

# Enea Parini

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*Assistant Professor in Applied Mathematics*

## Positions held

- sep 2012 – **Assistant Professor (“Maître de Conférences”)**, *Institut de Mathématiques de Marseille*, present
- feb 2011 – **Research and teaching assistant (“A.T.E.R”)**, *Ceremade - Université Paris-Dauphine*, aug 2012
- nov 2009 – **Research and teaching assistant (“Wiss. Mitarbeiter”)**, *Universität zu Köln*, jan 2011  
Cologne, Germany, in the group of Prof. Bernd Kawohl.
- sep 2006 – **Ph. D. student**, *Universität zu Köln*, Cologne, Germany.  
nov 2009

## Ph. D thesis

- title *Asymptotic behaviour of higher eigenfunctions of the  $p$ -laplacian as  $p$  goes to 1*
- supervisor Prof. Bernd Kawohl - *Universität zu Köln*, Cologne, Germany
- date November 2009

## Teaching activities

### Responsibilities

- Member of the responsibility committee of the L2 Math (Aix-Marseille Université) at St. Charles campus (September 2020 - current).

### Courses and exercise classes (last three years)

- 2021/22, 1S “Analysis 2” (course and exercise classes, L2 Math), “PDE (advanced course)” (Master 2 Math).
- 2021/22, 2S “Differential equations and Numerical Analysis” (course and exercise classes, L3 MPCI).
- 2022/23, 1S “Analysis 2” (course and exercise classes, L2 Math).
- 2022/23, 2S “Differential equations and Numerical Analysis” (course and exercise classes, L3 MPCI).
- 2023/24, 1S “Analysis 2” (course and exercise classes, L2 Math).

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### Other teaching activities

In January 2014 I spent one week at the Kwame Nkrumah University of Science and Technology in Kumasi (Ghana) to give a doctoral course on Differential Equations.

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## Scientific and administrative responsibilities

### Grants and distinctions

- Recipient of the PEDR ("Prime d'Encadrement Doctoral et de Recherche"), starting from October 2016, and from October 2020, each time for four years.

### Participation in research groups

- Member of the ANR SHAPO (Shape Optimization, principal investigator: Jimmy Lamboley), September 2018 - May 2023
- Member of the GdR CALVA (Calculus of Variations, principal investigator: Antoine Lemenant), September 2019 - August 2023

### Participation in committees

- Member of the steering committee of the FRUMAM (September 2023 - current)
- Member of the planning committee ("comité de prospective") of the Institut de Mathématiques de Marseille (April 2019 - current), whose task is to identify promising research directions developed at the institute, and recruitment needs.
- Member of the scientific committee of the Institut de Mathématiques de Marseille (April 2016 - January 2018), which is competent for the evaluation and ranking of postdoctoral applications and conference proposals.
- Member of the hiring committee for Assistant Professor ("Maître de Conférences") positions in Marseille (2016, 2019).
- Member of the hiring committee for a Teaching Assistant ("Professeur agrégé") position in Marseille (2022).

### Organization of scientific activities

- Since September 2020 I am the general coordinator of "Stages Hippocampe" at the IRES in Marseille, which consist in letting high school students work on mathematical problems related to current research.

### Organization of recurrent scientific events

- Co-organizer of the weekly seminar of the Applied Analysis Group in Marseille (September 2020 - current)
- Organizer of the online seminar of the ANR SHAPO (September 2020 - July 2021)
- Responsible for the organization of "Thematical workshops" for the Applied Analysis Group in Marseille (January 2017 - December 2020)
- Co-organizer of the periodic seminar "Calculus of Variations and PDE" (Marseille, September 2014 - December 2018), in collaboration with the IMATH (Toulon)

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### Organization of workshops

- Co-organizer of a special session in Spectral Optimization at the AMS-EMS-SMF Meeting (Grenoble, 18–22.7.2022)
- Co-organizer of the meeting of the ANR SHAPO (Montpellier, 12–14.6.2019)
- Co-organizer of the workshop “Recent progress in Partial Differential Equations” (Marseille, 2.12.2016)
- Co-organizer of the workshop “Optimisation et contrôle” (Marseille, 5.12.2014)
- Organizer of the workshop “Recent progress in Nonlinear Analysis” (Marseille, 10-11.12.2012)

### Ph.D. thesis advised

- Giulio Romani (October 2014 - October 2017), together with François Hamel (I2M, Marseille) and Bernhard Ruf (Milano)
- Arthur Sahakian (October 2019 - ), together with François Hamel (I2M, Marseille)
- Roméo Leylekian (October 2021 - ), together with François Hamel (I2M, Marseille)

### Ph.D. referee activity

- External referee for the Ph.D. thesis of Giorgio Saracco (Università di Modena e Reggio Emilia, 2017).
- External referee for the Ph.D. thesis of Antonella Ritorto (Universidad de Buenos Aires, 2017).

