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Decreto Rettore Università di Roma "La Sapienza" n. 155/2018 del 18/01/2018

ALESSANDRO TETA
Curriculum Vitae
<u>ai fini della pubblicazione</u>

Place: Roma
Date: February 11, 2018

Part I – General Information

Full Name	Alessandro Teta
Citizenship	Italian
Spoken Languages	italian, english

Part II – Education

Type	Year	Institution	Notes (Degree, Experience,…)
University graduation	1985	Universita` di Napoli	Degree in Physics, grade 110/110 e Lode, advisor: prof. R. Figari, thesis: Comportamento asintotico e analisi delle fluttuazioni in un modello di mezzo fortemente disomogeneo.
Post-graduate studies	1987	S.I.S.S.A. di Trieste	Master in Mathematical Physics, advisor: prof. G. Dell'Antonio, thesis: Schroedinger operator with point interactions defined as quadratic form.
PhD	1989	S.I.S.S.A. di Trieste	PhD in Mathematical Physics, advisor: prof. G. Dell'Antonio, thesis: Singular perturbation of the laplacian and connections with models of random media.

Part III – Appointments

IIIA – Academic Appointments

Start	End	Institution	Position
Apr 1990	Dec 1991	Ruhr-Universitaet Bochum	Borsa post-doc C.N.R. Advisor: prof. S. Albeverio
Jan 1992	Oct 1999	Universita` di Roma "La Sapienza"	Ricercatore in Fisica Matematica S.S.D. MAT/07
Nov	Dec	Universita` di L'Aquila	Professore associato in Fisica Matematica

1999	2012		S.S.D. MAT/07
Dec 2012		Universita` di Roma "La Sapienza"	Professore associato in Fisica Matematica S.S.D. MAT/07
Dec 2013			Habilitation as professore ordinario in Fisica Matematica

Part IV – Teaching experience

Institution: Universita` di Roma "La Sapienza"

Acad. Year	Lecture/Course
1991/92 - 1998/99	Esercitazioni di Meccanica Razionale
1994/95	Istituzioni di Fisica Matematica (20 hours)
1995/96	Ciclo di seminari per il corso di Dottorato "Meccanica Quantistica"
1996/97	Istituzioni di Fisica Matematica (30 hours)

Institution: Universita` di L'Aquila

Acad. Year	Lecture/Course
1999/00	Meccanica Razionale, Istituzioni di Fisica Matematica (II modulo)
2000/01	Meccanica Razionale, Istituzioni di Fisica Matematica (II modulo)
2001/02	Meccanica Razionale, Fisica Matematica (I modulo), Storia della Matematica (6 hours)
2002/03	Meccanica Razionale, Fisica Matematica 1, Storia della Matematica (6 hours)
2003/04	Meccanica Razionale, Meccanica Classica e Analitica
2004/05	Meccanica Razionale, Fisica Matematica 1
2005/06	Meccanica Razionale, Fisica Matematica 1
2006/07	Meccanica Razionale, Fisica Matematica 1
2007/08	Meccanica Razionale, Fisica Matematica 1
2008/09	Meccanica Classica e Analitica, Fisica Matematica 1
2009/10	Meccanica Classica e Analitica, Fisica Matematica 1
2010/11	Meccanica Razionale, Fisica matematica 1
2011/12	Meccanica Razionale, Fisica matematica 1
2012/13	Fisica Matematica 1

Institution: Universita` di Roma "La Sapienza"

Acad. Year	Lecture/Course
2012/13	Calcolo Integrale per informatici (half course)
2013/14	Calcolo e Biostatistica per biologi, Istituzioni di Fisica Matematica (3 CFU)
2014/15	Fisica Matematica Superiore, Meccanica Razionale per matematici
2015/16	Meccanica Razionale per matematici, Meccanica Razionale per fisici
2016/17	Meccanica Razionale per matematici, Meccanica Razionale per fisici
2017/18	Fisica Matematica Superiore, Meccanica Razionale per matematici (II semestre)

Institution: Gran Sasso Science Institute

Acad. Year	Lecture/Course
2016/17	Introduction to Quantum Mechanics, 16 hours for PhD in Math.
2017/18	Introduction to Quantum Mechanics and Scattering Theory, 18 hours for PhD in Math.

Part V - Society memberships

G.N.F.M.
U.M.I.
Societa` Italiana di Storia delle Matematiche
International Research Center on Mathematics and Mechanics of Complex Systems
International Association of Mathematical Physics

Part VI - Funding Information [grants as PI-principal investigator or I-investigator]

Year	Title	Program	Grant value
2013/16	Problemi matematici in teoria cinetica e applicazioni	Miur/Prin 2012, national coordinator: M. Pulvirenti	230 279
2016/18	Metodi fisico-matematici per problemi di evoluzione	Progetto di ricerca di Ateneo, coordinator: D. Benedetto	12 500
2018/20	Topological and spectral analysis of quantum matter	Progett di ricerca di Ateneo, coordinator: G. Panati	Approvato, da assegnare

Participation in some past research projects:

  Project PRIN 1998 "Interazioni singolari in sistemi dinamici classici e quantistici", national coordinator G. Jona Lasinio, local coordinator G. Dell'Antonio.
  Project PRIN 1999 "Metodi variazionali e topologici nello studio di vari fenomeni nonlineari con particolare enfasi ai fenomeni di concentrazione, biforcazione. Esistenza e dinamica di onde solitarie", national and local coordinator V. Benci.
  Project PRIN 2000 "Metodi analitici e stocastici in sistemi complessi", national coordinator G. Jona Lasinio, local coordinator A. De Masi.
  Project PRIN 2002 "Metodi analitici e stocastici per lo studio di sistemi complessi", national coordinator G. Jona Lasinio, local coordinator A. De Masi.
  Project GNFM-GNAMPA 2004 ``Equazioni dispersive della Fisica matematica , aspetti teorici e numerici'', coordinator A. Teta.
  Project PRIN 2004 ``Metodi analitici e stocastici per lo studio di sistemi complessi, national coordinator G. Jona Lasinio, local coordinator A. De Masi.
  Project INdAM 2006-07 "Mathematical modeling and numerical analysis of quantum systems with applications to nanosciences", coordinator A. Sacchetti.
  European project "Hyperbolic and Kinetic Equations: Asymptotics, Numerics, Analysis", local coordinator P. Marcati.
  European project GDR "Mathematics and Quantum Physics", coordinator M. Combescure.
  Project PRIN 2006 "Comportamento cinetico e idrodinamico di sistemi complessi classici e quantistici", national coordinator C. Cercignani, local coordinator M. Pulvirenti.
  Project of the Istituto Italiano di Studi Germanici 2008-2011 "Origini e sviluppi della fisica

