

Gabriele Mancini

Curriculum Vitae

Personal Information

Full Name Gabriele Mancini
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Current Position

Position Associate Professor
Institute Università degli Studi di Bari Aldo Moro
Department Dipartimento di Matematica
Starting date May 3, 2024

Past Experiences

May 2021 to Apr. 2024 Assistant Professor (Ricercatore di tipo B)
Institution: Università degli Studi di Bari Aldo Moro, Dipartimento di Matematica
Scientific disciplinary sector: MAT/05 - Analisi Matematica

From Oct. 2020 to Apr. 2021 Assistant Professor (Ricercatore di tipo A)
Institution: Università degli Studi di Roma La Sapienza, Dipartimento di Matematica
Scientific disciplinary sector: MAT/05 - Analisi Matematica
Project: Analisi Matematica e sue Applicazioni

From Jun. 2020 to Sep. 2020 Postdoc in Mathematical Analysis (Assegnista di ricerca)
Institution: Università degli Studi della Campania, Dipartimento di Matematica e Fisica
Funding: MIUR project PRIN 2017JPCAPN
Supervisor: Professor Giusi Vaira
Project: "Equazioni differenziali alle derivate parziali non lineari"

From Sep. 2019 to May 2020 INDAM Research Fellow (Assegnista di ricerca INDAM)
Institution: Università Sapienza di Roma, Dipartimento S.B.A.I.
Funding: INDAM - Istituto Nazionale di Alta Matematica
Supervisor: Professor Angela Pistoia
Project: "Sharp Inequalities and lack of compactness for Moser-Trudinger type embeddings"

- From Sep. 2018 to Aug. 2019 Postdoc in Mathematical Analysis (Assegnista di ricerca)
 Institution: Università Sapienza di Roma, Dipartimento S.B.A.I.
 Supervisor: Professor Angela Pistoia.
 Project: “Non-linear Partial Differential Equations in Geometry and Physics”
- From Oct. 2017 to Aug. 2018 Postdoc in Mathematical Analysis (Assegnista di ricerca)
 Institution: Università degli Studi di Padova - Dipartimento di Matematica Tullio Levi-Civita
 Supervisor: Professor Luca Martinazzi.
 Project: “Non-linear and non-local differential equations in functional and geometric analysis” Swiss National Science foundation Project PP00P2-170588
- From Oct. 2015 to Sep. 2017 Postdoctoral Researcher in Mathematics
 Institution: Universität Basel - Departement Mathematik und Informatik (Basel, Switzerland)
 Research Group: Research Group in Mathematical Analysis
 Supervisor: Professor Luca Martinazzi.
 Funding: SNF - Swiss National Science Foundation

Education

- 2011–2015 Ph.D. in Applied Mathematics, *SISSA - Scuola Internazionale Superiore di Studi Avanzati, Trieste, Italy*
 Date: September 25, 2015
 Thesis: *Sharp Inequalities and Blow-up Analysis for singular Moser-Trudinger Embeddings*
 Advisor: Prof. Andrea Malchiodi
- 2008–2011 Master’s Degree in Mathematics, *Università degli Studi Roma Tre, Rome, Italy*
 Graduation Marks: 110/110 cum laude
 Thesis Title: *Moser-Trudinger inequality and applications to a geometric problem*
 Advisor: Prof. Giovanni Mancini
- 2005–2008 Bachelor’s Degree in Mathematics, *Università degli Studi Roma Tre, Rome, Italy*
 Graduation Marks: 110/110 cum laude
 Final Exam: B-type final exam (PFB).
- 2000–2005 High School Diploma, *Liceo Scientifico Statale Farnesina, Rome, Italy*
 Indirizzo Scientifico Sperimentale PNI
 Final Mark: 100/100
 Thesis: *La teoria della relatività di Einstein: originalità ed inquadramento storico culturale*

Research Interests

My research interests include Calculus of Variations, Partial Differential Equations, Functional Analysis and Riemannian Geometry. Currently, I am studying the existence of solutions to a class of PDEs involving critical exponential non-linearities and high-order (possibly non-local) elliptic operators. In particular, I am interested in the properties of critical points for Adams-Moser-Trudinger functionals and in the study of Liouville-type equations, which have several applications in conformal geometry and mathematical physics. For instance, they appear in the problem of prescribing the Gaussian curvature of Riemannian surfaces and in the analysis of Abelian Chern-Simons vortices in Electroweak theory. I am also interested in Toda systems,

which are relevant in the description of holomorphic curves on projective spaces and in high temperature superconductivity.

My research focuses on the analysis of quantization and blow-up phenomena, and on their applications to the study of existence of solutions through variational and topological methods.

