

CURRICULUM VITAE

Personal Information

NAME	Sante Carloni
DATE OF BIRTH	09 June 1977
PLACE OF BIRTH	Salerno, Italy
CITIZENSHIP	Italian
ADDRESS	Università di Genova Via Montallegro, 1 - 16145 Genova, Italy.
E-MAIL	sante.carloni@unige.it sante.carloni@gmail.com
RESEARCHER ID	J-2840-2013
ORCID	orcid.org/0000-0003-2373-2653

Current Position

Jan 2023- today Associate Professor
 ITIMAT - Mathematical Models and Methods
 DIME - Department of Mechanical, Energy, Management and Transportation Engineering Università di Genova

Education and Qualification

Jan 2020- Dec 2022 Research fellowship (“Ricercatore Universitario tipo B”)
 ITIMAT - Mathematical Models and Methods
 DIME - Department of Mechanical, Energy, Management and Transportation Engineering Università di Genova

Jul 2019- Dec 2019 Research Fellowship
 Instituto Superior Tecnico Lisbon
Duties: Support the teaching and research activities of CENTRA and the Department of Physics.
Research: Analyze the phenomenological consequences of modified theories of gravitation at cosmological, astrophysical and Solar System level with the aim of constraining and/or ruling out these theories.

Jul 2014 - Jul 2019 FCT Investigator: Development Grant
 Instituto Superior Tecnico Lisbon
Duties: Support the teaching and research activities of CENTRA and the Department of Physics. Create and manage an autonomous research group composed of Master and PhD students and Postdoctoral

fellows.

Research: Analyze the phenomenological consequences of modified theories of gravitation at cosmological, astrophysical and Solar System level with the aim of constraining and/or ruling out these theories.

May 2019 Abilitazione Scientifica Nazionale 2018 (National habilitation for the full professorship in Italy), Sector A4/01 “Mathematical Physics”.

Mar 2017 Abilitazione Scientifica Nazionale 2016 (National habilitation for the full professorship in Italy), Sector A2/02 “Theoretical physics of the fundamental interactions”.

Jan 2014 Abilitazione Scientifica Nazionale 2012 (National habilitation for the associate professorship in Italy), Sector A2/02 “Theoretical physics of the fundamental interactions”.

Nov 2013- Jul 2014 Postdoctoral Fellow

Institute of Theoretical Physics, Charles University of Prague

Duties: Pursue research in physics of gravitation, dark energy and cosmology. Support the courses in advanced relativity of the department.

Oct 2010 - Oct 2013 Research Fellow in Fundamental Physics in the Advanced Concepts Team
European Space Agency/ESTEC

Duties: Pursue research in physics of gravitation, dark energy and cosmology. Organize and manage Research programs between ESA and Universities in ESA member countries. Provide support in problems related to theoretical physics to ESA general study program and other directorates. Cooperate with the other members of the research group on multidisciplinary research.

Research: The research activity focused on the proposal of new tests of General Relativity based on the physics of the Solar System, the development of purely relativistic global positioning systems and the study of the transformational approach to metamaterials.

Oct 2008 - Oct 2010 Beatriu de Pinós Fellowship at Institut De Ciències De l’Espai
(Universitat Autònoma de Barcelona).

Supervisor: Prof. Emilio Elizalde

Duties: Pursue research in physics of gravitation, dark energy and cosmology.

Research: In this period the research activity focused on the investigation of the properties of fourth order gravity at cosmological level.

Jan 2006 - Oct 2008 Claude Leon Postdoctoral Fellowship at University of Cape Town.

Supervisor: Prof. P. K. S. Dunsby

Duties: Pursue research in physics of gravitation, dark energy and cosmology. Lecturing for the master course “Hot topics in cosmology”.

Research: In this period the research activity focused on the construction of a covariant gauge invariant theory of cosmological perturbation of modified gravity.

Jan 2004 - Dec 2005 Postdoctoral Fellow at University of Cape Town.

Supervisors: Prof. G.F.R Ellis, Assoc. Prof. P. K. S. Dunsby

Duties: Pursue research in physics of gravitation, dark energy and cosmology. Organization of the weekly group seminars.