quantistica: Max Born e la Scuola di Gottinga", coordinators P. Freguglia, S. Graffi, A. Teta.
   Project PRIN 2009 "Problemi Matematici delle Teorie Cinetiche e Applicazioni", national and local coordinator M. Pulvirenti.
   Progetto di ricerca di Ateneo 2010 "Evoluzione deterministica e stocastica di sistemi a molte componenti in Fisica Matematica e applicazioni", coordinator: C. Boldrighini up to Nov. 2014 and A. Teta up to Oct. 2015.
   Progetto di ricerca di Ateneo 2014 "Sistemi dinamici e problemi di evoluzione della fisica matematica", coordinator: P. Butta'.

Part VII – Research Activities

Keywords	Brief Description
Effective properties of random media	The problem is the analysis of the Laplace operator in R^{3} with b.c. assigned on N randomly distributed obstacles, with linear dimension of order N^{-1}, for N going to infinity. The model is relevant for the description of the effective behavior and the fluctuations of highly inhomogeneous media. In the case of Dirichlet and Robin b.c. we have determined the rate of convergence to the limit deterministic Schroedinger operator, where the potential is the density of capacity (Dirichlet) or the density of scattering length (Robin) of the system of obstacles. Moreover we have explicitly characterized the gaussian fluctuations around the limit operator. *(Publ. n. 1, 2, 8, 9, 58)*
Hamiltonians with zero-range interactions	Such Hamiltonians are defined as perturbations of the free Hamiltonian supported by a set of zero Lebesgue measure in R^{d}. They are often used in Quantum Mechanics to study low-energy behavior for short range interactions. In the special case of a support made of a finite set of points the Hamiltonian is explicitly solvable. We have shown that a regular potential in R^{3} can be reconstructed by N randomly and independently distributed point interactions with decreasing strength in the limit (in probability) for N going to intinity. We have also characterized the gaussian fluctuations around the limit. The reconstruction result has been extended to the case of a measure of Kato-class. Using the theory of quadratic forms, we have constructed the Schroedinger operator in R^3 with an interaction supported by a regular curve and we have studied the corresponding spectral properties. In the case of the Schroedinger equation with a finite number of point interactions in R^3 an estimate of dispersive-type has been proved. *(Publ. n. 3, 4, 5, 6, 7, 16, 33, 37)*
Time-dependent point interactions	Time-dependent point interactions are often used to describe diffusion or scattering of a particle in presence of varying external fields. From the mathematical point of view they gives rise to singular non-autonomous evolution problems where standard techniques do not apply. We have proved existence and uniqueness of the solution of the heat equation with N point sources in R^{3} whose positions or strengths are given functions of the time. In the case of N time-independent positions, randomly and independently distributed with strength decreasing with N, we have shown that the

	solution converges to a deterministic limit for N going to infinity. Such limit is the solution of a diffusion equation with a regular potential explicitly depending on time. We have also considered the Schroedinger equation in R^{3} with point interactions moving on pre-assigned paths. We have proved existence and uniqueness of the weak solution in the sense of quadratic forms. The result is in a sense optimal since the presence of a moving singularity prevents the existence of a strong solution. *(Publ. n. 13, 17, 20, 37, 59)*
Anyons and Aharonov-Bohm effect	Anyons are quantum particles in dimension two described by a wave function changing for a phase factor under the exchange of two particles. They play a role in the study of the quantum Hall effect and the superconductivity. Exploiting methods of classical potential theory, we have constructed the self-adjoint and positive Hamiltonian of the free system. Using the same technique we have also constructed the Hamiltonian of a particle in R^{2} subject to a magnetic field confined in N thin solenoids (Aharonov-Bohm Hamiltonian). In the special case N=1 we have explicitly constructed the most general Hamiltonian describing the interaction with the magnetic field plus a point interaction placed at the position of the solenoid. Due to the vorticity effect produced by the magnetic field, in general there is a lack of rotational invariance for the Hamiltonian. *(Publ. n. 14, 15)*
Quantum scattering	The so-called flux-across-surfaces theorem states a fundamental relation between the outgoing state and the flux of the quantum current across a surface far away from the scattering center. The result has been extended to the case in which a zero-energy resonance is present, making use of an Hamiltonian with a point interaction. *(Publ. n. 21)*
Concentrated nonlinearities	The Schroedinger equation with a nonlinearity concentrated in a bounded region (possibly with zero Lebesgue measure) has been proposed in Solid State Physics to study resonant interactions of a charged particles in presence of impurities. When the impurities are concentrated in finite number of points in dimension one we have proved a local and a global existence result for the solution in the finite energy space H^{1} and moreover we have characterized the conditions for the blow-up. These results have been generalized to the more delicate three dimensional case, where the finite energy space is larger than H^{1} and the standard Sobolev estimates cannot be directly used. It has been shown that a point-like nonlinearity can be obtained as suitable limit of a nonlinearity concentrated in a region shrinking to the point. *(Publ. n. 19, 22, 23, 25, 47, 54)*
Models of ultra-cold quantum gases	The dynamics of ultra-cold quantum gases is usually described by a formal Hamiltonian with two body zero-range interactions. The rigorous constructions of such Hamiltonians is a non trivial problem due to the possible presence of the so-called Thomas effect, i.e. an infinite sequence of energy levels going to minus infinity. We have constructed the self-adjoint and bounded from below Hamiltonian for a system of N particles in dimension two, showing in

