1. CURRICULUM VITAE

Philippe BOLLE
Professor of mathematics
University of Avignon, Department of Mathematics
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Education and academic degrees :

Scolarship at the Ecole Normale Supérieure (Paris), 1985-1989.

PhD, university Paris Dauphine, Feb. 1994.
Supervizer : Prof. I. Ekeland.
Title of the thesis : Etude des solutions périodiques de certains systèmes hamiltoniens : systèmes ayant des intégrales premières non triviales, problème du billard.

Habilitation à diriger des recherches, university Paris Dauphine, Dec. 2002
Title : Utilisation de méthodes variationnelles dans l'étude qualitative de systèmes hamiltoniens.

Professional experience :

1992-1996 : ATER (allocataire temporaire d'enseignement et de recherche), university Paris Dauphine.

1996- 1998 : postdoctoral fellow, Scuola Normale Superiore, Pisa, Italy (1996 and 1997), University of British Columbia, Vancouver, Canada (1997), University of Bath, UK (1997 and 1998).

1998-2004 : maître de conférences (lecturer) in mathematics, university of Avignon.

From 2004 : professor of mathematics, university of Avignon.

Charges :

From 2008 to 2013, director of the research department of mathematics, university of Avignon.

From 2011, member of the Council of the Faculty of Sciences, university of Avignon.

Research interests :

Dynamical systems, Hamiltonian and Lagrangian systems, variational methods, critical point theory, Arnold diffusion, Hamiltonian PDE, Nash Moser methods and KAM theory.

2. LIST OF PUBLICATIONS

[1] M. Arcostanzo, M.-C. Arnaud, P. Bolle, M. Zavidovique : *Tonelli Hamiltonians without conjugate points and C^0 integrability*, to appear in Math. Zeitschrift.

[2] M. Berti, P. Bolle : *Quasi-periodic solutions with Sobolev regularity of the nonlinear Schrödinger equation on T^d with a multiplicative potential*, J. Eur. Math. Soc. 15 (2013), 229-286.

[3] M. Berti, P. Bolle : *Sobolev quasi-periodic solutions of multidimensional wave equations with a multiplicative potential*, Nonlinearity 25 (2012), 2579-2613.

[4] M. Berti, P. Bolle : *Quasi-periodic solutions of nonlinear Schrödinger equations on T^d*, Rend. Lincei (9) Mat. Appl. 22 (2011), 223-236.

[5] M. Berti , P. Bolle : *Sobolev periodic solutions of nonlinear wave equations in higher spatial dimensions* , Arch. Ration. Mech. Anal. 195 (2010), 609-642.

[6] M. Berti , P. Bolle , M. Procesi : *An abstract Nash-Moser theorem with parameters and applications to PDEs* , Ann. Inst. H. Poincaré Anal. Non Linéaire 27 (2010) 377-399.

[7] M. Berti , P. Bolle : *Cantor families of periodic solutions of wave equations with C^k nonlinearities*, NoDEA Nonlinear Differential Equations Appl. 15 (2008), 247-276.

[8] M. Berti , P. Bolle : *Cantor families of periodic solutions for completely resonant wave equations*, Front. Math. China 3 (2008), 151-165.

[9] M. Berti , P. Bolle : *Cantor families of periodic solutions for wave equations via a variational principle*, Adv. Math. 217 (2008), 1671-1727.

[10] M. Berti , P. Bolle : *Cantor families of periodic solutions for completely resonant nonlinear wave equations*, Duke Math. J. 134 (2006), 359-419.

[11] M. Berti , P. Bolle : *Bifurcation of free vibrations for completely resonant wave equations*, Boll. Unione Mat. Ital. Sez. B Artic. Ric. Mat. (8) 7 (2004), 519-528.

[12] M. Berti, P. Bolle : *Multiplicity of periodic solutions of nonlinear wave equations*, Nonlinear Analysis 56 (2004), 1011-1046.

[13] M. Berti, P. Bolle : *Periodic solutions of nonlinear wave equations with general nonlinearities*, Commun. Math. Phys. 243 (2003), 315-328.

[14] M. Berti, L. Biasco, P. Bolle : *Drift in phase space : a new variational mechanism with optimal diffusion time*, J. Math. Pures Appl. 82 (2003), 613-664.

[15] M. Berti, L. Biasco, P. Bolle : *Optimal stability and instability results for a class of nearly integrable Hamiltonian systems*, Rend. Lincei (9) Mat. Appl. 13 (2002), 77-84.

