

PERSONAL INFORMATION **Roberto Ognibene**APPLYING FOR **UNIVERSITÀ DEGLI STUDI DI MILANO**

Selezione pubblica per n.1 posto/i di Ricercatore a tempo determinato in tenure track (RTT) per il settore concorsuale 01/A3, settore scientifico-disciplinare MAT/05, MAT/06 presso il Dipartimento di Matematica "Federigo Enriques", (avviso bando pubblicato sulla G.U. 49 del 18/06/2024) Codice concorso 5582

## EDUCATION

2006–2011 **High School - Scientific Studies (Maturità scientifica)**

Liceo Classico-Scientifico "Ariosto-Spallanzani" - Reggio Emilia, Italy

**Evaluation:** 100/100

2011–2014 **Bachelor's Degree in Mathematics (Laurea triennale)**

Università degli studi di Modena e Reggio Emilia - Modena, Italy

**Evaluation:** 110/110 cum Laude

Thesis Title: "Complessità e Approssimazione"

Supervisor: prof. Mauro Leoncini.

2014–2017 **Master's Degree in Mathematics (Laurea magistrale)**

Università degli studi di Modena e Reggio Emilia - Modena, Italy

**Evaluation:** 110/110 cum Laude

Thesis Title: "Perturbation of the Green-Dirichlet Operator and Weyl's Law"

Supervisor: prof. Massimo Villarini.

2017–2021 **Ph.D. in Mathematics (Dottorato di ricerca)**

Università degli studi di Milano-Bicocca - Milano, Italy

Thesis title: "Monotonicity formulas and blow-up methods for the study of spectral stability and fractional obstacle problems"

Supervisor: prof.ssa Veronica Felli

Defence: 16 April 2021

Referees: A. Ferrero and E. Valdinoci.

## ACADEMIC POSITIONS

Feb 2022 – now **Post-doc fellow (Assegnista di Ricerca)**

Università di Pisa - Pisa, Italy

Within the ERC program VAREG "Variational approach to the regularity of the free boundaries".

Supervisor: prof. Bozhidar Velichkov.

## Sep 2022 – Dec 2022 Junior fellow

Mittag-Leffler Institute, Royal Swedish Academy of Sciences - Stockholm, Sweden

Within the research program "Geometric Aspects of Nonlinear Partial Differential Equations"

Website of the program.

## Feb 2021 – Jan 2022 Post-doc fellow (Assegnista di Ricerca)

Università degli studi di Genova - Genova, Italy

Title of the project: "Equazioni alle derivate parziali e metodi variazionali applicati alla scienza dei materiali".

Supervisor: prof. Edoardo Mainini

## PUBLICATIONS

### Referred publications

1. V. Felli, D. Mukherjee, R. Ognibene, *On fractional multi-singular Schrödinger operators: Positivity and localization of binding*, (2020), J. Funct. Anal., 278 (4), DOI: <https://doi.org/10.1016/j.jfa.2019.108389>.
2. V. Felli, R. Ognibene, *Sharp convergence rate of eigenvalues in a domain with a shrinking tube*, (2020), J. Differential Equations, 269 (1), pp. 713-763, DOI: <https://doi.org/10.1016/j.jde.2019.12.022>.
3. V. Felli, B. Noris, R. Ognibene, *Eigenvalues of the Laplacian with moving mixed boundary conditions: the case of disappearing Dirichlet region*, (2020), Calc. Var. and Partial Differential Equations, 60 (1), art. no. 12, DOI: <https://doi.org/10.1007/s00526-020-01878-3>.
4. E. Cinti, R. Ognibene, B. Ruffini, *A quantitative stability inequality for fractional capacities*, (2021), Math. Eng., 4 (5), pp. 1-28, DOI: <https://doi.org/10.3934/mine.2022044>.
5. V. Felli, B. Noris, R. Ognibene, *Eigenvalues of the Laplacian with moving mixed boundary conditions: the case of disappearing Neumann region*, (2022), J. Differential Equations, 320, pp. 247-315, DOI: <https://doi.org/10.1016/j.jde.2022.02.052>.
6. E. Mainini, R. Ognibene, D. Percivale, *Asymptotic Behavior of Constrained Local Minimizers in Finite Elasticity*, (2022), J. Elast, DOI <https://doi.org/10.1007/s10659-022-09946-9>.
7. D. Danielli, R. Ognibene, *On a weighted two-phase boundary obstacle problem*, (2023), Indiana Univ. Math. J. 72, No. 4, 1627–1666 , DOI: <https://doi.org/10.1512/iumj.2023.72.9481>.
8. L. Abatangelo, R. Ognibene, *Sharp behavior of Dirichlet-Laplacian eigenvalues for a class of singularly perturbed problems*, (2024), SIAM Journal on Math. Anal., 56 (1), pp. 474-500. DOI: <https://doi.org/10.1137/23M1564444>.
9. F. Bianchi, L. Brasco, R. Ognibene, *On the spectrum of sets made of cores and tubes*, (2024), J. Convex Anal. 31, No. 2, 315-358, <https://www.heldermann.de/JCA/JCA31/JCA312/jca31022.htm>