Publications and preprints

- N. Borgia, S. Cingolani, G. Mancini, *On N -Euclidean Logarithmic Moser-Trudinger-Onofri inequality and some geometrical variants*, ArXiv preprint <https://arxiv.org/abs/2408.04335>
- A. DelaTorre, G. Mancini, A. Pistoia, *Non degeneracy of the bubble for a fractional singular 1d Liouville equation*, ArXiv preprint <https://arxiv.org/abs/2404.14119>
- N. Borgia, S. Cingolani, G. Mancini, *New analytical and geometrical aspects on Trudinger-Moser type inequality in 2D*, submitted for publication on the volume "Singularities, Asymptotics, and Limiting Models", Springer-INdAM series
- A. Hyder, G. Mancini, L. Martinazzi, *Local and nonlocal singular Liouville equations in Euclidean spaces*, International Mathematics Research Notices 2021 (2021), no. 15, url: <https://doi.org/10.1093/imrn/rnz149>.
- A. DelaTorre, G. Mancini, *Improved Adams-type inequalities and their extremals in dimension $2m$* , Communications in Contemporary Mathematics 23 (2021), No. 05, Article No. 2050043, url: <https://doi.org/10.1142/S0219199720500431>.
- M. Grossi, G. Mancini, D. Naimen, A. Pistoia, *Bubbling nodal solutions for a large perturbation of the Moser-Trudinger equation on planar domains*, Mathematische Annalen 380 (2021), url: <https://doi.org/10.1007/s00208-020-01975-w>.
- A. DelaTorre, G. Mancini, A. Pistoia, *Sign-changing solutions for the one-dimensional non-local sinh-Poisson equation*, Advanced Nonlinear Studies 20 (2020), no. 4, <https://doi.org/10.1515/ans-2020-2103>
- G. Mancini, L. Martinazzi, *Extremals for fractional Moser-Trudinger inequalities in dimension 1 via harmonic extensions and commutator estimates*, Advanced Nonlinear Studies 20 (2020), no. 3, url: <https://doi.org/10.1515/ans-2020-2089>.
- G. Mancini, G. Romani, *Uniform bounds for higher-order semilinear problems in conformal dimension*, Nonlinear Analysis 192 (2020), <https://doi.org/10.1016/j.na.2019.111717>.
- G. Mancini, P.-D. Thizy, *Glueing a peak to a non-zero limiting profile for a critical Moser-Trudinger equation*, J. Math. Anal. Appl. 472 (2019), no. 2, 1430-1457, url: <https://doi.org/10.1016/j.jmaa.2018.11.084>
- G. Mancini, P.-D. Thizy, *Non-Existence of Extremals for the Adimurthi-Druet Inequality*, Journal of Differential Equations 266 (2019), no. 2-3, 1051-1072, url: <http://doi.org/10.1016/j.jde.2018.07.065>.
- G. Mancini, L. Martinazzi, *The Moser-Trudinger inequality and its extremals on a disk via energy estimates*, Calculus of Variations and Partial Differential Equations 56:94 (2017), url: <http://doi.org/10.1007/s00526-017-1184-y>.

- S. Iula, G. Mancini, *Extremal Functions for Singular Moser-Trudinger Embeddings*, *Nonlinear Analysis* 156 (2017), 215-248, url: <http://doi.org/10.1016/j.na.2017.02.029>.
- G. Mancini, *Singular Liouville Equations on S^2 : Sharp Inequalities and Existence Results*, preprint available at <http://arxiv.org/abs/1508.02090>.
- G. Mancini, *Onofri-type inequalities for singular Liouville equations*, *Journal of Geometric Analysis* 26 (2016) Issue 2, 1202–1230, url: <http://doi.org/10.1007/s12220-015-9589-3>.
- L. Battaglia, G. Mancini, *A note on compactness properties of the singular Toda system*, *Atti Accad. Naz. Lincei, Rend. Lincei Mat. Appl.* 26 (2015), no. 3, 299–307, url: <http://doi.org/10.4171/RLM/708>.
- L. Battaglia, G. Mancini, *Remarks on the Moser-Trudinger inequality*, *Adv. Nonlinear Anal.* 2 (2013), no. 4, 389–425, url: <http://doi.org/10.1515/anona-2013-0014>.