[16] M. Berti, P. Bolle : *Fast Arnold diffusion in systems with three time scales*, Discr. Cont. Dyn. Systems 8 (2002), 795-811.

[17] M. Berti, P. Bolle : *A functional analysis approach to Arnold diffusion*, Ann. I.H.P. AN 19 (2002), 395-450.

[18] M. Berti, P. Bolle : *Diffusion time and splitting of separatrices for nearly integrable isochronous Hamiltonian systems*, Rend. Lincei (9) Mat. Appl. 11 (2000), 235-243.

[19] P. Bolle, N. Ghoussoub, H. Tehrani : *The multiplicity of solutions in nonhomogeneous boundary value problems*, manuscripta math. 101 (2000), 325-350.

[20] P. Bolle, B. Buffoni : *Multiplicity of algebraically decaying solitary waves*, International Conference on Differential Equations (Berlin 1999), 1339-1344, World Sci. Publishing, River Edge, NY, 2000.

[21] P. Bolle, B. Buffoni : *Multibump homoclinic solutions to a centre equilibrium in a class of autonomous Hamiltonian systems*, Nonlinearity 12 (1999), 1699-1716.

[22] P. Bolle : *On the Bolza problem*, J. Diff. Eq. 152 (1999), 274-288.

[23] M. Berti, P. Bolle : *Homoclinics and Chaotic Behaviour for Perturbed Second Order Systems*, Ann. Mat. pura ed appl. 176 (1999), 323-378.

[24] M. Berti, P. Bolle : *Variational construction of homoclinics and chaos in presence of a saddle-saddle equilibrium*, Ann. Scuola Norm. Sup. Pisa Cl. Sci. 27 (1998), 331-377.

[25] Berti, P. Bolle : *Variational construction of homoclinics and chaos in presence of a saddle-saddle equilibrium*, Rend. Lincei (9) Mat. Appl. 9 (1998), 167-175.

[26] P. Bolle : *A contact condition for p-codimensional submanifolds of a symplectic manifold* ($2 \leq p \leq n$), Mat. Z. 227 (1998), 211-230.

[27] P. Bolle : *Morse index of approximating periodic solutions for the billiard problem. Application to existence results*, Can. J. Math. 50 (1998), 497-524.

[28] P. Bolle : *Une condition de contact pour les sous-variétés coïsotropes d'une variété symplectique*, C.R.A.S. Sér. I Math. 322 (1996), 83-86.

3. TITLES USEFUL FOR THE SELECTION

1) From my PhD, my research interests turn around the qualitative properties of Hamiltonian systems. In particular I worked in the following subjects

(i) Symplectic geometry and periodic solutions of Hamiltonian systems (ref. [26]-[28] of the list of publications)

(ii) Boundary value problems for some Lagrangian systems ([19],[22])

(iii) Homoclinic orbits and chaotic behavior ([20],[21], [23]-[25])

(iv) Arnold diffusion for nearly integrable systems ([14]-[18])

(v) Periodic and quasi-periodic solutions of Hamiltonian PDEs ([2]-[13]), which has been my main research topic for these last years.

In this last topic, the aim is to extend to infinite dimensional Hamiltonian systems (more precisely Hamiltonian PDE such as the Schrödinger equation or the wave equation), some well-known results about the existence of families of periodic or quasi-periodic solutions (Lyapunov center theorem, Weinstein theorem, KAM theory, Melnikov-Eliasson theorem) in the neighborhood of an elliptic equilibrium of a Hamiltonian systems. In papers [2]-[13], and in a work on autonomous wave equations in preparation with M. Berti, new results on the existence of periodic and quasi-periodic solutions are obtained for some Hamiltonian PDE with analytic or C^k nonlinearity (k large), using Nash Moser methods that are strongly related to KAM theory.

I supervize a PhD thesis on topic (v).

2) KAM theory is also used in [1], where Tonelli Hamiltonian without conjugate points are considered. In this case, it can be proved, using Aubry Mather and weak KAM theory that the phase-space is completely C^0-foliated by invariant tori, but we do not know in the general case whether this foliation is smooth. However some properties of the dynamics on these invariant tori are available. In particular, it is possible to prove, using a KAM theorem, that there is a rich family of smooth invariant tori filled with quasi-periodic orbits.

3) In the first semester of 2012-13, I taught a course in the "Master de mathématiques fondamentales" (2nd year) of Aix-Marseille University, entitled "Advanced implicit function theorems and an introduction to KAM theory".