

Curriculum di Massimiliano Berti

Nato a Pisa il 6-3-1972.

• **Formazione**

1. 1995. Laurea in Fisica presso l'Università statale di Milano, 110/110 e Lode,
2. 1998. Perfezionamento in Matematica presso la Scuola Normale Superiore di Pisa, 70/70 e Lode. Supervisor: Prof. A. Ambrosetti.

• **Posizioni**

1. 1999-2005: Ricercatore di Analisi Matematica presso la SISSA, Trieste.
2. Dal 2005: Professore Associato all'Università Federico II di Napoli,
3. Da 2010 membro del collegio dei docenti del Dottorato dell'Università Federico II

• **Riconoscimenti Internazionali e premi**

1. 2007. Vinto a punteggio pieno, 10/10, il concorso dell' European Research Council come Principal Investigator del Progetto ERC-Starting Grants Ideas "Hamiltonian PDEs: new connections between dynamical systems and Hamiltonian PDEs with small divisors phenomena".
2. Premio Vinti 2010 dell'Unione Matematica Italiana

• **Relatore di tesi di PhD**

1. Luca Biasco (Sissa, 1999-2002)
2. Pietro Baldi (Sissa, 2004-2007)
3. Elisa Magistrelli (Univ. Federico II, 2009-2012)
4. Riccardo Montalto (Sissa, dal 2011)

• **Supervisione di Post doc**

1. Michela Procesi (Sissa, 2002-2004)
2. Pietro Baldi (Univ. Federico II, 2008-2009)
3. Gabriella Pinzari (Univ. Federico II, 2009-11)
4. Xindong Xu (Univ. Federico II, 2009-11)
5. Philipp Lorhmann (Univ. Federico II, 2010-12)
6. Livia Corsi (Univ. Federico II, da maggio 2012)

- Invited speakers a numerose conferenze Internazionali e a tenere corsi di PhD, ex. ENS, Paris XI, IHES, Princeton, Fudan Univ., Univ, British Columbia, Mc Master, Univ. of Zürich, Bath, Nanjin, Paris VII, ...

- **Coordinatore di Programmi di ricerca**

1. 2006. Coordinatore principale del progetto “Sistemi Hamiltoniani” finanziati dalla Regione Campania.
2. 2007. Coordinatore principale del progetto Gnampa “La teoria di Mather per i sistemi Lagrangiani finito e infinito dimensionali”.
3. 2008-2012. Principal Investigator del Progetto ERC: “Hamiltonian PDEs: new connections between dynamical systems and PDEs with small divisors phenomena” di 400.000 euro
4. 2011-2013, Coordinatore della sezione di Napoli del progetto PRIN2009 grant “Critical Point Theory and Perturbative Methods for Nonlinear Differential Equations”.

Pubblicazioni e Preprints

1. M. Berti: “*Some remarks on a variational approach to Arnold diffusion*”, DISCRETE AND CONTINUOUS DYNAMICAL SYSTEMS, vol. 2, n. 3, 1996.
2. M. Berti, P. Bolle: “*Homoclinics and Chaotic Behaviour for Perturbed Second order Systems*”, ANNALI DI MATEMATICA PURA E APPLICATA, vol. CLXXVI, pp. 323-378, 1999.
3. M. Berti, P. Bolle: “*Variational construction of Homoclinics and Chaotic Behaviour in presence of a saddle-saddle equilibrium*”, ANNALI SCUOLA NORMALE SUPERIORE DI PISA, serie IV, vol. XXVII, fasc. 2, 1998.
4. M. Berti, P. Bolle: “*Variational construction of Homoclinics and Chaotic Behaviour in presence of a saddle-saddle equilibrium*”, REND. MAT. ACC. NAZ. LINCEI, s. 9, vol. 9, fasc. 3, 1998.
5. A. Ambrosetti, M. Berti: “*Homoclinics and Complex dynamics in slowly oscillating systems*”, DISCRETE AND CONTINUOUS DYNAMICAL SYSTEMS, vol. 4, n.3, 1998.
6. M. Berti: “*Heteroclinic solutions for perturbed second order systems*”, REND. MAT. ACC. NAZ. LINCEI, s. 9, vol. 8, fasc.4, 1998.
7. M. Berti, P. Bolle: “*Diffusion time and splitting of separatrices for nearly integrable isochronous Hamiltonian systems*”, REND. MAT. ACC. NAZ. LINCEI, s. 9, vol. 11, fasc. 4, pp. 235-243, 2000.
8. M. Berti, A. Malchiodi: “*Non-compactness and multiplicity results for the Yamabe problem on S^n* ”, JOURNAL OF FUNCTIONAL ANALYSIS, vol. 180, n.1 febbraio 2001.
9. M. Berti, C. Carminati: “*Chaotic dynamics for perturbations of infinite dimensional Hamiltonian systems*”, NONLINEAR ANALYSIS TMA, 48, pp. 481-504, 2002.