Research: In this period the research activity focused on the application of the dynamical system approach and the 1+3 and 1+1+2 covariant approaches to modified gravity and in particular to $f(R)$ -gravity.

PhD Physics, December 2003
Salerno University, Italy
GPA = excellent
Supervisor: Prof. S. Capozziello.

Thesis: Cosmology in Extended Theories of Gravitation

The thesis deals with a comprehensive analysis of cosmological models based on three particular extension of General Relativity (i.e. scalar-tensor theories of gravity, higher order theories of gravity and theories of gravity with torsion). Particular attention is devoted to the model of curvature quintessence in which non-Einsteinian part of the gravitational interaction plays the role of the homogeneous part of the dark energy and can drive an accelerating expansion phase.

The PhD was oriented to studies in gravitation, astrophysics and cosmology. It included a series of courses in astrophysics, cosmology, relativity, linear perturbation theory, low energy physics and particle physics. During this period I was also involved in teaching assistance.

MA Physics, October 2000
Salerno University, Italy
GPA = 110+ / 110 (cum laude)
Supervisor: Prof. S. Capozziello.

Thesis: Cosmological constant and Gravitational Coupling in Extended Theories of Gravitation

The thesis concerns two main aspects of modified theories of gravitation: the variable gravitational coupling and the generation of an effective cosmological term. Both of them are discussed in connection with the observational results.

Referee Activities

2018-today	Referee activity for <i>Physics Reports</i>
2018-today	Referee activity for <i>Mathematical Reviews</i>
2012-today	Referee activity for <i>Monthly Notices of the Royal Astronomical society</i>
2011-today	Referee activity for <i>Physica Scripta</i>
2011-today	Referee activity for <i>Journal of Physics A: Mathematical and Theoretical</i>
2011-today	Referee activity for <i>JCAP</i>
2011-today	Referee activity for <i>Journal of Aerospace Engineering</i>
2008-today	Referee activity for <i>Physical Review Letters</i>
2007-today	Referee activity for <i>Physics Letters B</i>
2007-today	Referee activity for <i>Physical Review D</i>

2006-today	Referee activity for <i>Classical and Quantum Gravity</i>
2002-today	Referee activity for <i>General Relativity and Gravitation</i>

Grants and Awards

2022	MUR ISARP bilateral program Italy South Africa EUR 20.000
2018	WOS Top reviewer in Physics
2014	EXPLORA Grant from the Portuguese national science foundation EUR 50.000
2013	Grant for the ESA ARIADNA CCN project <i>Time transformations, anisotropy and Analogue Transformational Elasticity</i> , 6 months EUR 35.000
2012	One year extension of the ESA research fellowship. The extension is granted exceptionally to the fellows which have has a particularly constructive and productive contribution to the research pursued at ESA.
2011	2 Grants for the ESA ARIADNA project <i>Analogue Transformational Acoustics</i> , 8 months EUR 15.000 each
2011	Grant for the ESA PECS project <i>Relativistic global navigation systems</i> , 3 years EUR 250.000
2009	Grant for the project <i>Efectos cuánticos en cosmología</i> , 1 year, EUR 7.000
2009	Grant for the project <i>Aplicaciones en cosmología de efectos de vacío en las teorías de campos cuánticos</i> , 1 year, EUR 5.600
2008	Grant for Bilateral Agreement between Universitat Autònoma de Barcelona (Spain) and University of Cape Town (South Africa), 2 years, EUR 16.650
2007	Renewal of the grant for Bilateral Agreement between University of Naples (Italy) and the University of Cape Town (South Africa), 1 year, EUR 25.000
2006	One year extension of Claude Leon Foundation Fellowship
2005	Grant for Bilateral Agreement between University of Naples (Italy) and University of Cape Town (South Africa), 2 years, EUR 50.000 The research project for this agreement has been one of the best funded in South Africa in the decade 2000-2010.
2002	Winner of “Progetto Giovani Ricercatori 2001” grant for the young researcher at Salerno University. EUR 4000