### Other Ph.D. related activities

- Member of the follow-up committee for the Ph.D. thesis of Y. Oudghiri (Marseille, September 2018 - June 2022) and B. Colombari (Marseille, September 2019 - July 2023).

### Master thesis advised

- N. Abbad (April 2018 - June 2018), M2 Mathématiques et Applications (Marseille)
- N. Mai (April 2018 - June 2018), M2 Mathématiques et Applications (Marseille)
- A. Sahakian (April 2019 - June 2019), M2 Mathématiques et Applications (Marseille)
- R. Leylekian (April 2021 - July 2021), M2 Analyse Modélisation Simulation (Paris-Saclay)

## Editorial activity

- Referee for:
  - Adv. Calc. Var. (2x)
  - Adv. Nonlinear Anal.
  - An. Acad. Brasil. Ciênc.
  - Ann. Acad. Sci. Fenn. Math.
  - Ann. Global Anal. Geom.
  - Appl. Anal. (3x)
  - Appl. Math. Comput.
  - Appl. Math. Lett.
  - Appl. Math. Optim.
  - Arch. Math. (Basel) (5x)
  - Bol. Soc. Mat. Mex. (2x)
  - Bull. Malays. Math. Sci. Soc.
  - Calc. Var. Partial Differential Equations (2x)
  - Canad. Math. Bull.
  - Commun. Contemp. Math.
  - Commun. Pure Appl. Anal. (2x)
  - C. R. Math. Acad. Sci. Paris
  - Differential Integral Equations
  - Discrete Contin. Dyn. Syst. Ser. B
  - Electron. J. Qual. Theory Differ. Equ.
  - Eur. J. Math.
  - ESAIM Control Optim. Calc. Var. (3x)
  - Experiment. Math.
  - Indian J. Pure Appl. Math.
  - J. Éc. polytech. Math.
  - J. Funct. Anal.
  - J. Geom. Anal.
  - J. Math. Anal. Appl. (2x)
  - Manuscripta Math.
  - Math. Ann.
  - Math. Methods Appl. Sci.
  - Milan J. Math. (2x)
  - Nonlinear Anal. (3x)
  - NoDEA Nonlinear Differential Equations Appl. (3x)
  - Potential Anal.
  - Proc. Amer. Math. Soc. (preliminary assessment)
  - Proc. Edinburgh Math. Soc. (preliminary assessment)
  - Proc. Roy. Soc. Edinburgh Sect.
  - Results Math. (2x)
  - Rev. Mat. Complut.
  - Rocky Mountain J. Math.
  - SIAM J. Appl. Math.
  - Topol. Methods Nonlinear Anal.
- Reviewer for “Mathematical Reviews”.
- Reporter ("Berichterstatter") for the Oberwolfach Report 08/2010.

## Research activities

My research interests are focussed on partial differential equations, both of linear and nonlinear kind, with a particular attention for eigenvalue problems, and related shape optimization problems.