10. M. Berti, P. Bolle: “*Fast Arnold diffusion in systems with three time scales*”, DISCRETE AND CONTINUOUS DYNAMICAL SYSTEMS, series A, Vol. 8, n. 3, pp. 795-811, july 2002.
11. M. Berti, P. Bolle: “*A functional analysis approach to Arnold Diffusion*”, ANNALES DE L’INSTITUTE HENRY POINCARÉ, ANALYSE NON LINEAIRE, 19, 4, 395-450, 2002.
12. M. Berti, L. Biasco, P. Bolle: “*Optimal stability and instability results for a class of nearly integrable Hamiltonian systems*”, REND. MAT. ACC. NAZ. LINCEI, s. 9, vol. 13, fasc. 2, pp. 77-84, 2002.
13. M. Berti, L. Biasco, P. Bolle: “*Drift in phase space: a new variational mechanism with optimal diffusion time*”, JOURNAL DES MATHEMATIQUES PURES ET APPLIQUÉES, 82/6, pp. 613-664, 2003.
14. M. Berti, P. Bolle: “*Periodic solutions of nonlinear wave equations with general nonlinearities*”, COMMUNICATIONS IN MATHEMATICAL PHYSICS, Vol. 243, 2, pp. 315-328, 2003.
15. M. Berti, P. Bolle: “*Multiplicity of periodic solutions of nonlinear wave equations*”, NONLINEAR ANALYSIS, THEORY METHODS APPLICATIONS, 56/7, pp. 1011-1046, 2004.
16. M. Berti, L. Biasco, E. Valdinoci: “*Periodic orbits close to elliptic tori and applications to the three-body problem*”, ANNALI SCUOLA NORMALE SUPERIORE DI PISA, Cl. Sci. (V) 3, 87-138, 2004.
17. M. Berti, P. Bolle: “*Bifurcation of free vibrations for completely resonant wave equations*”, BOLLETTINO UNIONE MAT. ITALIANA, 7, n.2, 2004.
18. D. Bambusi, M. Berti: “*A Birkhoff-Lewis type theorem for some Hamiltonian PDEs*”, SIAM JOURNAL ON MATHEMATICAL ANALYSIS, 37, 1, 83-102, 2005.
19. M. Berti, L. Biasco: “*Periodic solutions of nonlinear wave equations with nonmonotone forcing terms*”, REND. MAT. ACC. NAZ. LINCEI, s. 9, v. 16, fasc. 2, 117-124, 2005.
20. M. Berti, M. Procesi: “*Quasi-periodic oscillations for wave equations under periodic forcing*”, REND. MAT. ACC. NAZ. LINCEI, s.9, v.16, fasc.2, 109-116, 2005.
21. M. Berti, P. Bolle: “*Cantor families of periodic solutions for completely resonant nonlinear wave equations*”, DUKE MATHEMATICAL JOURNAL, 134, issue 2, 359-419, 2006.
22. M. Berti, L. Biasco: “*Forced vibrations of wave equations with non-monotone nonlinearities*”, ANNALES DE L’INSTITUTE HENRY POINCARÉ, ANALYSE NON LINEAIRE, Vol. 23, issue 4, 2006, 439-474.
23. M. Berti, M. Procesi: “*Quasi-periodic solutions of completely resonant forced wave equations*”, COMMUNICATIONS IN PARTIAL DIFFERENTIAL EQUATION, 31, 6, 959-985, 2006.