Teaching Activity

- a.y. 2023/2024 Lecturer for the course *Matematica* at *Università degli Studi di Bari*, Dipartimento di Scienze della Terra e Geoambientali, course in *Scienze Geologiche*.
- a.y. 2023/2024 Assistant Lecturer for the course *Analisi Matematica 1* at *Università degli Studi di Bari*, Dipartimento di Matematica
- a.y. 2023/2024 Lecturer for the course *Elementi di Matematica* at *Università degli Studi di Bari*, Dipartimento di Matematica
- a.y. 2022/2023 Lecturer for the course *Prescribed curvature problems and Liouville Equations* for the PhD Programme in Computer Science and Mathematics at *Università degli Studi di Bari Aldo Moro*
- a.y. 2022/2023 Lecturer for the course *Matematica* at *Università degli Studi di Bari*, Dipartimento di Scienze della Terra e Geoambientali, course in *Scienze Geologiche*.
- a.y. 2022/2023 Assistant Lecturer for the course *Analisi Matematica 2* at *Università degli Studi di Bari*, Dipartimento di Matematica
- a.y. 2022/2023 Assistant Lecturer for the course *Analisi Matematica 1* at *Università degli Studi di Bari*, Dipartimento di Matematica
- a.y. 2022/2023 Lecturer for the course *Introduzione al Linguaggio Matematico* at *Università degli Studi di Bari*, Dipartimento di Matematica
- a.y. 2021/2022 Lecturer for the course *Matematica* at *Università degli Studi di Bari*, Dipartimento di Scienze della Terra e Geoambientali, course in *Scienze Geologiche*.
- a.y. 2021/2022 Assistant Lecturer for the course *Analisi Matematica n. 1 e 2* at *Università degli Studi di Bari*, Dipartimento di Matematica
- a.y. 2021/2022 Lecturer for the course *Precorso* at *Università degli Studi di Bari*, Dipartimento di Matematica
- a.y. 2020/2021 Assistant Lecturer for the course *Analisi Matematica 2* at *Università degli Studi di Bari*, Dipartimento Interuniversitario di Fisica, course in *Scienze dei Materiali*
- a.y. 2020/2021 Lecturer for the course *Ottimizzazione* at *Università degli Studi di Roma La Sapienza*, Dipartimento di Matematica Guido Castelnuovo

- a.y. 2019/2020 Teaching Assistant for the course *Analisi Matematica 1* at *Università degli Studi Roma Tre*, Dipartimento di Ingegneria
- a.y. 2019/2020 Assistant Lecturer for the courses *Analisi Matematica I - Canale AO* and *Analisi Matematica I - Canale PZ* at *Università Sapienza di Roma*, Facoltà di Ingegneria Civile e Industriale, course in *Ingegneria Clinica*.
- a.y. 2018/2019 Teaching Assistant for the course *Analisi Matematica 1* at *Università degli Studi Roma Tre*, Dipartimento di Ingegneria
- a.y. 2016/2017 Lecturer for the course *Variational Methods for Elliptic PDEs* at *Universität Basel*, Departement Mathematik und Informatik
- a.y. 2015/2016 Teaching assistant for the course of *Analysis II* at *Universität Basel*, Departement Mathematik und Informatik
- November 2014 Training sessions for the *Coppa Aurea* project at *Liceo Scientifico Oberdan* (Trieste, Italy) and *Liceo Scientifico Duca degli Abruzzi* (Gorizia, Italy).
- November 2014 Training session for the *Coppa Aurea* project at *Liceo Scientifico Duca degli Abruzzi*, Gorizia, Italy
- 2007 - 2010 Tutor for the course *Analisi Matematica III* at *Università Degli Studi Roma Tre*, Dipartimento di Matematica
- 2007 - 2010 Tutor for the course *Analisi Matematica II* at *Università Degli Studi Roma Tre*, Dipartimento di Matematica

Honors and Awards

- May 2021 National Scientific Qualification for the calls in the role of Associate Professor in Mathematical Analysis
- August 2019 Winner of a national research grant by *Istituto Nazionale Di Alta Matematica* (INDAM) for the academic year 2019-2020.
- March 2009 Grant by *Istituto Nazionale Di Alta Matematica* (INDAM) for first year students of Master's course of Mathematics
- September 2005 Grant by *Università degli Studi Roma Tre* for first year students of Bachelor's course of Mathematics

Funding and Research Projects

- 2024-2025 Participation to the PRIN PNRR 2022 Project P2022YFAJH - *Linear and Nonlinear PDE's: New directions and Applications*
- 2022-2025 Member of the research project *PNRR - National Centre for HPC, Big Data and Quantum Computing, Spoke 5 - Environment & Natural Disasters*, code CUP-H93C22000450007
- 2024 Member of the 2024 GNAMPA research project *Problemi di doppia curvatura su varietà a bordo e legami con le EDP di tipo ellittico*, funded by the INDAM group *Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni (GNAMPA)*. Principal investigator: *Marco Ghimenti, Università di Pisa*.

