Abstract. This workshop continued the biannual series at Oberwolfach on Dynamical Systems that started as the “Moser-Zehnder meeting” in 1981. The main themes of the workshop are the new results and developments in the area of dynamical systems, in particular in Hamiltonian systems and symplectic geometry related to Hamiltonian dynamics. Highlights were the solution of a fifty year old problem in Arnold diffusion and a KAM-result on quasi-linear perturbations of the KdV-equation.

Mathematics Subject Classification (2010): 37, 35, 53D.

Introduction by the Organisers

The workshop was organized by H. Eliasson (Paris), H. Hofer (Princeton) and J.-C. Yoccoz (Paris). It was attended by more than 50 participants from 11 countries and covered a large area of dynamical systems centered around classical Hamiltonian dynamics: KAM theory, Arnold diffusion, geodesic flows, periodic solutions of symplectic flows, Floer homology. Other subjects treated where dynamics of PDEs, magnetic fields, quasi-periodic co-cycles and Schrödinger operators, pseudo-rotations, Teichmüller dynamics, pentagram maps, discrete bicycle transformations, group actions and algebraic number theory.

C.-Q. Cheng and by V. Kaloshin presented their proofs of existence of Arnold diffusion in “generic” nearly integrable Hamiltonian systems in $2\frac{1}{2}$ degrees of freedom. This is a fifty year old problem to whose solution many mathematicians, in particular J. Mather, have contributed.

M. Berti presented a perturbation result of KAM-type for quasi-linear perturbations of the KdV equation. Quasi-linear perturbations are particularly important
for the connection of KdV with water wave equations whose perturbation theory is one of the most challenging problem in the KAM-theory for PDE's. M. Guardia reported on growth of Sobolev norms for the non-linear cubic Schrödinger equation and L.-S. Young discussed a work on center manifolds and chaotic dynamics in infinite dimension with applications to certain PDE's.

A. Abbondandolo presented new results on the old problem of periodic solutions in magnetic fields. V. Ginzburg P. Albers and U. Hryniewicz discussed pseudo holomorphic curve and Floer homology methods in symplectic and contact dynamics. M.-C. Arnaud reported on a generalization of the (former) Hopf conjecture to Tonelli Hamiltonians.

Pseudo-rotations were discussed by B. Bramhan and P. Le Calvez and also in the talk of J. Franks on Tits alternative for symplectic surface diffeomorphisms. New results on reducibility and Lyapunov exponents for quasi-periodic co-cycles were presented by N. Karaliolios, K. Bjerklöv and J. You. Teichmuller dynamics was discussed in the talks of C. Matheus Silva Santos and C. Ulcigrai.

The meeting was held in an informal and stimulating atmosphere. The weather was very nice the whole week and the traditional walk to St. Roman, this year under the leadership of Sergei Tabachnikov, was even more pleasant than usual.
Table of Contents

Marian Gidea (joint with Rafael de la Llave, Tere Seara)
Local and global instability in nearly integrable Hamiltonian systems . . . 1979

Massimiliano Berti
KAM for quasi-linear KdV equations ......................... 1982

Viktor L. Ginzburg (joint with Başak Z. Gürel)
Hyperbolic fixed points and periodic orbits of Hamiltonian systems ..... 1985

Lai-Sang Young
Toward a smooth ergodic theory for infinite dimensional systems ..... 1988

Alain Chenciner
Angular momentum and Horn’s problem ..................... 1989

Peter Albers (joint with W. Merry, U. Fuchs, U. Frauenfelder)
Orderability of contactomorphism groups ................... 1990

Chong-Qing Cheng
Arnold diffusion in nearly integrable Hamiltonian systems .......... 1991

Carlos Matheus (joint with Martin Möller and Jean-Christophe Yoccoz)
A criterium for the simplicity of Lyapunov exponents of origamis .... 1992

Patrice Le Calvez
A finite dimensional approach to Bramham’s approximation theorem ... 1996

Marcel Guardia (joint with Vadim Kaloshin)
Growth of Sobolev norms for the cubic nonlinear Schrödinger equation . 1998

Nikolaos Karaliolios
Reducibility of quasiperiodic cocycles in semi-simple compact Lie groups 2001

Barney Bramham
First steps towards invariant circles using pseudoholomorphic curve methods ........................................... 2004

Marie-Claude Arnaud (joint with Marc Arcostanzo, Philippe Bolle, Maxime Zavidovique)
Tonelli Hamiltonians with no conjugate points and $C^0$ integrability ... 2006

Serge Tabachnikov
Tire tracks geometry, continuous and discrete bicycle transformation, and the filament equation .......................... 2008
Umberto L. Hryniewicz (joint with Joan E. Licata, Pedro A. S. Salomão and Kris Wysocki)
Existence of special finite-energy foliations on $SO(3)$ and applications to positively curved geodesic flows on the 2-sphere 2010

Vadim Kaloshin (joint with Marcel Guardia, Ke Zhang)
Arnold diffusion and weak quasirandom hypothesis 2012

Corinna Ulcigrai (joint with Pascal Hubert and Luca Marchese)
Lagrange spectra for translation surfaces 2015

Kristian Bjerklöv
The dynamics of a class of quasi-periodic Schrödinger cocycles 2018

Svetlana Katok (joint with A. Katok and F. Rodriguez Hertz)
The Fried entropy for smooth group actions and connections with algebraic number theory 2020

Karl Friedrich Siburg (joint with Andreas Knauf and Frank Schulz)
A nightcap on magnetic dynamics 2021

Alberto Abbondandolo (joint with Leonardo Macarini and Gabriel P. Paternain)
Closed orbits for exact magnetic flows on surfaces below the Mañé critical value 2022

Boris Khesin (joint with Fedor Soloviev)
Higher-dimensional pentagram maps and KdV flows 2025

John Franks (joint with Michael Handel)
The group of symplectic surface diffeomorphisms 2028