	particular the absence of Thomas effect. The Hamiltonian is defined via a closed and bounded from below energy form obtained as Gamma-limit of natural approximating forms. The result has been extended to the case of a particle interacting with N harmonic oscillators. We have also considered the case of N identical fermions of mass one plus a particle of mass m with zero-range interactions. We have found a critical mass m*(N), increasing with N, such that: i) for m>m*(N) the energy form is closed and bounded from below (and therefore the Hamiltonian is self-adjoint and bonded from below); ii) for m<m*(2) the energy form is unbounded from below (and this suggests that the Thomas effect occurs). In the unitary limit for N=2 it has been shown that a further point interaction at three-body coincidence point can be introduced. For three bosons we have shown lower boundedness of the Hamiltonian if the s-wave subspace is excluded. *(Publ. n. 10, 12, 31, 42, 43, 48, 50, 51, 53, 57)*
Limits of infinite particles in quantum systems	The dynamics of N quantum particles, for N large, is usually reduced to an effective, nonlinear, one-body dynamics. The derivation of the effective dynamics requires to prove a phenomenon of propagation of chaos under a suitable scaling limit for N going to infinity. In the mean-field limit for N particles with repulsive coulomb interaction and obeying Maxwell-Boltzmann statistics we have obtained the self-consistent limit equation, making use of the Feynmann-Kac formula. The analysis of the short-range limit for a system of identical bosons is particularly relevant in the study of the Bose-Einstein condensation. In dimension one, with zero-range interaction and assuming propagation of chaos, we have derived the effective dynamics, described by the Gross-Pitaevskii equation. For a generic, regular two-body interaction, the same result has been obtained without assuming the propagation of chaos. In particular we have first proved convergence of the solution of the BBGKY hierarchy associated to the many-body system to a solution of the BBGKY hierarchy obtained from the cubic NLS. Then we have shown uniqueness of the solution of the infinite BBGKY hierarchy. *(Publ. n. 11, 29, 35)*
Decoherence	Superposition principle and the corresponding interference effects are peculiar aspects of Quantum Mechanics without classical counterpart. A fundamental problem is therefore to understand how such effects are reduced or destroyed by the environment (decoherence). In the one-dimensional case of a heavy particle (the system) interacting with a light particle (the environment) via point interaction we have rigorously proved the decoherence effect on the heavy particle due to the scattering of the light one in the limit of small mass ratio. The result has been extended to a generic, regular interaction potential in dimension three. In the general case of a system made of K heavy particles and N light particles we have obtained the asymptotic form of the wave function in the limit of small mass ratio, with an explicit estimate of the error. The proof is based on perturbative methods and it requires a generalized version of the dispersive estimates for the Schroedinger equation, which is also explicitly proved.

	(Publ. n. 24, 26, 27, 28, 30, 34, 36, 45)
Models of cloud chamber	The explanation of the straight tracks observed in a cloud chamber using quantitative models is relevant both for applications and for the foundations of Quantum Mechanics. In dimension one, we have considered a particle interacting with two harmonic oscillators. At time zero the particle is in a superposition state of two wave-packets centered in the origin with opposite momentum. We have shown that the excitation probability of the oscillators is not negligible only if the oscillators are placed on the same side of the origin. The result is proved exploiting second order perturbation theory and suitable assumptions on the parameters. In dimension three, we have considered a model made of a particle, initially described by a spherical wave, and two model-atoms described by Hamiltonians with discrete and continuos spectrum. Under suitable assumptions on the parameters and using second order perturbation theory, we have shown that the ionization probability of both atoms is negligible unless the atoms and the center of the spherical wave lie on the same line. Such work is a rigorous version of Mott's analysis in the seminal paper of 1929. In a one-dimensional model the analysis has been extended to any order in perturbation theory. In the case of atoms modelized by harmonic oscillators we have derived an asymptotic form of the wave function showing the emergence from the atoms of semiclassical wave packets propagating along straight lines. *(Publ. n. 32, 38, 39, 40, 41, 44, 46, 49, 52, 60)*
History of Quantum Mechanics	The Copenhagen interpretation of Quantum Mechanics, based on the so-called wave-particle duality, has been widely accepted for many years in the physics community. We analyzes the role that such interpretation had, until recent times, in preventing detailed and quantitative studies of the emergence of classical behavior in quantum systems in interaction with the environment (decoherence). As a case study we consider the pioneering work by Mott, neglected for long time, where the correct approach was already developed in 1929. *(Publ. n. 39, 44, 49, 52, 60)*
Efimov effect	The Efimov effect is a remarkable universal phenomenon emerging in three-particle quantum systems at low energy. It consists in the following. If the particles interact via short range and resonant two-body potentials, such that the two-particle subsystems have no bound states, then an infinite number of three-body bound states appears. We have proved the effect in the case of two identical fermions plus a different particle for a suitable value of the mass ratio. *(Publ. n. 55)*

Part VIII – Summary of Scientific Achievements

Product type	Number	Data Base	Start	End
Papers [international]	41 7 5 2 1	Web of Science Scopus Mathscinet published on books with ISBN ArXiv [math-ph]	1985	2017
Papers [national]	3	Preprint S.I.S.S.A.	1993	1995
Books [scientific]	1	ISBN: 978-3-642-40915-8		2014
Books [conf. proceeding]	1	ISBN: 981-02-1821-4		1995

Total Impact factor	32,188
Total Citations	573
Average Citations per Product	11,94
Hirsch (H) index	14
Normalized H index	0,50

Notice that:

For the impact factor (IF) the data base is ISI Web of Science. It is available only from 1997 to 2016 for 31 publications. For two papers published in 2017 we have considered the IF of the year 2016. The IF per product is 32,188 / 31 = 1,038.

The number of total citations 573 is obtained considering only the 48 papers listed in Web of Science and Scopus on February 6, 2018, i.e.,
467 citations for the 41 papers in Web of Science and 106 citations for the remaining 7 papers in Scopus. The average citations per product are 573 / 48 = 11,94.

The data base used for the H index is Web of Science on February 6, 2018.
The normalized H index is 14 / 28 = 0,50, where 14 is the H index and 28 is the academic seniority, i.e., the number of years from the PhD on October 30, 1989 to February 17, 2018.

