Algorithm to Construct Adversarial Deformations*, ICLR 2019.

[C4] G.S.A., S. Dahlke, F. De Mari, E. De Vito and H. Führ, *Recent Progress in Shearlet Theory: Systematic Construction of Shearlet Dilation Groups, Characterization of Wavefront Sets, and New Embeddings*, Appl. Numer. Harmon. Anal., 127–160, 2017.

[C3] G.S.A. and Y. Capdeboscq, *On local non-zero constraints in PDE with analytic coefficients*, Contemp. Math., vol. 660, AMS, 2016, pp. 89-97.

[C2] G.S.A., H. Ammari and K. Ruan, *Multi-frequency acousto-electromagnetic tomography*, Contemp. Math., vol. 658, AMS, 2016, pp. 67-79.

[C1] G.S.A. and Y. Capdeboscq, *À propos de certains problèmes inverses hybrides*, Seminaire: Equations aux Dérivées Partielles. 2013–2014, Exp. No. II. École Polytech.

Professional memberships

European Laboratory for Learning and Intelligent Systems (ELLIS)
Inverse Problems International Association (IPIA)
IFIP working group Inverse Problems and Imaging
Gruppo UMI Matematica per l'intelligenza artificiale e il machine learning
Gruppo UMI Matematica delle Immagini, della Visione e delle loro Applicazioni (MIVA)

Institutional memberships

EAIP Young Scientist Award Committee (2022, 2024)
PhD Committee of Adrian Kirkeby (DTU, Copenhagen, 2019), Francesca Bartolucci (UniGe, 2020), Paolo Massa (UniGe, 2022), Andreas Habring (University of Graz, 2023)
Scientific Committee, PhD in Mathematics and applications, UniGe

Editor

2024-now SIAM Journal on Imaging Sciences
2023-now Numerical Functional Analysis and Optimization
2023-now Inverse Problems
2022-now Communications on Analysis and Computation
2019-2021 Inverse Problems in Science and Engineering

Reviewer

Austrian Science Fund, AMS Mathematical Reviews, Anal. PDE, Appl. Anal., Appl. Math. Lett., Appl. Math. Lett., Calc. Var. Partial Differ. Equ., Contemp. Math., ESAIM: Math. Model. Numer. Anal., IMA J. Appl. Math., Inverse Probl., Inverse Probl. Imaging, Isr. J. Math., J. Eur. Math. Soc., Math. Comput., Nonlinear Anal. Real World Appl., SIAM-ASA J. Uncertain. Quantif., SIAM J. Appl. Dyn. Syst., SIAM J. Imaging Sci., SIAM J. Math. Anal., SIAM J. Math. Data Sci., SIAM J. Numer. Anal., Zentralblatt MATH.

Supervision

Postdocs

2024-now Markus Holzleitner
2023-now Romain Petit, Anupam Gumber
2020-2023 Luca Ratti (next: ass. prof. at University of Bologna)
2020-2022 S. Ivan Trapasso (next: ass. prof. at Politecnico di Torino)
2019-2020 Ángel Arroyo (next: ass. prof. at University Carlos III of Madrid)

PhD students

Simone Sanna (2023-now), Işıl Güleken (2022-now), Alessandro Felisi (2021-now), Silvia Sciutto (2020-2024), Tandri Gauksson (2018-2024, ETH Zürich)

Master's students

Lorenzo Bozzi (2024), Veronica Raffetto (2024), Lorenzo Sacchi (2023), Simone Sanna (2023), Camilla Casaleggi (2023), Silvia Sciutto (2020), Paolo Campodonico (2019), Luca Di Fazio (2018, co-supervision, University of Catania), Victor Storchan (2015, co-supervision, École Normale Supérieure)

Bachelor's students

L. Finotti (2023), G. Traverso (2023), M. Arscone (2022), S. Buzzo (2022), S. Sanna (2021), M. Bertuzzo (2021), F. Papallo (2020), L. Bozzi (2020), B. Ravera (2020), M. Baracchini (2019), E. Dellepiane (2019), D. Parodi (2019), S. Sciutto (2018)

Organisation

9/2024	Applied Harmonic Analysis and Machine Learning, *UniGe*
6/2023	INdAM Workshop on Learning for Inverse Problems, *INdAM, Rome*
5/2022	XLI Convegno di Analisi Armonica, *University of Genoa*
5/2022	Electrical Impedance Tomography: Theory and Applications, *IPMS*
3/2022	Data-Driven Methods in Inverse Problems & Imaging, *SIAM IS*
9/2019	Applied Harmonic Analysis and Machine Learning, *UniGe*
7/2019	Compressed Sensing meets Inverse Problems, *AIPC 2019*
5/2018	Direct and Inverse Problems for Maxwell's Equations, *IPMS 2018*
7/2017	Summer School on Applied Harmonic Analysis, *University of Genoa*

