

# Diego Noja

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## Studies

- 1992 DEGREE IN PHYSICS Università degli Studi di Milano, (*Sul Problema delle Runaway nel Modello di Pauli-Fierz dell'Elettrodinamica Classica*, Advisor Prof. Luigi Galgani)
- 1997 PHD IN MATHEMATICS, (*Aspetti analitici della teoria dell'interazione radiazione materia*, Advisor Prof. Luigi Galgani, Milano 1997)

## Present position

ASSOCIATE PROFESSOR OF MATHEMATICAL PHYSICS, Università di Milano Bicocca

## Habilitation

HABILITATION TO THE ROLE OF FULL PROFESSOR OF MATHEMATICAL PHYSICS

## Research interests

- Theory of self-adjoint extensions and applications. Singular perturbations of Schrödinger, wave and Dirac equations and applications to various physical models.
- Models of interaction between particles and classical and quantum fields.
- Linear and nonlinear dispersive equations on singular structures.  
Analysis of well-posedness in the presence of defects on the line and in higher dimensions.  
Linear and nonlinear dispersive equations on networks and quantum (or metric) graphs.  
Existence, orbital and asymptotic stability of standing waves and solitons for dispersive non linear equations.

## Published papers

- 2018a Mugnolo D, Noja D, Seifert C, Airy-type evolution equations on star graphs, *Analysis & PDE* 11-7 (2018), 1625-1652. doi: 10.2140/apde.2018.11.1625
- 2017a Cacciapuoti C, Finco D, Noja D, Ground state and orbital stability for the NLS equation on a general starlike graph with potentials, *Nonlinearity*, , **30**, 8, 3271-3303 (2017), doi:10.1088/1361-6544/aa7cc3
- 2017b Cacciapuoti C, Finco D, Noja D, Teta A, The point-like limit for a NLS equation with concentrated nonlinearity in dimension three, *J.Funct.Anal.*, **273**, 1762–1809 (2017) doi:10.1016/j.jfa.2017.04.011
- 2017c Cacciapuoti C, Carlone R, Noja D, Posilicano A, The 1-D Dirac equation with concentrated nonlinearity, *SIAM J. Math. Anal.*, Vol. 49, No. 3 : pp. 2246-2268 (2017), doi:10.1137/16M1084420
- 2016a Adami R, Noja D, Ortoleva C, Asymptotic stability for standing waves of a NLS equation with subcritical concentrated nonlinearity in dimension three: Neutral modes, *DCDS A*, **36**, p. 5837-5879, doi: 10.3934/dcds.2016057
- 2016b Adami R, Cacciapuoti C, Finco D, Noja D, Stable standing waves for a NLS on star graphs as local minimizers of the constrained energy. *J.Diff. Eq.*, **260**, p. 7397-7415, (2016), doi: 10.1016/j.jde.2016.01.029
- 2015a Noja D, Pelinovsky D, Shaikhova G, Bifurcations and stability of standing waves in the nonlinear Schrödinger equation on the tadpole graph, *Nonlinearity*, **28**, p. 2343-2378 (2015), doi: 10.1088/0951-7715/28/7/2343
- 2015b Cacciapuoti C, Finco D, Noja D, Topology-induced bifurcations for the nonlinear Schrödinger equation on the tadpole graph. *Phys.Rev. E*, **91**, 013206 (2015), doi: 10.1103/PhysRevE.91.013206
- 2014a Adami R, Cacciapuoti C, Finco D, Noja D, Constrained energy minimization and orbital stability for the NLS equation on a star graph, *Ann.H.Poincaré, AN*, **31**, p. 1289-1310 (2014), doi: 10.1016/j.anihpc.2013.09.003
- 2014b Cacciapuoti C, Finco D, Noja D, Teta A, The NLS Equation in Dimension One with Spatially Concentrated Nonlinearities: the Pointlike Limit, *Lett.Math.Phys.*, **104**, p. 1557-1570 (2014), doi: 10.1007/s11005-014-0725-y