Taking into account also the 5 papers listed in Mathscinet, we have:
Total citations = 602, average citations per product = 11,36, H index = 15, normalized H index = 0.54.

Part IX– Selected Publications

a) Papers listed in a Data Base (41 in Web of Science, 7 in Scopus and 5 in Mathscinet) or published in books with ISBN (2)

  1) Figari R., Orlandi E., Teta S., The Laplacian in regions with many small obstacles: fluctuations around the limit operator. *Journal of Statistical Physics*, 41, no. 3-4, 465-487, 1985.
DOI 10.1007/BF01009018,
Data Base: Web of Science, citations: 26
  2) Figari R., Orlandi E., Teta S., A central limit theorem for the Laplacian in regions with many small holes. In *Stochastic Processes - Mathematics and Physics II*, Lecture Notes in Mathematics n. 1250, 75-86, 1987.

Data Base: Web of Science, citations: 0

3) Figari R., Holden H., Teta A., A law of large numbers and a central limit theorem for the Schroedinger operator with zero range potentials. *Journal of Statistical Physics*, 51, no. 1-2, 205-214, 1988.
DOI: 10.1007/BF01015327,
Data Base: Web of Science, citations: 14

4) Teta A., Quadratic forms for singular perturbations of the Laplacian. *Publications of the Research Institute for Mathematical Sciences*, 26, no. 5, 803-817, 1990.
DOI: 10.2977/prims /1195170735,
Data Base: Web of Science, citations: 25

5) Scarlatti S., Teta A., Derivation of the time-dependent propagator for the three-dimensional Schroedinger equation with one point interaction. *Journal of Physics A - Mathematical and General*, 23, no. 19, L1033-L1035, 1990.
Data Base: Web of Science, citations: 18

6) Figari R., Teta A., Derivation of the optical potential in a model for low-energy neutron scattering. In *Rigorous Results in Quantum Dynamics*, Dittrich J. and Exner P. eds., 147-151, World Scientific, Singapore 1991.
Data Base: Web of Science, citations: 0

7) Brasche J.F., Teta A., Spectral analysis and scattering theory for Schroedinger operators with an interaction supported by a regular curve. In *Ideas and Methods in Quantum and Statistical Physics*, Albeverio S., Fenstad J.F., Holden H. and Lindstrom T. eds., 197-211, Cambridge Univ. Press, Cambridge, 1992.
Data Base: Mathscinet, citations: 18

8) Figari R., Teta A., Effective potential and fluctuations for a boundary value problem on a randomly perforated domain. *Letters in Mathematical Physics*, 26, no. 4, 295-305, 1992.
DOI: 10.1007/BF00420239,
Data Base: Web of Science, citations: 3

9) Figari R., Teta A., A boundary value problem of mixed type on perforated domains. *Asymptotic Analysis,* 6, no. 3, 271-284, 1993.
Data Base: Web of Science, citations: 10

10) Dell'Antonio G.F., Figari R., Teta A., Hamiltonians for systems of N particles interacting through point interactions. *Annales de l'Institut Henri Poincare' - Physique Theorique,* 60, no. 3, 253-290, 1994.
Data Base: Web of Science, citations: 44

11) Angelescu N., Pulvirenti M., Teta A., Derivation and classical limit of the mean-field equation for a quantum coulomb system: Maxwell-Boltzmann statistics. *Journal of Statistical Physics*, 74, no. 1-2, 147-165, 1994.
DOI: 10.1007/BF02186811,
Data Base: Web of Science, citations: 6

12) Dell'Antonio G.F., Figari R., Teta A., N-Particle systems with zero-range interactions. In *Stochastic Processes, Physics and Geometry II*, Albeverio S., Cattaneo U., Merlini D. eds., 189- 198, World Scientific, Singapore 1995.
ISBN: 981-02-2141-X

13) Dell'Antonio G.F., Figari R., Teta A., A limit evolution problem for time-dependent point interactions. *Journal of Functional Analysis*, 142, no. 1, 249-275, 1996.
DOI: 10.1006/jfan. 1996.0149,
Data Base: Web of Science, citations: 7

14) Dell'Antonio G.F., Figari R., Teta A., Statistics in space dimension two. *Letters in Mathematical Physics*, 40, no. 3, 235-256, 1997.
DOI: 10.1023/A:1007361832622,
IF: 0,922, Data Base: Web of Science, citations: 7

15) Adami R., Teta A., On the Aharonov-Bohm Hamiltonian, *Letters in Mathematical Physics*, 43, no. 1, 43-53, 1998.
DOI: 10.1023/A:1007330512611,
IF: 0,793, Data Base: Web of Science, citations: 69

16) Brasche J.F., Figari R., Teta A., Singular Schroedinger operator as limits of point interaction Hamiltonians. *Potential Analysis*, 8, no. 2, 163-178, 1998.
DOI: 10.1023/A:1008654423238,

IF: 0,310, Data Base: Web of Science, citations: 25

17) Dell'Antonio G.F., Figari R., Teta A., Diffusion of a particle in presence of N moving point sources. *Annales de l'Institut Henri Poincare' - Physique Theorique*, 69, no. 4, 413-424, 1998.
IF: 0.470, Data Base: Web of Science, citations: 3

18) Esposito R., Pulvirenti M., Teta A., The Boltzmann equation for a one-dimensional quantum Lorentz gas. *Communications in Mathematical Physics*, 204, no. 3, 619-649, 1999. Erratum, *Communications in Mathematical Physics*, 214, no. 2, 493-494, 2000.
IF: 1.537, Data Base: Web of Science, citations: 13

19) Adami R., Teta A., A simple model of concentrated nonlinearity. In *Mathematical Results in Quantum Mechanics*, Dittrich J., Exner P.,Tater M.eds., 183-189, Birkhauser, Basel, 1999.
Data Base: Web of Science, citations: 5

20) Dell'Antonio G.F., Figari R., Teta A., Schroedinger equation with moving point interactions in three dimensions. In *Stochastic Processes, Physics and Geometry: New Interplays I*, F. Gesztesy, H. Holden, J. Jost, S. Paycha, M. Rockner, and S. Scarlatti eds., 99-113, CSM Conf. Proc., 28 Amer. Math. Soc., Providence, 2000.
Data Base: Mathscinet, citations: 8