### Scientific visits

- 3–7.11.2008 Dipartimento di Matematica "F.Brioschi" - Politecnico di Milano, Milan (Italy).
- 2–4.12.2009 Technische Universität Dresden (Germany).
- 19–23.7.2010 Departamento de Matemáticas - Universidad Autónoma de Madrid, Madrid (Spain).
- 16–27.1.2012 University of Texas at Austin (USA).
- 27.2–2.3.2012 Université de Toulouse 1 - Capitole.
- 29.10–1.11.2012 Goethe-Universität Frankfurt (Germany).
- 12–14.11.2012 Dipartimento di Matematica - Università di Pisa (Italy).
- 24–28.6.2013 Goethe-Universität Frankfurt (Germany).
- 12–16.5.2014 KTH, Stockholm (Sweden).
- 26–27.10.2015 Università di Napoli "Federico II", Napoli (Italy).
- 23–25.11.2015 Universität Kassel (Germany).
- 13–22.7.2016 University of West Bohemia, Plzeň (Czech Republic).
- 9–13.12.2016 University of Reading (United Kingdom).
- 14–16.12.2016 Universität Kassel (Germany).
- 15–25.5.2017 Universidade Federal da Paraíba, Joao Pessoa (Brazil).
- 6–9.6.2017 Université Libre de Bruxelles (Belgium).
- 8–12.1.2018 Universidade de Lisboa (Portugal).
- 15–17.10.2018 University of West Bohemia, Plzeň (Czech Republic).
- 13–24.5.2019 Wayne State University, Detroit (USA).
- 3–7.6.2019 Università di Pavia (Italy).
- 30.1–2.2.2023 Università La Sapienza, Roma (Italy).
- 17–20.4.2023 Università degli Studi di Trento (Italy).

### Talks given (upon invitation)

- 15–16.3.2008 AMS Eastern Sectional Meeting, New York (U.S.A.).  
79th Annual Meeting of the International Association of Applied Mathematics and Mechanics (GAMM), Bremen (Germany)
- 31.3–4.4.2008
- 17–23.5.2009 Workshop on "Topological and Variational Methods for PDEs", Oberwolfach (Germany).
- 3.12.2009 Institutsseminar Technische Universität Dresden (Germany).
- 14.1.2010 Seminari di Analisi Nonlineare, Università degli Studi di Milano (Italy).
- 7–13.2.2010 Workshop on "Optimal constants in the theory of Sobolev spaces and PDEs", Oberwolfach (Germany).
- 22–26.2.2010 XX Conferenza Nazionale di Calcolo delle Variazioni, Levico Terme (Italy).

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- 27.4.2010 Séminaires d'Analyse non linéaire, Université Catholique de Louvain-la-Neuve (Belgium).
- 14.3.2011 Groupe de Travail "Calcul des Variations", Ceremade, Université Paris-Dauphine (France).
- 16.5.2011 Séminaire d'Analyse Appliquée A3, LAMFA, Université de Picardie, Amiens (France).
- 22.9.2011 DMV-Tagung (Conference of the German Mathematical Union), Köln (Germany).
- 6.12.2011 Séminaire MIP, Institut Mathématique de Toulouse (France).
- 14.12.2011 GT Calcul des Variations, CMAP, Ecole Polytechnique, Palaiseau (France).
- 25.1.2012 Analysis Seminar, University of Texas at Austin (USA).
- 10.2.2012 Séminaires de l'équipe EDPs, LAMA, Université de Savoie, Chambéry (France).
- 21.2.2012 Séminaires d'Analyse Appliquée, LATP, Université de Marseille (France).
- 2.3.2012 Séminaires du CeReMath, Université de Toulouse 1 - Capitole (France).
- 4–6.6.2012 Quasilinear equations and singular problems, Tours (France) (poster).
- 1.11.2012 AG-Seminar Differentialgleichungen, Frankfurt (Germany).
- 13.11.2012 Seminari di Calcolo delle Variazioni e Analisi Geometrica, Università di Pisa (Italy).
- 27.2.2013 Cologne Conference on Nonlinear Differential Equations, Cologne (Germany).
- 17.5.2013 Journées Nice-Toulon-Marseille, Porquerolles (France).
- 14.5.2014 SMC Analysis Seminar, Stockholm (Sweden).
- 24.2.2015 Seminario di Equazioni differenziali, Università Tor Vergata, Roma (Italy).
- 2.4.2015 Séminaire d'Analyse non-linéaire et Optimisation, Avignon (France).
- 7.5.2015 Seminario d'Analisi, Università degli Studi di Napoli "Federico II", Napoli (Italy).
- 6.7.2015 Oberseminar Nichtlineare Analysis, Köln (Germany).
- 21.10.2015 Séminaire de Dynamique Quantique et Classique (CPT), Marseille (France).
- 23.11.2015 Oberseminar Analysis und Angewandte Mathematik, Kassel (Germany).
- 28.04.2016 Geometric aspects of PDE's and functional inequalities, Cortona (Italy).
- 01.07.2016 Geometric and physical aspects of Trudinger-Moser type inequalities, Institut Mittag-Leffler, Djursholm (Sweden).
- 13.12.2016 PDE Seminars, University of Reading (United Kingdom).
- 6–10.2.2017 XXVII Conferenza Nazionale di Calcolo delle Variazioni, Levico Terme (Italy).
- 6.6.2017 Séminaire d'Analyse non linéaire et EDP, Bruxelles (Belgium)
- 10.1.2018 Seminar of the Grupo de Física Matemática, Lisboa (Portugal)
- 20–24.2.2018 Workshop in Nonlinear PDE's and Geometric Analysis, Joao Pessoa (Brazil)
- 10.4.2018 Séminaire de l'équipe ACIOM, Université de Montpellier (France)
- 15.5.2019 Mathematics PDE Seminar, Wayne State University (USA)
- 5.6.2019 Dipartimento di Matematica, Università di Pavia (Italy)
- 29.7.2019 XI Workshop in Nonlinear Differential Equations, Varese (Italy)
- 13.9.2019 Joint Seminar in Geometric Analysis, Marseille (France)
- 29.10.2019 Journées d'Optimisation de Forme JOFA 4, Palaiseau (France)
- 20.01.2020 Groupe de Travail CalVa, Paris 6 (France)