24. P. Baldi, M. Berti, “*Periodic solutions of wave equations for asymptotically full measure sets of frequencies*”, REND. MAT. ACC. NAZ. LINCEI, Volume 17, Issue 3, 2006, 257-277.
25. M. Berti, Lectures on “*Variational Methods for Hamiltonian PDEs*”, Nato summer School “Hamiltonian Dynamical Systems and Applications”, Montreal 2007, 391-420, Springer, W. Craig editor.
26. M. Berti, P. Bolle, “*Cantor families of periodic solutions for wave equations via a variational principle*”, ADVANCES IN MATHEMATICS, 217, 16711727, 2008.
27. P. Baldi, M. Berti, “*Forced vibrations of a nonhomogeneous string*”, SIAM JOURNAL IN MATHEMATICAL ANALYSIS, 40, 1, 382-412, 2008.
28. M. Berti, M. Matzeu, E. Valdinoci, “*On periodic elliptic equations with gradient dependence*”, COMMUNICATIONS IN PURE AND APPLIED ANALYSIS, 601-615, 7, 3, 2008.
29. M. Berti, P. Bolle, “*Cantor families of periodic solutions of wave equations with C^k nonlinearities*”, NONLINEAR DIFFERENTIAL EQUATIONS AND APPLICATIONS, 15, 247-276, 2008.
30. M. Berti, “*Nonlinear Oscillations of Hamiltonian PDEs*”, PROGRESS IN NONLINEAR DIFFERENTIAL EQUATIONS, (BOOK), Birkhauser, 1-180, Boston, 2008.
31. M. Berti, P. Bolle, “*Sobolev Periodic solutions for nonlinear wave equations in higher spatial dimensions*”, ARCHIVE FOR RATIONAL MECHANICS AND ANALYSIS, 195, 609-642, 2010.
32. M. Berti, P. Bolle, M. Procesi, “*An abstract Nash-Moser theorem with parameters and applications to PDEs*”, ANNALES DE L’INSTITUTE HENRY POINCARÉ, ANALYSE NON LINEAIRE, 27, 377 - 399, 2010.
33. M. Berti, M. Procesi, “*Nonlinear wave and Schrodinger equations on compact Lie groups and homogeneous spaces*”, DUKE MATH. J., 159, 3, 479-538, 2011.
34. M. Berti, L. Biasco, “*Branching of Cantor manifolds of elliptic tori and applications to PDEs*”, COMM. MATH. PHYS., 305, 3, 741-796, 2011
35. M. Berti, P. Bolle, “*Quasi-periodic solutions of NLS on T^d* ” REND. MAT. ACC. NAZ. LINCEI, 22, 223-236, 2011
36. D. Bambusi, M. Berti, E. Magistrelli, “*Degenerate KAM theory for partial differential equations*” JOURNAL DIFFERENTIAL EQUATIONS, 250, 3379-3397, 2011.
37. M. Berti, P. Bolle, “*Sobolev quasi periodic solutions of multidimensional wave equations with a multiplicative potential*”, NONLINEARITY, 25, 2579-2613, 2012 (featured article).
38. M. Berti, P. Bolle, “*Quasi-periodic solutions with Sobolev regularity of NLS on T^d and a multiplicative potential*”, JOURNAL EUROPEAN MATHEMATICAL SOCIETY, 15, 229-286, 2013.