21) Panati G., Teta A., The Flux-Across-Surfaces theorem for a point interaction Hamiltonian. In *Stochastic Processes, Physics and Geometry: New Interplays II*, F. Gesztesy, H. Holden, J. Jost, S. Paycha, M. Rockner, and S. Scarlatti eds., 547-557, CSM Conf. Proc., 29, Amer. Math. Soc., Providence, 2000.
Data Base: Mathscinet, citations: 3

22) Adami R., Teta A., A class of nonlinear Schroedinger equations with concentrated nonlinearity. *Journal of Functional Analysis*, 180, no. 1, 148-175, 2001.
DOI: 10.1006/jfan.2000.3697,
IF: 0.879, Data Base: Web of Science, citations: 24

23) Adami R., Dell'Antonio G., Figari R., Teta A., The Cauchy problem for the Schroedinger equation in dimension three with concentrated nonlinearity. *Annales de l'Institut Henri Poincare' - Analyse Non Lineaire*, 20, no. 3, 477-500, 2003.
DOI: 10.1016/S0294-1449(02)00022-7/FLA,
IF: 0,881, Data Base: Web of Science, citations: 19

24) Dell'Antonio G., Figari R., Teta A., Decoherence and classical behaviour in Quantum Mechanics. In *Determinism, Holism and Complexity*, C. Pellegrini, P. Cerrai, P. Freguglia, V. Benci, G. Israel eds., 63-77, Kluwer, 2003.
ISBN: 0-306-47472-7

25) Adami R., Dell'Antonio G., Figari R., Teta A., Blow up solutions for the Schroedinger equation with a concentrated nonlinearity in dimension three. *Annales de l'Institut Henri Poincare' - Analyse Non Lineaire*, 21, no. 1, 121-137, 2004.
DOI: 10.1016/j.anihpc.2003.01.002,
IF: 0,753, Data Base: Web of Science, citations: 15

26) Carlone R., Figari R., Teta A., The Joos-Zeh formula and the environment-induced decoherence. *International Journal of Modern Physics B*, 18, no. 4-5, 667-674, 2004.
DOI: 10.1142/S0217979204024288,
IF: 0.361, Data Base: Scopus, citations: 1

27) Duerr D., Figari R., Teta A., Decoherence in a two-particle model. *Journal of Mathematical Physics*, 45, no. 4, 1291-1309, 2004.
DOI: 10.1063/1.1647692,
IF: 1,430, Data Base: Scopus, citations: 18

28) Adami R., Figari R., Finco D., Teta A., On the asymptotic behaviour of a quantum two-body system in the small mass ratio limit. *Journal of Physics A - Mathematical and General*, 37, no. 30, 7567-7580, 2004.
DOI: 10.1088/0305-4470/37/30/012,
IF: 1.504, Data Base: Web of Science, citations: 13

29) Adami R., Bardos C., Golse F., Teta A., Towards a rigorous derivation of the cubic NLSE in dimension one. *Asymptotic Analysis*, 40, no. 2, 93-108, 2004.
IF: 0,425, Data Base: Web of Science, citations: 26

30) Teta A., On a rigorous proof of the Joos-Zeh formula for decoherence in a two-body problem. In *Multiscale methods in Quantum Mechanics*, P. Blanchard, G. Dell'Antonio eds., 197-205, Birkhauser, Boston, 2004.

Data Base: Web of Science , citations: 1

31) Dell'Antonio G., Finco D., Teta A., Singularly perturbed Hamiltonians of a quantum Rayleigh gas defined as quadratic forms. *Potential Analysis*, 22, no. 3, 229-261, 2005.
DOI: 10.1007/s11118-004-6121-y,
IF: 0,521, Data Base: Web of Science, citations: 1

32) Figari R., Teta A., A one dimensional model for ionization induced by scattering with a heavy particle. *Journal of Physics A - Mathematical and General*, 38, no. 22, 4947-4955, 2005.
DOI: 10.1088/03054470/38/22/0 17,
IF: 1.566, Data Base: Web of Science, citations: 0

33) D'Ancona P., Pierfelice V., Teta A., Dispersive estimate for the Schroedinger equation with point interactions. *Mathematical Methods in the Applied Sciences*, 29, no. 3, 309-323, 2006.
DOI: 10.1002/mma.682,
IF: 0.473, Data Base: Scopus, citations: 7

34) Adami R., Figari R., Finco D., Teta A., On the asymptotic dynamics of a quantum system composed by heavy and light particles. *Communications in Mathematical Physics*, 268, no. 3, 819-852, 2006.
DOI: 10.1007/s00220-006-0115-0,
IF: 2,077, Data Base: Scopus, citations: 17

35) Adami R., Golse F., Teta A., Rigorous derivation of the cubic NLS in dimension one. *Journal of Statistical Physics*, 127, no. 6, 1193-1220, 2007.
DOI: 10.1007/s10955-006-9271-z,
IF: 1,605, Data Base: Scopus, citations: 63

36) Finco D., Teta A., Scattering of a light particle by a system of harmonic oscillators. *Reports on Mathematical Physics*, 59, no. 3, 379-388, 2007.
DOI: 10.1016/S0034-4877(07)80073-5,
IF: 0,624, Data Base: Web of Science, citations: 0

37) Dell'Antonio G., Figari R., Teta A., A brief review on point interactions. In *Inverse problems and imaging*, L. L. Bonilla ed., Lectures Notes in Mathematics n.1843, 171-189, Berlin-Heidelberg, 2008.
Data Base: Web of Science, citations: 2

38) Dell'Antonio G., Figari R., Teta A., Joint excitation probability for two harmonic oscillators in dimension one and the Mott problem. *Journal of Mathematical Physics*, 49, n. 4, 042105, 2008.
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DOI: 10.1088/0143-0807/31/1/019,
IF: 0,757, Data Base: Web of Science, citations: 4

40) Dell'Antonio G., Figari R., Teta A., A time dependent perturbative analysis for a quantum particle in a cloud chamber. *Annales Henri Poincare'*, 11, no. 3, 539-564, 2010.
DOI: 10.1007/s00023-010-0037-4,
IF: 0,967, Data Base: Web of Science, citations: 11