Teaching Experience

- Università di Genova
 - 2023-today** Lecturer for the course ‘Meccanica Razionale 2’ (Analytical Mechanics 2) , Polytechnic School, University of Genova
 - 2020-today** Lecturer for the course “Meccanica Razionale” (Analytical Mechanics) , Polytechnic School, University of Genova
 - 2020-today** Lecturer for the course “Fisica Matematica” (Mathematical Physics) , Polytechnic school, University of Genova
- Instituto Superior Tecnico, Lisbon
 - 09/2018** “9a Escola de Verão de Astrofísica e Gravitação (EAG9)”.
Three lectures on Relativistic Cosmology.
 - 09/2017** “8a Escola de Verão de Astrofísica e Gravitação (EAG8)”.
Two lectures on Cosmic Microwave Background.
- Charles University in Prague
 - 2015-2024** Lecturer for the course “Theoretical Cosmology”
 - 2013** Lecturer for the short course “Modern cosmology”
- University of Cape Town (UCT)
 - 2005-2008** Lecturer for the course *Introduction to cosmology* NASSP Masters program, UCT
 - 2005** Teaching assistant General Relativity, UCT
 - 2004-2005** Teaching assistant first year calculus, Engineering Faculty UCT
 - 2004** Teaching assistant first year mathematics, Commerce School UCT
- University of Salerno
 - 2002** Teaching assistant first year calculus, Engineering Faculty

Undergraduate and Post graduate Supervision

I have been involved as supervisor of the following undergraduate students

- 2024-today** Alena Vanzurova (Ma) Masaryk University in Brno
- 2023-today** Ujjwal Agarwal (PhD) Charles University in Prague
- 2020-2024** Fabrizio Esposito (PhD) Università di Genova
- 2017-2019** João Luís Rosa Instituto Superior Tecnico (Lisbon)
- 2007-2008** M Abdelwahab (Master) University of Cape Town
- 2006-2008** J Leach (PhD) University of Cape Town

I assisted in the research work as well as in the preparation of the dissertation (see the “Publication” section for details about the research work).

05/2011-07/2011 J Latta (PhD Dalhousie University, Canada)

The supervision entailed assistance in the research work on a project initially proposed by myself and the Advanced Concepts Team at the European Space Agency.

I am currently supervising a postdoctoral fellow

11/2016-11/2018 Daniele Vernieri CENTRA Istituto Superior Tecnico.

paid entirely within the EXPLORA project (see the section “Grants and Awards”).

Research Collaborations

During my career I have been collaborating with a number of researchers and institution around the world. In particular:

2002/3 ICG Portsmouth (Prof. D. Wands)

2002 Imperial College, London (Dr M. Blasone, Dr A. Capolupo)

2005 Osservatorio Astrofisico di Catania (Dr A. Bonanno)

2006-7 Umeå university Sweden (Prof. M. Marklund)

2006 Università di Napoli (Prof. C. Rubano, Prof. S. Capozziello)

2008 University of Heidelberg (Dr. Iain Brown)

2009/2010/2013 University of Cape Town (Prof P K S Dunsby)

2012 Imperial college (Prof M McCall)

2012/14 Ljubljana, Slovenia (Dr U. Kostic, Prof. A Gomboc)

2013 Università di Genova (Dr S Vignolo, Prof R Ciani)

2014 European Space Agency (Dr. D Izzo)

2014 Max Planck Institute Frankfurt (Dr, F Biscani)

2016 University College London (Dr. C Boehmer)

2016 University of Nottingham (Prof. E. Copeland)

2016 Shanghai Normal University and The Shanghai Key Lab for Astrophysics (Dr. W Fang)

2016 Institut de Physique Theorique, CEA-Saclay (Dr. N Tamanini)

2016 Max-Planck-Institut fur Gravitationsphysik (Dr. N Tamanini)

2017 University College London (Dr. C Boehmer)

Administrative Duties

2020-today External Expert for the COST Action

09/2016 Organization of the Spanish Relativity Meeting “ERE2016”, Lisbon, Portugal.

19-21/09/2012 Organization of the workshop “Relativistic Positioning Systems and their Scientific Applications”, Ljubljana, Slovenia.