- 2023-2024 Member of the 2023 GNAMPA research project *Fenomeni di concentrazione in PDEs non locali*, funded by the INDAM group *Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni (GNAMPA)*. Principal Investigator: Azhara DelaTorre, Università Sapienza di Roma
- 2022-2023 Principal investigator for the GNAMPA-INDAM research project "*Fenomeni di blow-up per equazioni non lineari*", code CUP-E55F22000270001, funded by the INDAM group *Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni (GNAMPA)*
- 2020-2021 Member of the research project "*Aspetti variazionali di alcune PDE in geometria conforme*" funded by the INDAM group *Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni (GNAMPA)*
- 2019-2020 Member of the research project "*Esistenza, unicità e proprietà qualitative di soluzioni di equazioni differenziali su varietà Riemanniane*", funded by Sapienza University of Rome, coordinated by Prof. Massimo Grossi

Invited talks

- September 2024 *Existence and non-degeneracy of Liouville bubbles in dimension one*
Conference *Incontro INdAM a Bari 2024*, Bari, Italy
- August 2024 *Singular Liouville equations in high and low dimension*
Conference *Variational methods in applications to PDEs*, Będlewo Conference Center, Poland
- July 2024 *Non-degeneracy of solutions for singular Liouville equations in dimension one*
AMS-UMI International Joint Meeting 2024
- August 2023 *Local and nonlocal singular Liouville-type equations*
2023 SIMAI Conference, session *Anomalies emerging in math. modeling and probability*
Università degli Studi della Basilicata, Matera, Italy
- February 2023 *Local and non-local singular Liouville-type equations in Euclidean spaces*
Workshop on Variational Methods and Functional Inequalities
Osaka Metropolitan University, Osaka, Japan
- November 2021 *On a class of elliptic problems involving exponential-type non-linearities*
Indam day - *Mathematics and Industry: from basic research to applications*
Politecnico di Bari, Bari, Italy
- November 2021 *Disuguaglianze di Adams-Moser-Trudinger e applicazioni*
Workshop *Tutti insieme nonlinearmemente*, Regio hotel Manfredi, Manfredonia (FG), Italy
- May 2021 *Local and non-local Liouville type equations in Euclidean spaces*
Università Degli Studi di Napoli Federico II
Seminario di Analisi al Dipartimento di matematica e applicazioni Renato Caccioppoli
- March 2021 *Extremal functions for fractional Moser-Trudinger inequalities in dimension 1*
2021 AMS Spring Eastern Virtual Sectional Meeting
Geometric and Functional Inequalities and Nonlinear Partial Differential Equations
- December 2020 *Local and non-local Liouville type equations in Euclidean spaces*
Online seminar: *PDE's: Italia vs España*
<https://sites.google.com/view/pdesespanaitalia/home>

- February 2020 *Strongly Perturbed Moser-Trudinger Functionals And Their Critical Points In Dimension Two*
Workshop: *Variational Analysis On Critical Problems Of Nonlinear Partial Diff. Eq.*
Osaka-City University, Osaka, Japan
- January 2020 *Bubbling solutions for large perturbations of the Moser-Trudinger critical equation on planar domains*
V Congreso de Jóvenes Investigadores de la RSME - Castelló, Spain
- August 2019 *Bubbling nodal solutions for a large perturbation of the Moser-Trudinger critical equation on planar domains*
Sharp geometric inequalities and applications to geometry and PDEs
Tsinghua Sanya International Mathematics Forum, Sanya, China
- June 2019 *Bubbling phenomena for a class of perturbed Moser-Trudinger critical equations in dim. two*
Intensive Week of PDEs@Cogne, Cogne, Italy
- May 2019 *Energy quantification for perturbed Moser-Trudinger functionals in dimension two*
International Conference on Elliptic and Parabolic Problems, Gaeta, Italy
- May 2019 *Bubbling nodal solutions for a large perturbation of the Moser-Trudinger eq. on planar domains*
Nonlinear Geometric PDE's, Banff International Research Station, Banff, Alberta, Canada
- December 2018 *Energy quantification for Moser-Trudinger type nonlinearities in dimension two*
Dipartimento di Matematica Guido Castelnuovo, Università Sapienza di Roma, Rome, Italy
- May 2018 *Improved Adams-type inequalities and their extremals in dimension $2m$*
Università degli studi di Padova, Padova, Italia
- June 2016 *Critical points and Extremals of the Moser-Trudinger inequality*
2016 EWM-EMS Summer School, Institut Mittag-Leffler, Stockholm, Sweden
- May 2015 *Compactness Properties for Singular Liouville Equations and Systems*
Universität Basel, Basel, Switzerland
- May 2015 *Onofri-type Inequalities for Singular Liouville Equations on S^2*
Università di Roma Tor Vergata, Rome, Italy
- February 2015 *Mass Quantization for Liouville Equations and Toda Systems*
AJS seminar, SISSA, Trieste, Italy
- March 2014 *Onofri's inequality and blow-up analysis for the singular Liouville equation.*
AJS seminar, SISSA, Trieste, Italy
- February 2013 *Remarks on the Moser-Trudinger inequality*
University of Warwick, Coventry, UK