41) Finco D., Teta A., Asymptotic expansion for the wave function in a one-dimensional model of inelastic interaction. *Journal of Mathematical Physics*, 52, no. 2, 022103, 2011.
DOI: 10.1063/1.3549587,
IF: 1,291, Data Base: Web of Science, citations: 5

42) Finco D., Teta A., Quadratic forms for the fermionic unitary gas model. *Reports on Mathematical Physics*, 69, no. 2, 131-159, 2012.
DOI: 10.1016/S0034-4877(12)60022-6,
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43) Correggi M., Dell'Antonio G., Finco D., Michelangeli A., Teta A., Stability for a system of N fermions plus a different particle with zero-range interactions. *Reviews in Mathematical Physics*, 24, no. 7, 1250017, 2012.
DOI: 10.1142/S0129055X12500171,
IF: 1,092, Data Base: Web of Science, citations: 15

44) Figari R., Teta A., Emergence of classical trajectories in quantum systems: the cloud chamber problem in the analysis of Mott (1929). *Archive for History of Exact Sciences*, 67, no. 2, 215-234, 2013.
DOI: 10.1007/s00407-012-0111-z,

IF: 0,324, Data Base: Web of Science, citations: 5

45) Teta A., A Simple Model for Decoherence. In *Direction of Time*, S. Albeverio and Ph. Blanchard eds., 15-19, Springer, 2014.
DOI: 10.1007/978-3-319-02798-2_2,
Data Base: Scopus, citations: 0

46) Recchia C., Teta A., Semiclassical wave-packets emerging from interaction with an environment, *Journal of Mathematical Physics*, 55, 012104, 2014.
DOI: 10.1063/1.4861937,
IF: 1,243, Data Base: Web of Science, citations: 3

47) Cacciapuoti C., Finco D., Noja D., Teta A., The NLS equation in dimension one with spatially concentrated nonlinearities: the pointlike limit. *Letters in Mathematical Physics*,104, no. 12, 1557 - 1570, 2014.
DOI: 10.1007/s11005-014-0725-y,
IF: 1,939, Data Base: Web of Science, citations: 10

48) Teta A., System of fermions with zero-range interactions. In *Mathematical Results in Quantum Mechanics*, P. Exner, W. Konig, H. Neidhardt eds., World Scientific, 2015.
Data Base: Mathscinet, citations: 0

49) Dell'Antonio G., Figari R., Teta A., Classical-like trajectories of a quantum particle in a cloud chamber. In *The Message of Quantum Science*, Ph. Blanchard and J. Frohlich eds., 291-313, Lectures Notes in Physics 899, Springer-Verlag Berlin Heidelberg, 2015.
DOI: 10.1007/978-3-662-46422-9_13,
Data Base: Scopus, citations: 0

50) Correggi M., Finco D., Teta A., Energy lower bound for the unitary N+1 fermionic model. *Europhysics Letters*, 111, no. 1, 10003, 2015.
DOI: 10.1209/0295-5075/111/10003,
IF: 1,963, Data Base: Web of Science, citations: 5

51) Correggi M., Dell'Antonio G., Finco D., Michelangeli A., Teta A., A Class of Hamiltonians for a Three-Particle Fermionic System at Unitarity. *Mathematical Physics, Analysis and Geometry*, 18, no. 1, 2015.
DOI: 10.1007/s11040-015-9195-4,
IF: 0,787, Data Base: Web of Science, citations: 7

52) Figari R., Teta A., From quantum to classical world: emergence of trajectories in a quantum system. *Mathematics and Mechanics of Complex Systems, 4, No.* 4-3, 235-254, 2016.
DOI: 10.2140/memocs.2016.4.235,
Data Base: Web of Science, citations: 0

53) Basti G., Teta A., On the quantum mechanical three-body problem with zero-range interactions. In *Functional Analysis and Operator Theory for Quantum Physics*, J. Dittrich, H. Kovarik, A. Laptev eds., EMS Publishing House, 71-94, 2017.
Data Base: Mathscinet, citations: 0

54) Cacciapuoti C., Finco D., Noja D., Teta A., The point-like limit for a NLS equation with concentrated nonlinearity in dimension three. *Journal of Functional Analysis*, 273, 1762-1809, 2017.
DOI: 10.1016/j.jfa.2017.04.011,
IF(2016): 1,254, Data Base: Web of Science, citations: 3

55) Basti G., Teta A., Efimov effect for a three-particle system with two identical fermions. Annales Henri Poincare', 18, 3975-4003, 2017.
DOI: 10.1007/s00023-017-0608-8,
IF(2016): 1,599, Data Base: Web of Science, citations: 0

b) Papers deposited on electronic archives

56) Basti G., Cenatiempo S., Teta A., Universal low-energy behavior in a quantum Lorentz gas with Gross-Pitaevskii potentials. ArXiv:1710.10249v1 [math-ph] 27 Oct 2017.

c) Other publications

57) Dell'Antonio G.F., Figari R., Teta A., N-Particle systems with zero-range interactions. In *Workshop on Point Interactions (Trieste,1992)*, preprint ILAS/MS-8/1993.

58) Figari R., Teta A., Homogenization of boundary value problems with finite scattering length per unit volume. *Workshop on Point Interactions, (Trieste, 1992)*, preprint ILAS/MS-8/1993.

59) Dell'Antonio G.F., Figari R., Teta A., Time dependent point interactions. In *Workshop on Singular Schroedinger Operators, (Trieste, 1994)*, preprint ILAS/FM-16/1995.

d) Book (scientific)

60) Figari R., Teta A., *Quantum Dynamics of a Particle in a Tracking Chamber*, SpringerBriefs in Physics, Springer-Verlag Berlin Heidelberg, 2014.
DOI: 10.1007/978-3-642-40916-5; ISBN: 978-3-642-40915-8.

e) Book (Editor of conference proceedings)

Advances in Dynamical Systems and Quantum Physics, Albeverio S., Figari R., Orlandi E., Teta A. eds., World Scientific, Singapore, 1995.
ISBN: 981-02-1821-4

Part X– Other academic qualifications

Academic activities

University of Roma "La Sapienza"
From June 1993 to October 1999 member of "Senato Accademico Integrato".