11/03/2011 Organization of the workshop “Advances in relativistic global positioning systems”, ESTEC Noordwijk.

2005-2007 Organization of the “Cosmology Group Seminars” series at University of Cape Town.

Schools and Special courses

I have participated to some summer schools and special courses:

- ”24CFUA0001 Planning and monitoring teaching activities” (Teorie e modelli di progettazione e di monitoraggio dei contesti scolastici), University of Salerno, Italy 2018
- ”24CFUD0001 Basic Psychology” (Elementi di base del funzionamento psicologico), University of Salerno, Italy 2018
- ”24CFUD0003 Didactic methodologies for physics teaching” (Didattica per l’apprendimento della fisica), University of Salerno, Italy 2018
- ”24CFUD0004 Didactic methodologies for teaching physics in the laboratory” (Didattica laboratoriale per l’apprendimento della fisica), University of Salerno, Italy 2018
- ”Introduction to Space System Engineering”, ESTEC-ESA, Noordwijk, 2011
- “Villa Mondragone International school of cosmology” Mondragone Monte Porzio Catone, Roma September 5 -10 2002
- ”Short Course on Spectroscopy” Asiago Observatory, 15-18 January 1998

Workshops and Conferences

I have participated to some international conferences (as speaker):

- “SIGRAV”, Urbino, September 2021
- “Encontro Ciência 2017”, Lisbon, July 2017
- “Beyond Concordance Model II 2016”, Cape Town, December 2016
- “VIII Black Holes Workshop” Guimaraes, Portugal, December 2016
- “Spanish Relativity Meeting (Encuentros Relativistas Espanoles-ERE)”, Palma de Mallorca, September 2015

- “Fourteenth Marcel Grossmann Meeting - MG14”, Rome, 2015
- “VII Black Holes Workshop” Aveiro, Portugal, December 2014
- “Metamaterials 2014” Copenhagen, Denmark, August 2014
- “4th International Colloquium on Scientific and Fundamental Aspects of the Galileo Programme” Prague, Czech Republic, December 2013
- “Beyond the concordance Model”, Cape Town, South Africa, August 2010
- “The Invisible Universe”, Paris, France July 2009
- “Cosmo 08” Madison, Wisconsin, U.S.A. August 2008
- “Encuentros Relativistas Españoles” (Spanish Relativity Meeting), Puerto de La Cruz September 2007
- “2nd International Conference on Quantum Theories and Renormalization Group in Gravity and Cosmology” (IRGAC 2006), Barcelona, July 2006
- “Meeting for the 60th birthday of George Ellis”, Cape Town 3-5 July 2005
- “17th conference on General Relativity and Gravitation (GR17)”, Dublin 18-23 July 2004
- “Tenth Marcel Grossmann Meeting on General Relativity”, Rio de Janeiro July 20-26 2003
- “Where cosmology and fundamental physics meet” Marseille June 23-26 2003
- Durham Annual Theory Meeting, Durham University December 16-18 2002
- “Brane World Gravity”, Imperial College November 13 2002
- “The Relativistic Universe” ICG Portsmouth September 16-17 2002
- “Conference on General Relativity and Gravitational Physics”, Villa Mondragone Monte Porzio Catone, Rome, Italy September 9-12, 2002
- “Villa Mondragone International school of cosmology” Mondragone Monte Porzio Catone, Roma September 5 -10 2002
- “Thinking, mining, exploring the Universe” Sorrento (Naples) 21-22 September 2001

Other Seminars

During scientific collaborations and/or visits in other institutions I had the chance to give some seminars on my scientific activity:

- 03/2025** invited seminar “Covariant gauge-invariant perturbations of compact stellar objects”, African Mathematical Institute, Cape Town
- 04/2024** invited seminar “Generalizing the coupling between matter and gravity”, CEICO, Prague
- 01/2024** invited seminar “Covariant Junction conditions in General Relativity”, Univerisità di Torino