39. M. Berti, L. Biasco, M. Procesi, “*Existence and stability of quasi-periodic solutions for derivative wave equations*”, REND. LINCEI MAT. APPL., 24, 2013.
40. M. Berti, L. Biasco, M. Procesi, “*KAM theory for the Hamiltonian derivative wave equation*”, ANNALES SCIENTIFIQUES DE L' ÉCOLE NORMALE SUPÉRIEURE, Volume 46, fascicule 2, p. 299-371, 2013.
41. P. Baldi, M. Berti, R. Montalto, “*A note on KAM theory for quasi-linear and fully nonlinear KdV*”, to appear on REND. LINCEI MAT. APPL., 2013.
42. M. Berti, L. Biasco, M. Procesi, “*KAM for reversible derivative wave equations*”, preprint 2012.
43. P. Baldi, M. Berti, R. Montalto “*KAM theory for quasi-linear and fully non-linear perturbations of KdV*”, preprint 2012.

Proceedings

1. A. Ambrosetti, M. Berti: “*Applications of Critical Point Theory to Homoclinics and Complex Dynamics*”, Proc. of the International Conference on Dynamical Systems and Differential Equations, W.Chen and S. Hu editors, 1998.
2. M. Berti: “*A functional analysis approach to Arnold diffusion*”, Proc. of the International conference SPT2001, World Scientific.
3. M. Berti: “*Arnold diffusion: a functional analysis approach*”, Proc. of the Fourth International Conference, “Symmetry in nonlinear math. physics”, Kiev, 2001.
4. M. Berti: “*Soluzioni periodiche di PDEs Hamiltoniane*”, Conf. invitata 30', XVII Congresso UMI, Milano, 2003, Bolletino Unione Matematica Italiana, 8, 7-B, pp. 647-661, 2004.
5. M. Berti: “*Nonlinear oscillations of Hamiltonian PDEs*”, Proceedings of Contributed talks Equadiff.11, invitato da P. Rabinowitz, 2005.
6. M. Berti: “*Nonlinear oscillations of completely resonant wave equations*”, for “Fixed Point Theory and Its applications” Banach Center Publications, Institute of Mathematics, Polish Academy of Sciences, Warsaw, 2007.
7. M. Berti, P. Bolle: “*Cantor families of periodic solutions in wave equations*”, Proc. of the International Conference on Variational Methods, organizers A. Ambrosetti, V. Bangert, K. Chang, I. Ekeland, P. Rabinowitz, Tianjin, 2007.
8. M. Berti “*Quasi periodic solutions of Hamiltonian PDEs*”, 38-Journé equations aux dérivées partielles, Biarritz, 2011.
9. M. Berti “*Quasi-periodic solutions of PDEs*”, Seminaire Laurent Schwartz, IHES, 2012.

• Some invited Conference at International Universities and Workshops

1998. “*Chaotic dynamics in presence of a saddle-saddle equilibrium*”, Paris VI, invited by M. Chaperon.

1998. “*Melnikov-type variational results*”, Paris VII, invited by J. P. Marco.
1999. “*Homoclinics and chaos in presence of a saddle-saddle equilibrium*”, Oberwolfach workshop on differential equations.
2000. “*Nuovi metodi variazionali nello studio della diffusione di Arnold*”, Roma La Sapienza, invited by G. Gallavotti.
2001. “*A functional analysis approach to Arnold diffusion*”, Univ. di Barcelona, invited by A. Delshams.
2002. “*Drift in phase space: a new variational mechanism with optimal diffusion time*”, Scuola Normale Superiore, invited by S. Marmi.
2002. “*Periodic solutions in nonlinear wave and plate equations*”, University of Milano, invited by S. Terracini.
2003. “*Periodic solutions in nonlinear wave equations*” at “New connections between Dynamical Systems and PDEs”, Palo Alto, organizers: L. Evans, P. Rabinowitz.
2004. “*Periodic solutions of completely resonant wave equations*” at “Integrable and Near-integrable Hamiltonian PDE”, Toronto. Organizers: W. Craig, P. Deift, S. Kuksin.
2004. “*Periodic solutions of Hamiltonian PDEs*” at “Bifurcation Theory and Nonlinear Waves”, Lausanne. Organizers: A. Ambrosetti, M. Esteban, Stuart, Toland.
2004. “*Forced vibrations of wave equations with nonmonotone nonlinearities*”, Madison-Wisconsin, invited by P. Rabinowitz.
2005. “*Periodic solutions of completely resonant wave equations and the Nash-Moser theorem*”, Mc Master University, Hamilton, Canada, invited by W. Craig.
2005. “*A variational principle on a Cantor set*” at “Equadiff 11”, Bratislava. Invited by P. Rabinowitz.
2005. “*Nonlinear oscillations for the wave equation*”, University of British Columbia, Vancouver, invited by I. Ekeland and N. Ghoussoub.
2007. “*Nonlinear oscillations in Hamiltonian PDEs*” at “Variational Methods and Nonlinear Analysis”, Nankai Univ., Tianjin. Organizers: A. Ambrosetti, V. Bangert, I. Ekeland, J. Long, P. Rabinowitz.
2007. “*Variational methods in Hamiltonian PDEs*”, Nanjin University, invited by J. You and C. Chang.
2008. “*Periodic solutions of NLW in any dimension*”, at “From Dynamical Systems to Statistical Mechanics” CIRM Marseille. Scientific Committee: V. Baladi, D. Bambusi, C. Liverani, F. Martinelli.
2008. “*Sobolev periodic solutions for nonlinear wave equations in higher dimension*”, Ecole Polytechnique de Lausanne, invited da Buffoni

