

# Curriculum of scientific and didactic activity

## Stefano Lisini

### Address

Dott. Stefano Lisini  
Università degli Studi di Pavia  
Dipartimento di Matematica “F. Casorati”  
via Ferrata 1,  
27100 Pavia, Italy

phone: +39 0382 985635

fax: +39 0382 985602

mobile phone : +39 347 9006216

e-mail: stefano.lisini@unipv.it

web pages:

<http://www-dimat.unipv.it/lisini>

<http://cvgmt.sns.it/people/lisini/>

### Personal data

Born: March 18, 1967, in Voghera (Pv), Italy

Nationality: Italian

Languages: Italian, French, English.

### Research interests

Partial Differential Equations, Calculus of Variations, Optimal Mass Transport Theory, Analysis in metric spaces.

In particular: variational methods and optimal transport methods for evolution equations of gradient flow type. Asymptotic behavior for solutions of evolution equations. Study of absolutely continuous curves in spaces of probability measures.

## Present position

From 2011, December 29, Researcher in Mathematical Analysis at Department of Mathematics of Università degli Studi di Pavia (Italy).

## Education

Before mathematical studies I followed musical studies. In 1987 I reached Conservatoire diplome in Clarinet and in 1990 diplome in didactic of music. From 1990 to 2000 I worked as a professional musician. Simultaneously, starting from 1995, I followed mathematical studies.

Degree in Mathematics 6 April 2001 at Università degli Studi del Piemonte Orientale (Italy), with 110/110 cum laude.

Title of the thesis: “*Considerazioni su un problema di contatto con attrito in elasticità lineare*”, advisor Prof. Fabio Gastaldi (Università degli Studi del Piemonte Orientale).

PhD in Mathematics and Statistics at Università degli Studi di Pavia, 9 June 2006.

Title of PhD thesis: “*Absolutely continuous curves in Wasserstein spaces with applications to continuity equation and to nonlinear diffusion equations*”, advisor Prof. Giuseppe Savaré (Università degli Studi di Pavia).

## Grants

- A.Y. 2001-2002. Post lauream grant for collaboration scientific didactic in Mathematical Analysis at Università degli Studi del Piemonte Orientale, Italy.
- A.Y. 2002-2003, 2003-2004, 2004-2005. Grant for PhD at Università degli Studi di Pavia.

## Past post-doc position

From December 2006 to December 2008, assegno di ricerca (Post doc position) for 2 years in Mathematical Analysis at Department of Science and Advanced Technology of Università degli Studi del Piemonte Orientale (Italy).

From December 2008 to September 2009, assegno di ricerca (Post doc position) for 1 year in Mathematical Analysis at Department of Mathematics of Università degli Studi di Pavia (Italy).

From October 2009 to September 2011 temporary researcher in Mathematical Analysis at Department of Mathematics of Università degli Studi di Pavia (Italy) and at Laboratorio

di Matematica Applicata of Fondazione per l'Università di Mantova (Mantua, Italy).

## Talks in meetings or in research centers

*“Diffusion equations with variable coefficients as gradient flows in Wasserstein spaces”*  
“XVII Giornate di Lavoro su Questioni di Teoria Geometrica della Misura e di Calcolo delle Variazioni”, Levico Terme 4-9 February 2007

*“Diffusion equations with variable coefficients as gradient flows in Wasserstein spaces”*  
Workshop “Optimal transportation structures, gradient flows and entropy methods for applied PDE’s”, Vienna 24-26 September 2007

*“Nonlinear mobility continuity equation and generalized displacement convexity”* Workshop “Optimal transportation and applications”, Pisa 3-6 November 2008

*“Flusso gradiente di funzionali di energia interna e loro convessità geodetica rispetto a una nuova classe di distanze”* “XIX Convegno Nazionale di Calcolo delle Variazioni”, Levico Terme 8-13 February 2009

*“Some evolution equations as gradient flows in spaces of measures”* INDAM Intensive period from May to June 2009 “Geometric properties of nonlinear local and nonlocal problems” Pavia and Milano- 5 May 2009

*“Some evolution equations as gradient flows of functionals in spaces of measures and its geodesic convexity”* Vienna, University of Technology, 20 May 2009

*“Gradient flow of functionals with respect to distances between measures and applications to some fourth order equations”* Trento, Problems in Calculus of Variations and Partial Differential Equations, 22-23 June 2009

*“Gradient flow of the Dirichlet functional with respect to distances between measures and applications to some fourth order equations”* 3 December 2009, University of Milano Bicocca

*“Cahn-Hilliard equation for phase separation”* Workshop “Modellizzazione matematica di materiali e processi”, Mantova, 21-22 June 2010

*“Gradient flows in spaces of measures and application to PDE’s”* 17 November 2011, Institute Henry Poincaré, Paris, Seminar of Group de Travail: Inégalités fonctionnelles et équations d'évolution