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- 26.11.2021 Seminari di Analisi Nonlineare, Milano (Italy)
- 01.02.2022 ICMC Summer Meeting on Differential Equations, Rio de Janeiro (Brazil, online)
- 06.04.2022 Journées ANR SHAPO, Autrans (France)
- 26.04.2022 Séminaire équipe EDP, Nancy (France)
- 30.01.2023 Seminario di Analisi Matematica, Università La Sapienza, Roma (Italy)
- 18.04.2023 Analysis Seminar, Università degli Studi di Trento (Italy)
- 01.06.2023 13th AIMS International Conference on Dynamical Systems, Differential Equations and Applications, Wilmington NC (United States)
- 11.09.2023 XII Workshop on Nonlinear Differential Equations, Brasilia (Brazil)

## Publications

### Research publications in peer-reviewed international journals

- [1] C. Grumiau, E. Parini, *On the asymptotics of solutions of the Lane-Emden problem for the  $p$ -Laplacian*, Arch. Math. **91** (2008), 354-365.
- [2] E. Parini, A. Stylianou, *On the positivity preserving property of hinged plates*, SIAM J. Math. Anal. **41** (2009), 2031-2037.
- [3] E. Parini, *The second eigenvalue of the  $p$ -Laplacian as  $p$  goes to 1*, Int. J. Differ. Equ. (2010), Article ID 984671, 23 pp.
- [4] F. Charro, E. Parini, *Limits as  $p \rightarrow \infty$  of  $p$ -Laplacian problems with a superdiffusive power-like nonlinearity: positive and sign-changing solutions*, J. Math. Anal. Appl. **372** (2010), 629-644.
- [5] E. Parini, *Continuity of the variational eigenvalues of the  $p$ -Laplacian with respect to  $p$* , Bull. Aust. Math. Soc. **83** (2011), 376-381.
- [6] F. Charro, E. Parini, *Limits as  $p \rightarrow \infty$  of  $p$ -laplacian eigenvalue problems perturbed with a concave or convex term*, Calc. Var. Partial Differential Equations **46** (2013), 403-425.
- [7] E. Parini, B. Ruf, C. Tarsi, *The eigenvalue problem for the 1-biharmonic operator*, Ann. Sc. Norm. Super. Pisa Cl. Sci. (5) **13** (2014), 307-332.
- [8] E. Parini, N. Saintier, *Shape derivative of the Cheeger constant*, ESAIM Control Optim. Calc. Var. **21** (2015), no. 2, 348-358.
- [9] E. Parini, B. Ruf, C. Tarsi, *Higher-order functional inequalities related to the 1-biharmonic operator*, Ann. Mat. Pura Appl. (4) **194** (2015), no. 6, 1835-1858.
- [10] L. Brasco, E. Lindgren, E. Parini, *The fractional Cheeger problem*, Interfaces Free Bound. **16** (2014), 419-458.
- [11] F. Charro, E. Parini, *On the existence threshold for positive solutions of  $p$ -laplacian equations with a concave-convex nonlinearity*, Commun. Contemp. Math. **17** (2015).
- [12] E. Parini, T. Weth, *Existence, unique continuation and symmetry of least energy nodal solutions to sublinear Neumann problems*, Math. Z. **280** (2015), 707-732.