2008. “ C^k periodic solutions for nonlinear wave equations in higher dimension”, 2008, University of Bath, invitato dal Prof. J. Toland.
2008. “Periodic solutions of higher dimensional Hamiltonian PDEs”, CRM, Barcelona.
2009. “An abstract Nash-Moser Theorem with parameters and applications to PDEs”, Fudan Univ., Shanghai.
2009. “Periodic solutions of Hamiltonian PDEs”, Zhejiang University, in Hangzhou city.
- 2010, March. “Sobolev quasi-periodic solutions of NLS”, Zurich, invited by Kappeler.
- 2010, April. “Quasi-periodic solutions of NLS on T^d ”, Paris XI, invited by Burq.
- 2010, July. “Quasi-periodic solutions of PDEs”, IHES, invited by Delort.
- 2010, November. “Quasi-periodic solutions of NLS with a multiplicative potential”, Paris VII, invited by H. Eliasson.
- 2011, July. “Quasi-periodic solutions of Hamiltonian PDEs”, Biarritz, 34-Journees EDP, invitato da D. Lannes.
- 2011, August. “Quasi-periodic solutions of Hamiltonian PDEs”, at “Hamiltonian systems” Nanjin University. Scientific committee C. Cheng, H. Eliasson, A. Fathi, J. Mather.
- 2011, September. “Quasi-periodic solutions of Hamiltonian PDEs”, Berder, Nantes, invited by B. Grebert.
- 2011, October. “Quasi-periodic solutions of Hamiltonian PDEs”, Edinburgh, Workshop “Dynamical systems and classical mechanics” in memory of V.I. Arnold, invited by Kuksin, Eliasson, Toland, Yoccoz, Sinai.
- 2011, October. “Quasi-periodic solutions of Hamiltonian PDEs”, Workshop “Dynamics of PDEs” Accademia Naz. Lincei.
- 2012, January. “KAM for the Hamiltonian derivative wave equation”, St Etienne de Tineé, invited by Iooss, Stolovitch.
- 2012, February. “Quasi-periodic solutions of PDEs”, Seminaire L. Scwhartz, IHES, Paris, invited by F. Merle.
- 2012, February. “New connections between dynamical systems and PDEs”, Jussieu-ENS, invited by Alazard.
- 2012, February. “Quasi-periodic solutions of PDEs”, Paris XIII, video conference with Berkeley, Bonn, Zurich, invited by J.M. Delort.
- 2012, March. “Quasi-periodic solutions of PDEs”, Princeton, Institute for Advanced studies, workshop on “Symplectic dynamics”, invited by H. Hofer.
- 2012, May. “Quasi-periodic solutions of PDEs”, Postech. Workshop “Topics on Nonlinear Partial Differential Equations”, invited by P. Rabinowitz.