### Preprints

1. V. Felli, B. Noris, R. Ognibene, G. Siclari, *Quantitative spectral stability for Aharonov-Bohm operators with many coalescing poles*, (2023), <https://doi.org/10.48550/arXiv.2306.05008>.
2. V. Felli, L. Liverani, R. Ognibene, *Quantitative spectral stability for the Neumann Laplacian in domains with small holes*, (2023), <https://arxiv.org/abs/2311.05999>.
3. R. Ognibene, B. Velichkov, *Boundary regularity of the free interface in spectral optimal partition problems*, (2024), <https://arxiv.org/abs/2404.05698>.
4. E. Mainini, R. Ognibene, B. Volzone, *Local multiplicity for fractional linear equations with Hardy potentials*, (2024), <https://arxiv.org/abs/2407.04414>.

### Other publications

1. Ognibene, R., *Monotonicity formulas and blow-up methods for the study of spectral stability and fractional obstacle problems*, (2021), Ph.D. Thesis, Link.

## Articles in preparation

1. Mukherjee, D., Ognibene, R., *On fractional Schrödinger equations with multipolar Hardy-type potentials and critical nonlinearity.*
2. Jeon, S., Ognibene, R., Tortone, G., *On the fractional Alt-Phillips problem.*
3. De Luca, A., Ognibene, R., Vita, S., *Quantitative unique continuation at the boundary for fractional elliptic equations.*
4. R. Ognibene, B. Velichkov, *Regularity of the free interface near triple junction points.*

COMMUNICATIONS IN  
CONFERENCES AND  
WORKSHOPS, SEMINARS

## Invited talks in conferences and workshops

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|-----------------|--|
| 28 April 2022   | <i>A two-phase obstacle problem for the fractional Laplacian</i><br>Proprietà Qualitative per Soluzioni di Equazioni Ellittiche Non-Lineari - Cosenza, Italy             |
| 6 June 2022     | <i>A two-phase obstacle problem for the fractional Laplacian</i><br>Nonlinear meeting in Bologna - Bologna, Italy  |
| 13 January 2023 | <i>Sharp spectral stability in domains with thin branches</i><br>PDEs in Cogne: a friendly meeting in the snow - Cogne (AO), Italy                                       |
| 31 January 2024 | <i>Free boundary regularity in an optimal partition problem</i><br>Regularity and geometric aspects of nonlinear PDEs - Pisa, Italy                                      |
| 13 June 2024    | <i>Regularity of domain walls in optimal partition problems</i><br>Equadiff 2024 - Karlstad, Sweden  |
| 24 June 2024    | <i>Regularity of domain walls in optimal partition problems</i><br>Regularity Theory for Free Boundary and Geometric Variational Problems IV<br>Levico Terme (TN), Italy |

## Short communications

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|-------------------|---|
| 22 May 2018       | <i>Sharp convergence rate of eigenvalues in a domain with a shrinking tube</i><br>Summer School: Nonlocal interactions in Partial Differential Equations and Geometry - Stockholm, Sweden                         |
| 21 May 2019       | <i>Eigenvalues of the Laplacian with moving mixed boundary conditions: sharp asymptotics in terms of Sobolev capacity</i><br>International Conference on Elliptic and Parabolic Problems - Gaeta, Italy           |
| 9 September 2019  | <i>Eigenvalues of the Laplacian with moving mixed boundary conditions: sharp asymptotics in terms of Sobolev capacity</i><br>Workshop on Spectral Geometry and Analysis of Differential Operators - Padova, Italy |
| 22 June 2021      | <i>Sharp asymptotics of eigenvalues of the Laplacian in a domain with a shrinking tube</i><br>Online Mini-courses in Mathematical Analysis 2021 - Padova, Italy   |
| 24 September 2021 | <i>A quantitative fractional isocapacity inequality</i><br>XII Forum of Partial Differential Equations - Bedlewo, Poland  |
| 27 May 2022       | <i>Spectral stability of the Laplacian under perturbation of the boundary conditions: the case of disappearing Neumann region</i><br>First UMI meeting of Ph.D. students - Padova, Italy                          |
| 13 June 2022      | <i>Sharp spectral stability upon perturbation of the boundary conditions</i><br>Shape Optimization, related topics and applications - Roscoff, France   |
| 18 September 2023 | <i>Spectral stability for the Neumann-Laplacian in domains with small holes,</i><br>Shape Optimization and Isoperimetric and Functional Inequalities - Levico Terme (TN), Italy.                                  |