Conference talks

12/2024	AIMS Conference, *NYU Abu Dhabi*
9/2024	Statistical aspects of non-linear inverse problems, *Cambridge, UK*
7/2024	AMS-UMI Joint Meeting, *University of Palermo, Italy*
5/2024	XLIII Convegno nazionale di analisi armonica, *University of Padua*
5/2024	International Conference on Elliptic and Parabolic Problems, *Gaeta*
2/2024	SIAM conference on Uncertainty Quantification, *Trieste, Italy*
1/2024	Inverse Problems in the Physical Sciences, *Puerto Varas, Chile*
12/2023	CoMFoS23: Mathematical Aspects of Continuum Mechanics 2023
11/2023	Control Methods in Hyperbolic PDEs, *MFO Oberwolfach*
9/2023	Congresso UMI 2023, *University of Pisa*
9/2023	Applied Inverse Problems Conference (plenary speaker), *Göttingen*
7/2023	Deep Learning for Computational Physics (keynote speaker), *UCL*
6/2023	Leveraging model- and data-driven methods in medical imaging, *BIRS, UBC Okanagan*
5/2023	MATH + X Symposium on Dynamos, Planetary Exploration and General Relativity, Inverse Problems and Machine Learning, *Hella*
2/2023	2023 BASP Frontiers workshop, *Villars-sur-Ollon – Switzerland*
12/2022	Inverse problems in the desert, *New York University Abu Dhabi*
12/2022	Recent advances in direct and inverse problems for PDEs and applications, *Sapienza University of Rome*
11/2022	Inverse problems on large scales, *RICAM, Linz – Austria*
10/2022	PICOF 2022 (plenary speaker), *Caen – France*
9/2022	MIA-MIVA workshop, *Université Côte d'Azur*
3/2022	SIAM Conference on Imaging Science
11/2021	Statistical aspects of non-linear inverse problems, *Banff – Canada*
9/2021	Chemnitz Symposium on Inverse Problems 2021, *Klagenfurt*
9/2021	IFIP TC7 Conference on System modeling and optimization, *Quito*
9/2021	SIMAI 2020, *University of Parma*
3/2021	Tomographic Reconstructions and their Startling Applications, *ESI*

	9/2020	Inverse Problems for PDEs: A one day webinar in occasion of the 65^{th} birthday of Sergio Vessella
	7/2020	SIAM Conference on Imaging Science
	6/2020	Convegno Nazionale di Analisi Armonica, *University of Bologna*
	9/2019	Dynamics, Equations and Applications 2019, *AGH UST, Kraków*
	7/2019	Applied Inverse Problem Conference, *University of Grenoble*
	6/2019	Reconstruction Methods for Inverse Problems, *Banff – Canada*
	5/2019	Inverse Problems and Machine Learning Workshop, *CRM, Montreal*
	5/2019	Spring Workshop on Computational Mathematics, Statistics and Machine Learning, *University of Pavia*
	1/2019	Operators, Operator Families, and Asymptotics II, *Bath – UK*
	6/2018	SIAM Conference on Imaging Science, *Bologna*
	5/2018	Reconstruction Methods in Inverse Problems, *INDAM, Rome*
	5/2018	Inverse Problems: Modeling & Simulation (plenary speaker), *Malta*
	3/2018	Inverse Problems, Imaging and PDEs, *IAS, Hong Kong*
	1/2018	Trends in Hybrid Data Tomography, *DTU, Copenhagen*
	7/2017	Radon meets Bell and Maxwell, *RICAM, Linz – Austria*
	5/2017	Applied Inverse Problem Conference, *Hangzhou – China*
	4/2017	Inverse Problems Network Meeting 1, *Cardiff University*
	3/2017	100 Years of the Radon Transform, *RICAM, Linz – Austria*
	2/2017	INdAM Workshop on Biomedical Imaging, *Sapienza, Rome*
	6/2016	Computational and Analytic Problems in Spectral Theory, *Cardiff*
	6/2016	PICOF 2016, *Autrans – France*
	3/2016	New trends in Hybrid Ultrasonic Imaging, *Orléans – France*
	12/2015	Inverse Problems Workshop, *Marseille – France*
	11/2015	Compressive Sensing and Sparsity: Theory and Applications in Tomography, *University of Manchester*
	10/2015	Mathematics for Imaging Workshop, *ETH Zürich*
	7/2015	EquaDiff 2015, *Université Claude Bernard Lyon 1*
	6/2015	Hybrid Methods in Imaging, *Banff – Canada*
	5/2015	Applied Inverse Problem Conference, *University of Helsinki*
	3/2015	British Applied Mathematics Colloquium, *University of Cambridge*
	3/2015	Real and complex manifolds: geometry, topology and harmonic analysis, *Scuola Normale Superiore di Pisa*
	12/2014	Inverse Days 2014, *Tampere – Finland*
	8/2014	Imaging, Multi–scale and high contrast PDEs, *NIMS – Korea*
	7/2014	The 10^{th} AIMS Conference on Dynamical Systems, Differential Equations and Applications, *Universidad Autónoma de Madrid*
	7/2014	Hybrid imaging and multi-modal imaging, *Manchester University*
	7/2014	Young Researchers in Mathematics, *University of Warwick*
	6/2014	Workshop Imagerie Multi-Ondes, *Université Fourier – Grenoble*
	2/2014	Problèmes Inverses et Imagerie, *Institut Henri Poincaré – Paris*
	1/2014	6^{th} South West Regional PDE Winter School, *Oxford University*
	7/2013	Applied Inverse Problem Conference, *KAIST – Korea*
INVITED	1/2018	PhD School on Hybrid Data Tomography, *DTU, Copenhagen*