University of L'Aquila
Member of the committee for the re-organization of the Degree in Mathematics.
Member of the committee "Internazionalizzazione" of the Facolta` di Scienze MM.FF.NN. up to 2008.
From 2008 to 2012 member of the committee "Requisiti di Qualita`" of the Degree in Mathematics.
From December 2011 to May 2012 chairman of the committee of the Dipartimento di Matematica Pura e Applicata responsible for the "Valutazione della Qualita` della Ricerca 2004-2010".

University of Roma "La Sapienza"
From March 2013 to February 2015 member of the committee "sedute di laurea".
From September 2013 member of the committee for the re-organization of the Degree in Mathematics.
From January 2016 member of the committee for the interdisciplinary seminars "Matematica, scienza e societa`".
From November 2017 member of the "Commissione Didattica" of the Department.

Short term visiting

Institut fur Mathematik, Univ. Bochum
Institut fur Physik, Univ. Bielefeld
Escuela Politecnica Superior, Univ. Carlos III Madrid
S.I.S.S.A., Trieste
Ecole Normale Superieure, Paris
Doppler Institute for Mathematical Physics, Prague
Mathematisches Institut, Univ. Munchen
Center for Mathematical Sciences Research, Univ. Rutgers
Institut fur Angewandte Mathematik, Univ. Bonn
Gakushuin University, Tokyo
Research Institute for Mathematical Sciences, Kyoto

Talks in conferences   (* = invited)

Praga - Rigorous Results in Quantum Dynamics, June 10-15, 1990.
Locarno - Stochastic Processes, Geometry and Physics, June 24-29,   1991.
Lambrecht - Symposium on Operator Calculus and Spectral Theory, December 9-14, 1991.
Trieste* - Workshop on Point Interactions, December 21-23, 1992.
Trieste - Second Workshop on Composite Medium and Homogeneization, September 20-October 1, 1993.
Pechino - International Conference on Dirichlet Forms and Stochastic Processes, October 25-31, 1993.
Trieste - Workshop on Singular Schroedinger Operators, September 29-October 1,   1994.
Bielefeld - Classical and Quantum Evolution: Deterministic and Stochastic, July 10-14, 1995.
Vietri sul mare* - Problemi Attuali di Fisica Teorica, March 28- April 3, 1996.
Ascona - Mathematical Results in Quantum Mechanics, June 23-28, 1996.
Napoli* - Argomenti in Fisica Teorica, October 7-8, 1996.
Praga - Mathematical Results in Quantum Mechanics, June 22-26,   1998.
Bonn* - Schroedinger Operators, September 22-25, 1998.
Lund* - Conference on Analysis and Mathematical Physics, August 16-20, 1999.
Stoccolma* - Differential Equations and Applications, June 18-22,   2000.
Teulada (Cagliari)* - Dynamical Systems: Classical, Quantum, Stochastic, September 23-30, 2000.
Arcidosso* - Determinism, Holism and Complexity, September 3-8,   2001.
Trieste* - Quantum Entropies: Dynamics and Information, December 12-14, 2001.
Bielefeld* - The Direction of Time, January 14-18, 2002.
Otranto* - Dynamical Systems: Classical, Quantum and Stochastic, September 14-19, 2002.
Martina Franca* - Imaging (scuola C.I.M.E.), September 15-21,   2002.
Roma (Accademia dei Lincei) - Multiscale Methods in Quantum Mechanics, December 16-20, 2002.
Vietri sul mare* - Problemi attuali di Fisica Teorica, April 16, 2003.
L'Aquila* - Dispersive equations in Mathematical Physics, September 25-27, 2003.
Bedlewo - Operator Theory and Applications in Mathematical Physics, July 6-11, 2004.
Giens - Mathematical Results in Quantum Mechanics, September 12-16, 2004.
Oberwolfach* - Entanglement and Decoherence: Mathematics and Physics of Quantum Information and Computation, January 24-28, 2005.
Paris* - Nonlinear spectral problems and mean field models, Inst. H. Poincare`, April 4-8, 2005.
Bologna* - Semiclassical analysis and mathematical quantum mechanics, March 9-11, 2006.
Wroclaw* - XXI Max Born Symposium "Mathematical Problems in Nonrelativistic Quantum Dynamics", June 26-28, 2006.
Arcidosso* - Fondamenti delle scienze: settorializzazione e unitarieta` della conoscenza, September 6-8, 2007.
Pisa* - Mechanics, mathematical physics and foundations of mathematics in the 18th and 19th Centuries, July 7-12, 2008.
Zurigo* - Open Systems: Non-equilibrium Phenomena, Dissipation, Decoherence, Transport, June 8-12, 2009.
Londra* - 7th International ISAAC Congress, Imperial College, July 13-18, 2009.
Tsaghkadzor (Armenia)* - Probabilistic and analytical methods in mathematical physics, September 7-14, 2009.
Milano* - Three dispersive days, November 11-13, 2009.
Montecatini* - Assemblea Scientifica G.N.F.M., March 3-5, 2011.
Yerevan (Armenia)* - Stochastic and analytical methods in mathematical physics, September 2-9, 2012.
Frascati - Trails in Quantum Mechanics and Surroundings, January 29-February 2, 2013.
Berlino - QMATH 12, Mathematical Results in Quantum Mechanics, September 10-13, 2013.
Pisa* - Dispersive PDEs: Models and Dynamics, September 18-20, 2013.
Toulouse* - Modelling and Numerics for Quantum Systems, September 2-4, 2015.
Roma (INdAM)* - Contemporary Trends in the Mathematics of Quantum Mechanics, July 4-8, 2016.
St. Petersburg - Operator Theory, Analysis and Mathematical Physics, August 2-7, 2016.
Torino* - Recent trends in the analysis of spectral problems and applications, September 15-16, 2016.
Trieste* - Trieste Quantum Days 2017, February 20-24, 2017.
Catania* - Advances in Mathematics for Technology, October 9-11, 2017.
Napoli* - The many aspects of Low-Energy Physics, November 27, 2017.