- 2014c Adami R, Cacciapuoti C, Finco D, Noja D, Variational properties and orbital stability of standing waves for NLS equation on a star graph. *J.Diff.Eq.*, **257**, p. 3738-3777 (2014), doi: 10.1016/j.jde.2014.07.008
- 2014d Adami R, Noja D, Exactly Solvable Models and Bifurcations: the Case of the Cubic NLS with a delta or a delta' Interaction in Dimension One, *Math. Model. Nat. Phenom.*, **9**, (5), 1-16 (2014) doi:10.1051/mmnp/20149501
- 2013a Adami R, Noja D, Visciglia N , Constrained energy minimization and ground states for NLS with point defects. *DCDS B.*, **18**, p. 1155-1188 (2013) doi: 10.3934/dcdsb.2013.18.1155
- 2013b Noja D, Nonlinear Schrödinger equation on graphs: Recent results and open problems, *Phil. Trans. Royal Society A*, **372**, 20130002 (2013), doi:10.1098/rsta.2013.0002
- 2013c Adami R, Noja D, Ortoleva C, Orbital and asymptotic stability for standing waves of a nonlinear Schrödinger equation with concentrated nonlinearity in dimension three *J.Math.Phys.*, **54**, 013501 (2013), doi: 10.1063/1.4772490
- 2013d Adami R, Noja D, Stability and Symmetry-Breaking Bifurcation for the Ground States of a NLS with a  $\delta'$  Interaction, *Comm. Math. Phys*, **318**, p. 247-289 (2013), doi: 10.1007/s00220-012-1597-6
- 2012a Adami R, Cacciapuoti C, Finco D, Noja D, On the structure of critical energy levels for the cubic focusing NLS on star graphs, *J.Phys. A*, **45**,1751-8113 (2012), doi:10.1088/1751-8113/45/19/192001
- 2012b Adami R, Cacciapuoti C, Finco D, Noja D, Stationary states of NLS on star graphs. *EPL*, **100**, 10003 (2012), doi: 10.1209/0295-5075/100/10003
- 2011 Adami R, Cacciapuoti C, Finco D, Noja D, Fast solitons on star graphs, *Rev. Math. Phys.*, **23**, p. 409-451 (2011) doi: 10.1142/S0129055X11004345
- 2011 Adami R, Noja D, Nonlinearity-Defect Interaction: Symmetry breaking bifurcation in a NLS with a delta' impurity, *Nanosystems: Physics, Chemistry, mathematics*, **2** (4), 5-19 (2011)
- 2010 Adami R, Noja D, Sacchetti A, On the Mathematical Description of the Effective Behaviour of the One Dimensional Bose Einstein Condensates with Defects, In *Bose-Einstein Condensates: Theory, Characteristics, and Current Research*, Nova Publishers, pp. 169-197 (2010), ISBN 9781617281143

- 2009 Adami R, Noja D, Existence of dynamics for a 1D NLS equation perturbed with a generalized point defect, *J.Phys.A: Math. Theor.* **42** (2009) 495302 (19pp), doi:10.1088/1751-8113/42/49/495302
- 2006 Bertini M, Noja D, Posilicano A, Dynamics and Lax–Phillips scattering for generalized Lamb models, *J.Phys.A: Math. Gen.* **39** 15173-15195 (2006) doi:10.1088/0305-4470/39/49/007
- 2005a Bertini M, Noja D, Posilicano A, Rigorous dynamics and radiation theory for a Pauli-Fierz model in the ultraviolet limit, *J.Math.Phys.* **46**, 102305 (19pp) (2005) doi:10.1063/2F1.2009607
- 2005b Noja D, Posilicano A, Wave equations with concentrated nonlinearities, *J.Phys.A: Math. Gen.* **38**, 5011–5022 (2005) doi:10.1088/0305-4470/38/22/022
- 2001 Bertini M, Noja D, Posilicano A, Wave equations with point interactions in finite energy spaces, *J.Math.Phys.*, **42**, (5) 2184-2202 (2001) doi:10.1063/1.1360194
- 2000 Noja D, Posilicano A, Delta interactions and electrodynamics of point particles, in *Stochastic Processes, Physics and Geometry: New Interplays II: A Volume in Honor of Sergio Albeverio*, Conference Proceedings Can. Math. Soc. **29**, (2000), ISBN-10: 0-8218-1960-7
- 1999 Noja D, Posilicano A, On the point limit of the Pauli-Fierz model, *Ann.Inst. H.Poincaré' (Phys.Theor.)*, **71** (4), 425-457 (1999)
- 1998 Noja D, Posilicano A, The wave equation with one point interaction and the (linearized) classical electrodynamics of a point particle, *Ann.Inst. H.Poincaré' (Phys.Theor.)*, **68** (3), 351-377 (1998)
- 1996 Bambusi D, Noja D, On Classical Electrodynamics of Point Particles and Mass Renormalization: Some Preliminary Results, *Lett.Math.Phys.*, **37**, 449-460, (1996)
- SUBMITTED PREPRINTS
- 2017d Noja D, Rolando S, Secchi S, Standing waves for the NLS on the double-bridge graph and a rational-irrational dichotomy, *J.Diff. Eq.*, accepted arXiv:1706.09616 (2017)
- 2017e Cacciafesta F, de Suzzoni A-S, Noja D, A Dirac field interacting with point nuclear dynamics, arXiv:1709.05317 (2017)

BIBLIOMETRICS (21-05-2018)

ISI-WOS: 346 citations; h-index 13

## Referee for Scientific Journals:

Journal of Differential Equations, SIAM Journal of Mathematical Analysis, Nonlinearity, Annali SNS, Indiana University Mathematics Journal, Zeitschrift fuer Angewandte Mathematik und Physik (ZAMP), Mathematische Nachrichten, Discrete and Continuous Dynamical Systems, Journal of Mathematical Analysis and Applications, Differential and Integral Equations, Revista Matematica Iberoamericana, Complex Analysis and Operator Theory, Nonlinear Analysis, Journal of Nonlinear Mathematical Physics, New Journal of Physics, Classical and Quantum Gravity, Wave Motion, Journal of Physics A.