## Posters

11 September 2018 *Sharp convergence rate of eigenvalues in a domain with a shrinking tube*  
Nonlinear Analysis and PDEs in Caserta - Caserta, Italy

### Research seminars upon invitation

26 November 2018 *Eigenvalues of the Laplacian and their dependence on the domain: regular and singular perturbations*  
Université de Picardie Jules Verne - Amiens, France

2 April 2019 *"Can one hear the shape of a drum?" and other related questions*  
Università degli studi di Milano-Bicocca - Milano, Italy

17 April 2019 *Eigenvalues of the Laplacian and their dependence on the domain: regular and singular perturbations*  
Università degli studi di Modena e Reggio Emilia - Modena, Italy

17 June 2019 *An introduction to capacity. Basic notions and applications to PDEs*  
Université de Picardie Jules Verne - Amiens, France

13 February 2020 *Eigenvalues of the Laplacian under perturbation of the boundary conditions: a capacity approach*  
Purdue University - West Lafayette, IN, USA

14 May 2021 *Spectral stability of the Laplacian under perturbation of the boundary conditions*  
Young Researchers Colloquium - Mathematical Institute of the Polish Academy of Sciences - Warsaw, Poland

30 June 2021 *Spectral stability of the Laplacian under perturbation of the boundary conditions*  
DEG1 Webinars - Online seminar organized by DEG1 group

13 October 2022 *Capacity and torsional rigidity: two measures of spectral stability*  
Mittag-Leffler Institute - Stockholm, Sweden

23 March 2023 *Capacity and torsional rigidity: two measures of spectral stability*  
Università degli studi di Ferrara, Ferrara, Italy

5 April 2023 *Capacity and torsional rigidity: two measures of spectral stability*  
Università di Pisa, Pisa, Italy

30 May 2023 *Spectral stability in domains with small holes*  
Università degli studi di Torino, Torino, Italy

### ATTENDANCE TO SCHOOLS, WORKSHOPS AND CONFERENCES

I took part to more than 30 (national and international) events.

### AWARDS, SCHOLARSHIPS, FELLOWSHIPS, GRANTS

2014 Awarded by *Università degli studi di Modena e Reggio Emilia* for my Bachelor's Degree (520 EUR).

2017 Scholarship for the Ph.D. course (3 years), funded by *Università degli studi di Milano-Bicocca*.

2020 International mobility scholarship for Ph.D. students, funded by *Università degli studi di Pavia*, 9th edition.

2021 Post-doc fellowship (1 year), funded by *Università degli studi di Genova*.

2021 2nd place - "Enrico Jannelli" award for Ph.D. thesis

2021 Fellowship for the research program "Geometric aspects of nonlinear partial differential equations" (see Link) at Mittag-Leffler Institute, Sep-Dec 2022, funded by *Royal Swedish academy of sciences*.

2021 Kovalevskaya grant for participation to ICM2022, (supposed to be held in) St. Petersburg.

2021 Post-doc fellowship, funded by the ERC program VAREG "Variational approach to the regularity of the free boundaries", P.I. prof. Bozhidar Velichkov.

## RESEARCH PROJECTS

### As principal investigator

2022 Project: *Questioni di esistenza e unicità per problemi non locali con potenziale di tipo Hardy* (4500 €), Institution: INdAM-GNAMPA.

### As participant

2018 Project: *Formula di monotonia e applicazioni: problemi frazionari e stabilità spettrale rispetto a perturbazioni del dominio*, Institution: INdAM-GNAMPA, Principal investigator: Alberto Ferrero.

2019 Project: *Valeurs propres d'un opérateur Aharonov-Bohm avec pôle variable*, Institution: PICS, Principal investigator: Benedetta Noris.