Seminars in Italy

Roma "La Sapienza" (Dip. Matematica)
Trieste (S.I.S.S.A.)
Firenze (Dip. Fisica)
Roma Tre (Dip. Matematica)
Cassino (Facolta` di Ingegneria)
L'Aquila (Dip. Matematica)
Pescara (Facolta` di Economia)
Bologna (Dip. Matematica)
Milano (Dip. Matematica)
Milano Bicocca (Dip. Matematica)
Cosenza (Dip. Matematica)
Trieste (Dip. Fisica - sez. Fisica Teorica)
Torino Politecnico (Dip. Matematica)
Napoli "Federico II" (Dip. Matematca)
Roma Tor Vergata (Dip. Matematica)

Activity as co-organizer of conferences

Capri - Advances in Dynamical Systems and Quantum Physics, May 19-22, 1993.
Marsiglia - Complex Systems: Classical and Quantum Aspects, June 13-17, 1994.
Trieste - Workshop on Singular Schroedinger Operators, September 29-October 1, 1994.
Bielefeld - Classical and Quantum Evolution: Deterministic and Stochastic, July 10-14, 1995.
Trieste - Semiclassical Limit of Quantum Mechanics and Nonlinear Schroedinger Equation, June 30-July 3, 1998.
Modena - Problemi Matematici in Meccanica Quantistica, December 18-20, 2003.
Bressanone - School and workshop on Mathematical Methods in Quantum Mechanics, February 21-26, 2005.
Firenze - Giornata di lavoro nell'ambito del progetto INdAM "Mathematical modeling and numerical analysis of quantum systems with applications to nanosciences, December 16, 2005.
Modena - Metodi e Problemi Matematici in Meccanica Quantistica, October 5-7, 2006.
Bressanone - Second school and workshop on Mathematical Methods in Quantum Mechanics, February 26-March 3, 2007.
Roma - Multiscale analysis for quantum systems and applications, October 24 - 26, 2007.
Napoli - Advances in Theoretical and Mathematical Physics, March 28, 2008.
Bressanone - Third school and workshop on Mathematical Methods in Quantum Mechanics, February 16 - 21, 2009.
Bressanone - Fourth school and workshop on Mathematical Methods in Quantum Mechanics, February 14 - 19, 2011.
L'Aquila - Meccanica Quantistica e dintorni, March 22-23, 2012.
Frascati - Trails in Quantum Mechanics and Surroundings, January 29-February 2, 2013.
Milano - IperMiB 2013: 15th Italian Meeting on Hyperbolic Equations, September 11-13, 2013.
Como - Trails in Quantum Mechanics and Surroundings, July 8-10, 2015.
Bressanone - Mathematical Challenges in Quantum Mechanics, February 7-13, 2016.
Trieste – Trails in Quantum Mechanics and Surroundings, January 30-31, 2018.

Referee activity for journals

Bollettino dell'U.M.I.
Letters in Mathematical Physics
Europhysics Letters
Physics Letters A
Mathematische Nachrichten

Communication in Pure and Applied Analysis
Rendiconti del Seminario Matematico di Padova
Annales Institut H. Poincare`, Physique Theorique.
Journal of Physics. A: Mathematical and General
International Journal of Control
Journal of Functional Analysis
Journal of Statistical Physics
Discrete and Continuous Dynamical Systems, Series A
Moscow Mathematical Journal
Kinetic and Related Models
Communications in Computational Physics
Journal of Mathematical Analysis and Applications
Mathematics and Mechanics of Complex Systems

Supervisor of PhD thesis

R. Adami, A class of Schroedinger equations with concentrated nonlinearity, University of Roma "La Sapienza", a.a 1999/2000 (in collaboration with G. Dell'Antonio);
D. Finco, A model hamiltonian for condensed matter physics, University of Roma "La Sapienza", a.a 2001/2002 (in collaboration with G. Dell'Antonio);
C. Recchia, Modelli di dinamica per una particella quantistica in presenza dell'ambiente, University of L'Aquila, a.a. 2011/12;
G. Basti, On the quantum mechanical three body problem (preliminary title), University of Roma "La Sapienza", a.a 2016/17.

Publication of a book with Springer

Contract with Springer International Publishing AG (contract n. 53565, signed on May 9, 2016) for the publication of the book:
A. Teta, "*A Mathematical Primer on Quantum Mechanics*"
in the series UNITEXT for Physics.
To be published in 2018.

Table of Contents:
1. Elements of Hamiltonian Mechanics and Electromagnetism
2. From Planck's Hypothesis to Bohr's Atom
3. The Formulation of Wave Mechanics
4. Linear Operators in Hilbert Spaces
5. Rules of Quantum Mechanics
6. Free Particle
7. Harmonic Oscillator
8. Point Interaction
9. Hydrogen Atom
A. Semiclassical Evolution
B. Basic Concepts of Scattering Theory

A preliminary version of some chapters is available at the web page
https://sites.google.com/site/sandroprova/didattica-1/appunti-ed-esercizi

Other cultural activities

- Villa Mercede, Roma, April 17, 2009
Coordinator of the public discussion for "Caffe` Matematici" between S. Doplicher and M. Dorato on

"Mondo quantistico e conoscenza".
- Limonaia di Palazzo Ruschi, Pisa, October 14, 2011
Speaker, with L. Fronzoni, at the presentation of the book "Modelli e realta`: una riflessione sulle nozioni di spazio e tempo", by V. Benci and P. Freguglia.
- Facolta` di Scienze of University of L'Aquila, March 21, 2012
Organizer of the meeting "Modelli e Realta`", with talks of V. Benci, A. Teta, G. Dell'Antonio.
- Gran Sasso Science Institute, L'Aquila, October 5, 2015
Speaker, with F. Laudisa e M. Morganti, at the meeting "I mattoni dell'universo: la concezione quantistica del mondo".
- Politecnico di Torino, in the framework of the project Diderot, Torino, September 14, 2016
Seminar on "Meccanica Quantistica e mondo macroscopico" for the students of the Summer School of Mathematics AlfaClass.