Dissemination Activities (Terza Missione)

- September 2024 Organizer of the activities of the Department of Mathematics for the *European Researcher's Night 2024*, held on September 27, 2024
- March 2024 Member of the committee for the *Pi-Talk* competition organized on March 13, 2024 at the Department of Mathematics of *Università degli Studi di Bari*, on the occasion of the International Day of Mathematics
- September 2023 Participation to the *European Researchers' Night 2023* held on September 29, 2023, for the information desk of the Department of Mathematics.

- March 2023 Member of the committee for the *Pi-Talk* competition organized on March 15, 2023 at the Department of Mathematics of *Università degli Studi di Bari*, on the occasion of the International Day of Mathematics
- October 2022 Participation to information desk of the Department of Mathematics for the *Open Day* event organized by *Università degli Studi di Bari Aldo Moro* on October 27, 2022.
- September 2022 Participation to the *European Researchers' Night 2022* held on September 30, 2022, for the information desk of the Department of Mathematics.

Other Experiences

- Since April 2024 Delegate of the Department of Mathematics of the University of Bari Aldo Moro for Third Mission activities.
- February 2024 Member of the organizing committee for the workshop *ONE 2024 – a One-day meeting in Nonlinear differential Equations*, to be held at University of Bari Aldo Moro, Department of Mathematics on February 5, 2024.
- 2023-2024 Member of the committee for the revision of the rector election regulation in Statute the of University of Bari Aldo Moro.
- 2022-2024 Member of the social media committee of the Department of Mathematics, Università degli studi di Bari Aldo Moro.
- February 2023 Short visit at *Osaka Metropolitan University* (Japan) and the *RISM - Research Institute for Mathematical Sciences, Kyoto University* (Japan) for the activities of the 2022 RISM research project *Deepening and applications of variational problems*.
- December 2022 Co-advisor for the Bachelor's Degree Thesis in Mathematics of Dr. Michele Paolicelli. Thesis title: *Disuguaglianza di Poincaré in Spazi di Sobolev ed equazioni di tipo p -Laplace*
- December 2021 Co-advisor for the Bachelor's Degree Thesis in Mathematics of Dr. Michele Paolicelli. Thesis title: *Controllo ottimo di sistemi dinamici e il problema dell'atterraggio lunare*
- February 2020 Short visit at *Osaka-City University* (Osaka, Japan) from 18.02.2020 to 22.02.2020, for a scientific collaboration with Prof. Futoshi Takahashi and Prof. Daisuke Naimen
- 2018 Two one-week visits (22-27.04.2018 and 25-30.11.2018) at the *University of Lyon I, Institute Camille-Jordan* (Lyon, France) for a scientific collaboration with Prof. Pierre-Damien Thizy
- April 2018 A short visit at the *University of British Columbia* (Vancouver, Canada) for a scientific collaboration with Dr. Ali Hyder (member of the research group of Prof. Juncheng Wei), from 7.04.2018 to 12.04.2018.
- July 2015 A one-week visit at *Scuola Normale Superiore di Pisa* in the research group of Professor Andrea Malchiodi, from 11.07.2015 to 17.07.2015
- 2014-2015 Two visits at the *University of Basel, Department of Mathematics and Computer Science*, (Basel, Switzerland) in the research group of Prof. Luca Martinazzi, for a total duration of approximately two months
- 2013 Three visits at the *University of Warwick* (UK) in the research group of Professor Andrea Malchiodi for a total duration of approximately seven months

Since 2013 Reviewer for several Mathematical Journals including:

- Advances in Calculus of Variations
- Analysis and PDE
- Calculus of Variations and Partial Differential Equations
- Communications in Partial Differential Equations
- Discrete and Continuous Dynamical System
- International Mathematics Research Notices
- Journal of Functional Analysis
- Nonlinear Analysis
- Transactions of the American Mathematical Society
- Zeitschrift für angewandte Mathematik und Physik

Bari, November 2, 2024

Gabriele Mancini