## Visiting (selection)

Ulm, December 2012 , 1 week, Prof. D.Mugnolo);  
Rennes, February 2015 (1 week, Prof. Z.Ammari);  
Hagen, January 2016 (1 week, Prof. D.Mugnolo);  
Texas AM University, College Station, February 2016 (1 week, Prof. G.Berkolaiko)  
Texas AM University, College Station, May 2017 (1 week, Prof. G.Berkolaiko);  
Besancon, July 2017 (1 week, Prof. N.Boussaid)  
UNC at Chapel Hill, April-May 2018 (2 weeks, Prof. J.Marzuola)

## Recent conferences (as invited speaker)

"Mathematical Challenges of Zero-Range Physics: rigorous results and open problems"  
Roma, INdAM, 9 - 13 July 2018  
"Discrete and Continuous Models in the Theory of Networks", ZIF, Bielefeld, November  
27-December 1, 2017  
"Rencontres autour de l'équation de Dirac avec des interactions singulières", Besançon,  
July 10-13, 2017  
"Nonlinear Partial Differential Equations on Graphs", Oberwolfach, June 18 - 24, 2017  
"Contemporary Trends in the Mathematics of Quantum Mechanics", INdAM, Roma, July  
4-8, 2016  
"The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applica-  
tions", Orlando, July 1-5 2016  
"Dynamics Days Central Asia", Khiva, Uzbekistan, 25 - 27 May, 2015  
"Nonlinear Waves in Dispersive Equations" Equadiff 2015, Lyon July 6-11, 2015  
"Modelling and Numerics for Quantum Systems", Toulouse, France, 2-4 September 2015

## Recent conferences (as organizer or scientific committee member)

- "Nonlinear PDEs on Metric Graphs and Branched Networks", Lorentz Center, Leiden, 27- 31 August 2018
- "Hamiltonian PDEs, Models and Applications" University of Milano-Bicocca, Milano, 25-27 June 2018
- "Mathematical Challenges in Quantum Mechanics", Roma, 19-24 February, 2018
- "Trails in Quantum Mechanics and Surroundings", SISSA, Trieste, 29-30 January 2018
- "Linear and Nonlinear Dirac Equation: advances and open problems", Como, February 8-10, 2017
- "Localization and reducibility in Hamiltonian PDEs and Quantum Mechanics", Milano, December, 16-18, 2015
- "KAM and dispersive methods in Hamiltonian PDEs" Milano, December 1-3, 2014
- "Geometric and Analytic Aspects of Integrable and nearly-Integrable Hamiltonian Systems" Milano, 18-20 June 2014
- "Dispersive PDEs: Models and Dynamics", Pisa, September 18-20 2013
- "IperMiB2013: 15th Italian Meeting on Hyperbolic Equations", Milano, September 11-13, 2013
- "Solitary and dispersive days, Workshop on dispersive and nonlinear aspects of wave and Schrödinger equations", Milano, December 13-18, 2010

## Grants; Direction or participation

- Prin 2003 - Participant (National P.I. A. Giorgilli)
- Prin 2005 - Local coordinator (Milano Bicocca unit, National P.I. D.Bambusi);
- Prin 2007 - Participant (National P.I. C.Liverani);
- Prin 2010-11 - Participant (National P.I. B.Dubrovin)
- Firb 2012 - Partecipante (National P.I. N.Visciglia);
- GNFM-INDAM "Progetto Giovani" 2008-09 - P.I. ;
- GNFM-INDAM "Progetto Giovani" 2009-10 - P.I. ;
- "Fondi di Ateneo del Gruppo di Fisica Matematica", Università di Milano Bicocca, 2007- present, P.I.
- "FABR" 2017, Ministry individual grant

## PhD Board

- Member of the Faculty Board of the joint PhD program in Mathematics  
Milano Bicocca - Pavia - Indam

## Advising

PhD:

Dr. Cecilia Ortoleva

(co-supervisor R.Adami.; co-tutelle with Prof. Galina Perelman, U.Paris Est, 2010-2013;  
defence committee Prof. H.Bahouri, Prof. D. Bambusi, Dr. Noja, Prof. G. Perelman)

Dr. Martino Candon (2015-)

Postdoc:

Dr. Marta Strani (2014);

Dr. Federico Cacciafesta (2016-17)

Dr. Sergio Rolando (2015-16);

Dr. Sergio Rolando (2017-18)

## Affiliation

"Gruppo Nazionale per la Fisica Matematica" (GNFM) 2001-

"International Association of Mathematical Physics" (IAMP) 2016-

## Academic service

2012-2015 Giunta Dipartimento di Matematica e Applicazioni – member  
2012-2015 Consiglio Scuola di Scienze dell'Ateneo – member

## Teaching

### UNDERGRADUATE COURSES

2005-06 Classical Mechanics and Dynamical Systems;  
2003-13 Mathematical Physics I&II;  
2013-17 Mathematical Physics

### MASTER COURSES

2013-15 Mathematical Methods in Modern Physics;  
2016-18 Higher Mechanics

PHD COURSES

2016-17 Schrödinger Operators, perturbations of the Laplacian and applications;  
2017-18 Nonlinear Dispersive Equations: Theory and Applications

Milano, 15/07/2018

Diego Noja