COURSES	4/2017	Spring School in Analysis, *Polish Academy of Sciences*
	2/2017	INdAM Workshop on Biomedical Imaging, *Sapienza, Rome*
SEMINARS	2/2024	Statistics Seminar, *University of Cambridge*
	5/2023	*Collegio Fonda, Trieste*
	5/2023	Webinar on Scientific Machine Learning, *NYCU, Taiwan*
	11/2022	Analysis seminar, *University of Milan*
	9/2022	IAS Program on Inverse Problems, Imaging and PDEs, *HKUST*
	4/2022	UMI AI&ML&MAT
	3/2022	Partial Differential Equation and Applications Seminar, *Warwick*
	3/2022	Seminari di Matematica Applicata, *University of Pavia*
	3/2022	Machine Learning Seminar, *Italian Institute of Technology*
	1/2022	Applied Analysis Seminar, *University of Heidelberg*
	12/2021	OneWorld IMAGINE seminar
	10/2021	Mathematics Colloquium, *New York University Abu Dhabi*
	10/2021	Analysis & PDE Seminar, *Cardiff University*
	3/2021	Inverse Problems Seminar Series, *UCL – London*
	1/2021	Mathematical Methods in the Theory of Electromagnetism, *Padua*
	4/2019	Colloquium in Applied and Computational Math., *ETH Zürich*
	10/2018	PDE CDT Lunchtime Seminar, *University of Oxford*
	7/2018	Analysis Seminar, *University of Catania*
	6/2018	Differential Equations and Applications, *University of Padua*
	5/2018	Seminar of Calculus of Variations and PDEs, *University of Florence*
	4/2018	D.A.T.A & Crostata Seminars, *University of Genoa*
	10/2016	Analysis Seminar, *Politecnico di Milano*
	10/2016	PDE Seminar, *Université de Lorraine*
	6/2016	Analysis Seminar, *Università di Trieste*
	10/2015	Inverse Problems Seminar Series, *UCL – London*
	6/2015	Inverse Problems Seminar, *IHP – Paris*
	2/2015	Applied Harmonic Analysis Seminar, *Università di Genova*
	11/2014	ENS Analysis Seminar, *ENS – Paris*
	10/2014	Maths for Imaging Seminar, *ENS – Paris*
	5/2014	OxPDE Lunchtime Seminar, *University of Oxford*
	3/2014	MACSI Seminar Series, *University of Limerick*
	11/2013	Graduate Seminar, *St Peter's College – Oxford University*
	2/2013	MIDA Seminar, *Università di Genova*
	1/2013	OxPDE Junior Seminar, *Oxford University*

TEACHING		University of Genoa
	2022	Machine Learning Crash Course
	2021-now	Analysis 2
	2021	Machine Learning for Inverse Problems, Calculus
	2018-now	Functional analysis
	2018-2019	Fourier Analysis
	2017-2018	Analysis 1, Measure theory

Assistant – ETH Zürich

2016 Mathematics of Super-Resolution Biomedical Imaging

2015 Numerical methods for Computational Science and Engineering

Teaching assistant – University of Oxford

2013 Differential equations (Trinity and Hilary term)

2012 Hilbert spaces (Hilary term)

2011 Banach spaces (Michaelmas term)