- 2012, July. “*Quasi-periodic solutions of PDEs*”, Roma La Sapienza, Workshop “Mechanics: classical, statistical and quantum”, 70 birthday of G. Gallavotti.
- 2012, July. “*Existence of quasi-periodic solutions for nonlinear evolution equations via the theorem of Nash-Moser*”, Ascona, “Nonlinear Hamiltonian PDEs”, invited by Kappeler.
- 2012, September. “*KAM theory for derivative wave equations*”, Workshop Roman PDEs.
- 2012, November. “*KAM theory for quasi-linear and fully nonlinear perturbations of KdV*”, Roma La Sapienza, ERC-workshop, invited by P. D’Ancona, F. Merle.
- 2012, November. “*KAM theory for quasi-linear and fully nonlinear perturbations of KdV*”, CIRM, Marseille, Dynamics and PDEs, a conference for the 60 birthday of H. Eliasson.
- 2013, April. “*Quasi-periodic solutions for quasi-linear KdV equations*”, University of Nice, invited by L. Stolovitch.
- 2013, May. “*Quasi-periodic solutions for quasi-linear KdV equations*”, University of Zürich, invited by T. Kappeler.
- 2013, May. Workshop “*Wave Interactions and Turbulence*”, Field Institute Toronto, Organizers: W. Craig, C. Sulem.
- 2013, June. Workshop “*Hamiltonian and dispersive equations*”, CIRM Marseille, Organizers: Bambusi, Grebert, Kappeler.
- 2013, July. Workshop “*Dynamische Systeme*”, Oberwolfach. Organisers: H. Eliasson, H. Hofer, J.C. Yoccoz.
- **Didattica.** Molti corsi sia per laurea triennale che specialistica di “Sistemi dinamici”, “Analisi reale”, “Calcolo delle variazioni”, “Matematica generale” per biologi, numerose tesi di laurea triennale e magistrale.
2002. “*Geometric, Probabilistic and Variational Methods in Dynamics*”, SISSA school (with Ambrosetti, Liverani, Luzzatto).
2003. “*Dynamical Systems and Control Theory*”, Trimester SISSA-ICTP (with Agrachev, Boscain).
2005. “*Variational Problems in Nonlinear Analysis*”, SISSA school (with Ambrosetti, Malchiodi).
2006. Session “*Hamiltonian Systems*” at AIMs Sixth International Conference on “Dynamical Systems”, Poitiers (with Chierchia, Delshams).
2008. “*Hamiltonian PDEs and Variational Methods*”, workshop, Capri (with Coti Zelati).
2009. “*New connections between dynamical systems and PDEs*”, Trimester, Naples (with Coti Zelati, Procesi).

2010. “*KAM for PDEs*”, School and workshop, Naples-Ravello, (with Coti Zelati, Procesi, Baldi).

Since 2010. Member of the Scientific Committee of the JISD (Jornades d’interacció entre sistemes dinàmics i equacions en derivades parcials) on “Interactions between dynamical systems and PDEs, Barcelona.

2011. Invited session of “*Analisi nonlineare*”, XIX congresso UMI,

2012. “*New connections between dynamical systems and PDEs*”, workshop, Capri (with Coti Zelati, Procesi, Baldi)

see <http://www.dma.unina.it/hamiltonianPDE>.

2012. Member of the scientific committee of ‘*PDE’s in Rome: School and Conference*’ September” <https://sites.google.com/site/pdesrome/>

• **Attività di Referee**

1. Referee per numerose riviste internazionali,
2. Membro delle commissioni di PhD di Laura Di Gregorio (Roma 3), Cristina Bardelle (Milano), Gabriella Pinzari (Roma 3), Livia Corsi (Roma 3), Renato Lucá (Roma La Sapienza).
3. Referee per l’ANR (Agency-National-Research)
4. Referee per Progetti FIRB
5. Rapporteur for the Habilitation Thesis (Habilitation à diriger des recherches) di Laurent Thomann, Univ. Nantes, ’13

Napoli, 1/7/2013