- 12/2023** invited seminar “Junctions and covariant formalisms”, University of Cape Town, Lisbon
- 10/2020** invited (online) seminar “Discrete Relativistic Positioning Systems”, CENTRA Instituto Superior Tecnico, Lisbon
- 9/2019** invited seminar “Back To the future: Old a new ideas for Space Science”, ESA Advanced Concepts Team, Nederland
- 10/2018** invited seminar “Derrick’s theorem on curved spacetime and the stability of relativistic stars in modified gravity”, University of Prague, Czech Republic
- 12/2017** invited seminar “A first-order secular theory for the post-Newtonian two-body problem with spin: the restricted case”, University of Prague, Czech Republic
- 3/2017** invited seminar “Relativistic Stars”, University of Prague, Czech Republic
- 3/2016** invited seminar “Fermion condensates and cosmology”, University of Prague, Czech Republic
- 11/2014** invited seminar “Solving exactly the reduced two body problem with spin: the Weierstrass perspective”, University of Aveiro, Portugal
- 10/2014** invited seminar “Cosmology of non minimally coupled condensates”, University of Bilbao, Spain
- 03/2014** invited seminar “ Relativity and material science”, University of Cape Town, South Africa
- 11/2013** invited seminar “Dynamical systems and Covariant approaches in modified gravity” INFN, Frascati , Italy
- 10/2013** invited seminar “Analogue transformational acoustics and its application to material science” INFN, Frascati , Italy
- 7/2013** invited seminar “Exploring the idea of geometric dark phenomenology” Department of Physics, university of Prague
- 5/2013** invited seminar “Analogue transformation acoustics” Department of Engineering, university of Genoa
- 6/2012** invited seminar “Dark Matters and Wonders of Gravity”, Department of Physics University of Tartu, Estonia
- 11/2010** invited seminar “Exploring $f(R)$ Gravity in Simple Spacetimes”, Politecnico di Torino Italy
- 9/2008** invited seminar “Dynamical Systems Approach to Fourth Order Gravity”, Dalhousie University Halifax
- 7/2008** invited seminar “ The Evolution of Cosmological Perturbations in $f(R)$ -gravity”, Institut für Theoretische Physik Heidelberg
- 7/2008** invited seminar “ The Evolution of Cosmological Perturbations in $f(R)$ -gravity” ICG Portsmouth
- 7/2007** invited seminar “Cosmology in fourth order gravity”, ICE-IEEC-Bellaterra
- 7/2007** invited seminar “Cosmology in fourth order gravity”, ICG Portsmouth
- 1/2007** invited seminar “The evolution of scalar perturbations in scalar tensor gravity” LPT, Orsay

9/2006 “Gauge invariant perturbations of Scalar Tensor cosmologies: the vacuum case” South Africa GR Society meeting, Pretoria

2/2004 invited seminar “Alternative forms of dark energy” UCT Cape Town

1/2003 invited seminar “Dark Energy without scalar fields” Sussex University

11/2002 “Curvature and Torsion Quintessence” ICG Portsmouth

11/2001 “Diffusion of Scalar Particles in Janis-Newman-Winicour-Wyman Gravitational Field and GRBs” at Meeting INFN (gruppo collegato Napoli)

10/2001 “Extended theories of gravitation: a brief introduction” Relativity and Cosmology Group Portsmouth

10/2000 “Exact solutions and cosmology in non minimal derivative coupling theories” Università di Salerno

Outreach

- Talk at the workshop “Desafiar os Limites 2017” for high school students, Instituto Superior Tecnico, June 2017
- Contribution for the website [Birth of an idea](#)
- ESA postdoctoral fellowship campaign: [Finding solutions for unsolved problems](#)

Languages

- Italian (mother tongue)
- Good knowledge of written and spoken English
- Good knowledge of Spanish
- Basic knowledge of French
- Basic knowledge of Dutch
- Basic knowledge of Portuguese

Computer skills

- Good knowledge of Windows, Linux, mac OSX
- Good knowledge of Office Package (Word, Excel ed Access) and browsers Internet Explorer, Firefox, Safari, Chrome
- Very good knowledge of LaTeX, Mathematica, MAPLE
- Basic knowledge of Matlab

- Basic HTML programming
- Creation and management of WIKIs
- Good knowledge of OmniPlan