*“A gradient flow approach to the Keller-Segel model of chemotaxis”* 12 December 2011, Institute Henry Poincaré, Paris, Seminaire Parisien d'optimisation

*“A gradient flow approach to the Keller-Segel model of chemotaxis”* 19 March 2012, Technical University of Munich (Germany)

*“Introduction to optimal transport”* Workshop “Optimization, Control Theory and Applications”, University of Verona, 28-29 January 2013

## Visits

May 2007, one week visit to CRM Barcelona.  
18-23 May 2009, University of Technology, Vienna.  
13-22 October 2009, Autonomous University Barcelona.  
1-3 March 2010, Università degli Studi di Parma.  
5-12 June 2010 Autonomous University Barcelona.  
5-10 July 2010 Autonomous University Barcelona.  
10-16 October 2011 Université Paris-Dauphine.  
19-24 March 2012 Technical University of Munich.

## Organizational activity

*“Modellizzazione matematica di materiali e processi”* Workshop Polimeri Europa (ENI) - Laboratorio di Matematica Applicata, Fond. Univ. Mantova. Mantua, 22-23 April 2010. Organizers: E. Bonetti, U. Gianazza, S. Lisini, F. Bisi.

## Participation to schools

- *Minicorsi di Analisi Matematica* Università di Padova, Padova Italy June, 23-27, 2003
- *Scuola Matematica Interuniversitaria* Università di Perugia (Italy), 27 July-30 August 2003
- *Scuola Matematica Interuniversitaria* Palazzone di Cortona, 1-14 August 2004
- *Lectures on Transport Equations and Multi-D Hyperbolic Conservation Laws* Università di Bologna, 17-20 January 2005
- Summer school *“Optimal transportation structures, gradient flows and entropy methods for applied PDE’s”*, Wolfgang Pauli Institute, Vienna 10-21 September 2007
- CIME course *“Nonlinear PDE’s and applications”* Cetraro (Italy) 22-28 June 2008
- School *“Optimal transportation, geometry and functional inequalities”* Pisa, 28-31 Ottobre 2008
- Summer school GNAMPA-ERC *“Analytic Techniques for Geometric and Functional Inequalities”* Ischia (Italy), 13-18 June 2010

- ERC-Summer School on “*Calculus of Variations, Continuum Mechanics and Geometric Inequalities*” Ischia (Italy), June 5-10, 2011
- Summer Course UIMP 2011, “*Frontiers of Mathematics and Applications*” Santander (Spain), August 15-19, 2011

## Participation to meetings and workshops

- International meeting “*Giornate di studio in onore di Enrico Magenes*” Pavia 18-19 June 2003
- International meeting “*Optimal Transport Theory and Applications*” Scuola Normale Superiore, Pisa 9-12 October 2003
- International meeting “*Free Boundary Problems 2004*”, Montecatini Terme 10-12 June 2004
- National meeting “*XV Giornate di Lavoro su Questioni di Teoria Geometrica della Misura e di Calcolo delle Variazioni*”, Levico Terme 30 January-4 February 2005
- National meeting “*Modellizzazione Matematica ed Analisi dei Problemi a Frontiera Libera*”, Montecatini Terme 29-30 September 2005
- National meeting “*XVI Giornate di Lavoro su Questioni di Teoria Geometrica della Misura e di Calcolo delle Variazioni*”, Levico Terme 6-10 February 2006
- International meeting “*Optimal transport and geometric PDE’s*” Laboratoire “J.A. Dieudonné”, Nice (Francia) 15-18 June 2006
- International meeting “*Optimal Transport: Theory and Applications*” Scuola Normale Superiore, Pisa - 14-18 November 2006
- National meeting “*XVII Giornate di Lavoro su Questioni di Teoria Geometrica della Misura e di Calcolo delle Variazioni*”, Levico Terme 4-9 February 2007
- International Workshop “*Optimal Transportation and Applications to geophysics and Geometry*” International Centre for Mathematical Sciences, Edinburgh (UK) 16-20 July 2007
- International Workshop “*Partial differential equations, optimal design and numerics*” Centro de Ciencias “Pedro Pasqual” Benasque (Spain) 26 August-7 September 2007
- International Workshop “*Optimal transportation structures, gradient flows and entropy methods for applied PDE’s*”, Wolfgang Pauli Institute, Vienna 24-26 September 2007