2022–now Project: ERC VAREG - *Variational approach to the regularity of the free boundaries* (grant agreement No. 853404). Institution: European Research Council. Principal investigator: Bozhidar Velichkov.

2023 Project: *Regolarità e singolarità in problemi con frontiere libere*, Institution: INdAM-GNAMPA, Principal investigator: Giorgio Tortone.

2024 Project: *Nuove frontiere nella capillarità non locale*, Institution: INdAM-GNAMPA, Principal investigator: Alessandra de Luca.

## RESEARCH VISITS

18/11/2018 – 18/12/2018 Institution: Université de Picardie Jules Verne, Amiens, France.

7/06/2019 – 23/06/2019 Institution: Université de Picardie Jules Verne, Amiens, France.

14/11/2019 – 12/12/2019 Institution: Université de Picardie Jules Verne, Amiens, France.

2/02/2020 – 4/03/2020 Institution: Purdue University, West Lafayette, IN, USA.

5/02/2023 – 12/02/2023 Institution: Università degli studi di Milano-Bicocca, Milan, Italy.

20/03/2023 – 24/03/2023 Institution: Università degli studi di Ferrara, Ferrara, Italy.

29/05/2023 – 1/06/2023 Institution: Università degli studi di Torino, Torino, Italy.

## TEACHING ACTIVITIES

2015/2016 Teaching assistant (*esercitazioni*) for the course *Analisi Matematica 1*, Undergraduate studies in Computer Science, Università degli studi di Modena e Reggio Emilia.

2016/2017 Teaching assistant (*esercitazioni*) for the course *Analisi Matematica 1*, Undergraduate studies in Computer Science, Università degli studi di Modena e Reggio Emilia.

2016/2017 Teacher of the course *Analisi Matematica 1*, Fondazione Collegio San Carlo, Modena.

2017/2018 Teaching assistant (*esercitazioni*) for the course *Matematica 2*, Undergraduate studies in Material Science, Università degli studi di Milano-Bicocca.

2018/2019 Teaching assistant (*esercitazioni*) for the course *Matematica 2*, Undergraduate studies in Material Science, Università degli studi di Milano-Bicocca.

2019/2020 Teaching assistant (*esercitazioni*) for the course *Matematica 2*, Undergraduate studies in Material Science, Università degli studi di Milano-Bicocca.

2020/2021 Remedial course (*precorso*) in Mathematics for science students, Università degli studi di Milano-Bicocca.

2021/2022 Remedial course (*precorso*) in Mathematics for architecture students, Università degli studi di Genova.

2023 Teacher for the Ph.D. course *Monotonicity formulas in free boundary and geometric variational problems*, held at Università di Pisa during spring 2023.

## REFeree ACTIVITIES

I served as a referee for the journals *Journal of Differential Equations*, *Mathematica Bohemica*, *Mathematics in Engineering*, *Communications in PDEs*, *Mathematical Methods in the Applied Sciences*.

Since 2020 I am a reviewer for *Mathematical Reviews*.

## ORGANIZATION OF SEMINARS, CONFERENCES, WORKSHOPS

- 2019/2020 Member of the organizing committee of the series of thematic mini-workshops *PDEs Sessions in Bicocca*. We held 2 events (the third one was cancelled due to Covid-19), see <https://sites.google.com/view/pdessionsinbicocca/home>
- 2018–2020 Member of the organizing committee of the series of seminars *Insalate di Matematica* (based at Università degli studi di Milano-Bicocca), which are held by and addressed to PhD students or young researchers.
- 2023 Member of the organizing committee of the workshop *Calculus of Variations and Free Boundary Problems V*, held in Pisa on 28/03/2023. [Website](#)
- 2024 Member of the organizing committee of the workshop *Calculus of Variations and Free Boundary Problems VIII*, to be held in Pisa on 11-12/04/2024. [Website](#)
- 2024 Member of the organizing committee of the conference *Young Researchers Meeting on PDEs*, to be held at Università di Milano-Bicocca (Milan, Italy) from 25/9/2024 to 27/9/2024.

## MEMBERSHIPS

- 2019–present Member of UMI (Italian Mathematical Union).
- 2018–present Member of GNAMPA (INdAM group).

## OTHER

- 2016/2017 Tutor at Fondazione Collegio San Carlo (Modena, Italy) for approximately 1 year.

## LANGUAGES

- Italian** Mother tongue
- English** Fluent