

Giancarlo Benettin

Curriculum vitae

Born in 1948. Degree in Physics (“laurea”) in 1972.

Permanent positions (Padua University):

- Non permanent positions till 1981.
- Research associate in Theoretical Physics from 1981 to 1987.
- Full professor in Theoretical Mechanics from 1987. Department of Physics 1981–1989; Department of Mathematics 1989–2018. Retired since October 2018.

Miscellanea:

- Member of the board of the PhD School in Mathematics 1993–2008.
- Coordinator of the “Scuola Galileiana di studi superiori” (Galilean School of Higher Education), Class of Natural Sciences, 2010–2013; Director of the School 2013–2016.
- Member of the Editorial Board of *Journal of Statistical Physics* 1994–96; of *Mathematical Physics Electronic Journal* 1995–2014; of *Nonlinearity* 1998–2000; of *Regular and Chaotic Dynamics* 1998–2010; of the *Bollettino dell’Unione Matematica Italiana* 2004–2007.
- Member of the Evaluation Unit (Nucleo di Valutazione) of SISSA, since 2016.

Main research projects:

- Local coordinator of the European project: “Stability and universality in classical mechanics” in the years 1995–1998. Local coordinator of research projects supported by Italian Ministry of Education (PRIN), years 1998–2015.

Main research interests:

(1972–74) Statistical Mechanics, Ising model.

(1974–82) Mainly numerical study of dynamical systems: calculating Lyapunov Exponents; transition to chaos in FPU-like models; billiards; bifurcations in Hamiltonian systems.

(1982–1986) General studies of nearly-integrable Hamiltonian systems, within KAM or Nekhoroshev theory.

(1986–today) Nekhoroshev theory, with application to physical systems (both analytical and numerical methods). In particular: energy exchanges among different degrees of freedom in models of classical gases; physical realization of holonomic constraints; adiabatic invariants; stability of elliptic equilibria; stability of Lagrangian equilibria L4 and L5 in the restricted three-body problem; the rigid body dynamics: possible presence of chaotic motions, stability of the proper rotations, the spin-orbit problem; Nekhoroshev theorem in the generic “steep” case.

(1994–2011) Accuracy of symplectic algorithms for the numerical integration of Hamiltonian systems.

(1998–2001) Non equilibrium ergodic theory.

(2004–today) Study of the Fermi-Pasta-Ulam problem, in one and two dimensions.

Publications:

Indices (Scopus): 68 publications, 4,547 citations, H-index 28

Papers, since 2008:

1. G. Benettin, A. Carati, L. Galgani and A. Giorgilli, *The Fermi-Pasta-Ulam problem and the metastability perspective*, in: G. Gallavotti, *The Fermi-Pasta-Ulam Problem. A status report*. (Springer, Berlino 2008).
2. G. Benettin, M. Guzzo and A.I. Neishtadt, *A new problem of adiabatic invariance related to the rigid body dynamics*, *Discrete and Continuous Dynamical Systems* **21**, 959-975 (2008).
3. G. Benettin and G. Gradenigo, *A study of the Fermi-Pasta-Ulam problem in dimension two*, *CHAOS* **18**, 013112-1:13 (2008).
4. G. Benettin, M. Guzzo and V. Marini, *Adiabatic chaos in the spin-orbit problem*, *Celest. Mech. Dyn. Astr.* **101**, 203–224 (2008).
5. G. Benettin, R. Livi and A. Ponno, *The Fermi-Pasta-Ulam problem: scaling laws vs. initial conditions*, *Journ. Stat. Phys.* **135**, 873-893 (2009).
6. G. Benettin and A. Ponno, *On the numerical integration of the FPU-like systems*, *Physica D* **240**, 568-573 (2011).
7. G. Benettin and A. Ponno, *Time-scales to equipartition in the Fermi–Pasta–Ulam problem: finite-size effects and thermodynamic limit*, *Journ. Stat. Phys.* **144**, 793–812 (2011).
8. G. Benettin, F. Fassò and M. Guzzo, *Il corpo rigido in rapida rotazione: una moderna visione hamiltoniana*, in: *Complementi alle lezioni di Meccanica Razionale di T. Levi-Civita e U. Amaldi*, E.N.M. Cirillo, G. Maschio, T. Ruggeri and G. Saccomandi editors (Edizioni Compumat, 2012).
9. G. Benettin, H. Christodoulidi and A. Ponno, *The Fermi–Pasta–Ulam problem and its underlying integrable dynamics*, *Journ. Stat. Phys.* **152**, 195–212 (2013).
10. G. Benettin, R. Livi and G. Parisi, *Ergodicity: How Can It Be Broken?*, in: *From the Law of Large Numbers to Large Deviation Theory in Statistical Physics: An Introduction*, F. Cecconi, M. Cencini, A. Puglisi, D. Vergni and A. Vulpiani Editors, Springer, Lecture Notes in Physics 885 (2014); ISBN: 978-3-642-54250-3.
11. M. Guzzo, L. Chierchia and G. Benettin, *The steep Nekhoroshev’s Theorem and optimal stability exponents (an announcement)*, *Rendiconti Lincei-Matematica e Applicazioni*, Vol. 25, Issue 3, pp. 293-299, 2014.
12. M. Guzzo, L. Chierchia and G. Benettin, *The steep Nekhoroshev’s Theorem and optimal stability exponents*, *Commun. Math. Phys.* **342**, 569–601 (2016).
13. G. Benettin, S. Pasquali e A. Ponno, *The Fermi-Pasta-Ulam problem and its underlying integrable dynamics: an approach through Lyapunov Exponents*, *J. Stat. Phys.* **171**, 521-542 (2018).