- National meeting “*XVIII Convegno Nazionale di Calcolo delle Variazioni*”, Levico Terme 10-15 February 2008
- International meeting “*Optimal Transportation and Applications*”, Pisa, 3-6 November 2008
- National meeting “*XIX Convegno Nazionale di Calcolo delle Variazioni*”, Levico Terme 8-13 February 2009
- International Workshop “*Partial differential equations, optimal design and numerics*” Centro de Ciencias “Pedro Pasqual” Benasque (Spain) 23 August-4 September 2009
- National meeting “*XX Convegno Nazionale di Calcolo delle Variazioni*”, Levico Terme 21-26 February 2010
- National Workshop “*Modellizzazione matematica di materiali e processi*” Workshop Polimeri Europa (ENI) - Laboratorio di Matematica Applicata, Fond. Univ. Mantova. Mantua, 22-23 April 2010.
- International meeting “*Optimal Transportation and Applications*”, Scuola Normale Superiore, Centro De Giorgi, Pisa, 12-16 October 2010
- National meeting “*XXI Convegno Nazionale di Calcolo delle Variazioni*”, Levico Terme 6-11 February 2011
- International Workshop “*Partial differential equations, optimal design and numerics*” Centro de Ciencias “Pedro Pasqual” Benasque (Spain) 28 August-9 September 2011
- International Workshop “*Variational Methods for Evolution*” Mathematisches Forschungsinstitut Oberwolfach, (Germany) 4–10 December 2011
- National meeting “*XXII Convegno Nazionale di Calcolo delle Variazioni*”, Levico Terme 5-10 February 2012
- International Workshop “*ERC Workshop on Optimal Transportation and Applications*”, Pisa 5-9 November 2012
- National meeting “*XXIII Convegno Nazionale di Calcolo delle Variazioni*”, Levico Terme 3-8 February 2013
- International Workshop “*Partial differential equations, optimal design and numerics*” Centro de Ciencias “Pedro Pasqual” Benasque (Spain) 25 August-5 September 2013

## Teaching

In the last ten years I gave several courses as assistant teacher and teacher in Mathematical Analysis at the Università degli Studi di Pavia and the Università degli Studi del Piemonte Orientale.

## Thesis

- Degree thesis: “*Considerazioni su un problema di contatto con attrito in elasticità lineare*”, advisor Prof. Fabio Gastaldi.
- PhD thesis: “*Absolutely continuous curves in Wasserstein spaces with applications to continuity equation and to nonlinear diffusion equations*”, advisor Prof. Giuseppe Savaré.

## Papers

### Published and accepted papers

- [1 ] S. Lisini, *Characterization of absolutely continuous curves in Wasserstein spaces*, Calculus of Variations and Partial Differential Equations **28** (2007) 85-120.
- [2 ] L. Ambrosio, S. Lisini, G. Savaré, *Stability of flows associated to gradient vector fields and convergence of iterated transport maps*, Manuscripta Mathematica **121** (2006) 1-50.
- [3 ] S. Lisini, *Nonlinear diffusion equations with variable coefficients as gradient flows in Wasserstein spaces*, ESAIM: Control Optimization Calculus of Variations **15** (2009) 712-740.
- [4 ] J.A. Carrillo, S. Lisini, G. Savaré, D. Slepčev, *Nonlinear mobility continuity equations and generalized displacement convexity*, Journal of Functional Analysis **258** (2010) 1273-1309.
- [5 ] J.A. Carrillo, S. Lisini, *On the asymptotic behavior of the gradient flow of a polyconvex functional*, capitolo del libro: Nonlinear Partial Differential Equations and Hyperbolic Wave Phenomena, Contemporary Mathematics, vol. 526, Amer. Math. Soc., Providence, RI, 2010, pp. 37-51 (editors H. Holden and K. H. Karlsen). (Versione preprint disponibile su <http://cvgmt.sns.it/people/lisini/>)
- [6 ] S. Lisini, A. Marigonda, *On a class of modified Wasserstein distance induced by concave mobility functions defined on bounded intervals* Manuscripta Mathematica **133** (2010) 197–224.

- [7 ] S. Fornaro, S. Lisini, G. Savaré, G. Toscani, *Measure valued solutions of sub-linear diffusion equations with a drift term* Discrete and Continuous Dynamical Systems–Series A **32** (2012) 1675–1707
- [8 ] S. Lisini, D. Matthes, G. Savaré, *Cahn-Hilliard and Thin Film equations with nonlinear mobility as gradient flows in weighted-Wasserstein metrics* Journal of Differential Equations **253** (2012) 814-850
- [9 ] A. Chambolle, S. Lisini, L. Lussardi, *A remark on the anisotropic outer Minkowski content* Advances in Calculus of Variation **7** (2014) 241–266
- [10 ] J.A. Carrillo, S. Lisini, E. Mainini, *Gradient flows for non-smooth interaction potentials* Nonlinear Analysis, Theory Methods Applications, **100** (2014) 122–147, doi: 10.1016/j.na.2014.01.010
- [11 ] J.A. Carrillo, S. Lisini, E. Mainini, *Uniqueness for Keller-Segel-type chemotaxis models* Discrete and Continuous Dynamical Systems-Series A, **34** (2014) 1319–1338, doi: 10.3934/dcds.2014.34.1319

### Submitted papers

- [12 ] S. Lisini *Absolutely continuous curves in extended Wasserstein-Orlicz spaces* preprint arXiv:1402.7328 (2014)

Pavia, April 4, 2014.

Stefano Lisini.