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- [13] E. Parini, *Reverse Cheeger inequality for planar convex sets*, J. Convex Anal. **24** (2017), no. 1, 107–122.
- [14] L. Brasco, E. Parini, *The second eigenvalue of the fractional  $p$ -Laplacian*, Adv. Calc. Var. **9** (2016), no. 4, 323–355.
- [15] L. Brasco, E. Parini, M. Squassina, *Stability of variational eigenvalues for the fractional  $p$ -Laplacian*, Discrete Contin. Dyn. Syst. **36** (2016), no. 4, 1813–1845.
- [16] N. Katzourakis, E. Parini, *The eigenvalue problem for the  $\infty$ -bilaplacian*, NoDEA Nonlinear Differential Equations Appl. **24** (2017), no. 6, art. 32, 18 pp.
- [17] B. Audoux, V. Bobkov, E. Parini, *On multiplicity of eigenvalues and symmetry of eigenfunctions of the  $p$ -Laplacian*, Topol. Methods Nonlinear Anal. **51**, no. 2 (2018), 565–582.
- [18] E. Parini, A. Stylianou, *A free boundary approach to the Rosensweig instability of ferrofluids*, Z. Angew. Math. Phys. **69** (2018), no. 2, art. 32, 18 pp.
- [19] V. Bobkov, E. Parini, *On the higher Cheeger problem*, J. Lond. Math. Soc. **97** (2018), no. 3, 575–600.
- [20] E. Parini, B. Ruf, *On the fractional Moser-Trudinger inequality in Sobolev-Slobodeckij spaces*, J. Anal. Math. **138** (2019), no. 1, 281–300.
- [21] E. Parini, A. Salort, *Compactness and dichotomy in nonlocal shape optimization*, Math. Nachr. **293** (2020) 2208–2232.
- [22] D. Buoso, E. Parini, *The buckling eigenvalue problem in the annulus*, Commun. Contemp. Math. **23** (2021), no. 4, Paper No. 2050044, 19 pp.
- [23] V. Bobkov, E. Parini, *On the Cheeger problem for rotationally invariant domains*, Manuscripta Math. **166** (2021), 503–522.
- [24] E. Parini, A. Salort, J. D. Rossi, *Reverse Faber-Krahn inequality for a truncated laplacian operator*, Publ. Math. **66 (2)** (2022), 441–455.
- [25] D. Bonneure, E. Moreira dos Santos, E. Parini, H. Tavares, T. Weth, *Nodal solutions for sublinear-type problems with Dirichlet boundary conditions*, Int. Math. Res. Not. IMRN **2022 (5)** (2022), 3760–3804.
- [26] E. Parini, G. Saracco, *Optimization of the anisotropic Cheeger constant with respect to the anisotropy*, Canad. Math. Bull. **66 (3)** (2023), 1030–1043.
- [27] A. DelaTorre, E. Parini, *Uniqueness of least energy solutions of the fractional Lane-Emden equation in the ball*, submitted.

#### Research publications in conference proceedings

- [1] E. Parini, *On the Lane-Emden problem for the  $p$ -Laplacian*, Oberwolfach reports **6** (2009), 1457-1459.
- [2] E. Parini, *Positivity preserving property for the hinged plate*, Oberwolfach reports **7** (2010), 335-336.
- [3] E. Parini, B. Ruf, C. Tarsi, *Limiting Sobolev inequalities and the 1-biharmonic operator*, Adv. Nonlinear Anal. **3 S1** (2014), s19-s36.
- [4] E. Parini, B. Ruf, *On the fractional Moser-Trudinger inequality in Sobolev-Slobodeckij spaces*, Rend. Lincei Mat. Appl. **29** (2018), 315–319.

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Other publications (peer-reviewed)

- [1] E. Parini, *An introduction to the Cheeger problem*, *Surv. Math. Appl.* **6** (2011), 9-22.