

CURRICULUM VITAE

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Pierre MARTINETTI

Birth: 9th of august 1974 in Chamonix, french nationality.

Coordinates: (pro.) Università di Genova,
via Dodecaneso 35, I-16146 Genova.
(pers.) 243 avenue des Bois, F-74400 Chamonix.
tel.: +33 679 54 84 18 (Fr), +39 331 25 70 907 (It)
e-mail: martinetti@dima.unige.it
webpage: <http://www.dima.unige.it/martinetti/>



Education

2009: Habilitation à diriger les recherches en mathématiques (obtained 20.11.2009).

Title: *Géométrie non commutative et applications à la physique quantique.*

Département de mathématiques, université de Ht-Alsace, local contact: M. Bordemann.

1998-01: Ph.D. mathematical physics (obtained 1.10.2001).

Title: *Distances en géométrie non commutative.*

CPT Marseille & université de Provence, supervisor: B. Iochum.

1997-98: postgraduate diploma, *DEA physique mathématique* - CPT Marseille.

1993-97: undergradate studies of physics - école normale supérieure Lyon & université Lyon 1.

1993-95: undergradate studies of philosophy - université Lyon 3.

1992-93: classe préparatoire (hypokhgne BL) - lycée du Parc, Lyon.

Work experience

positions

da 2015: ricercatore (tipo A), dpt. di matematica, università di Genova.

2014-15: dpt. di matematica, università di Trieste - assistant researcher.

2012-14: dpt. di fisica, università di Napoli *Federico II* - assistant researcher.

2010-12: dpt. matematica, università Roma *Tor Vergata* & CMTP (R. Longo's ERC advanced grant)
& dpt. fisica, università Roma *Sapienza* (M. Curie reintegration grant) - assistant researcher.

2008-10: Institut für Theoretische Physik, Universität Göttingen - assistant professor.

2005-07: dpt di fisica, università di Roma *Sapienza* - Marie Curie intra-european fellowship.

2003-04: dpt de Matemática, Instituto Superior Técnico, Lisboa - eu-network *geometric analysis*.

2001-02: CPT & université de Provence - assistant professor.

invited stays

2015: *professeur invité* at LPT Orsay (one month).

2010-11: *chercheur invité* at LPT Orsay (three months).

july 2007: visiting Max Planck Institute for Mathematics, Bonn.

sept 2003: visiting Perimeter Institute for theoretical physics, Waterloo, Canada.

sept 2002 - april 2003 : visiting université d'Oujda, Morocco, fellowship "agence de la francophonie".

Administration, responsibilities, management of research

students: co-supervision of PhD, graduating and undergraduate students (see *teaching* section).

evaluation and expertise: member of the PhD commission of

E. Cagnache (june 2012, also referee):

Aspects différentiels et métriques de la géométrie non-commutative. Application la physique,
laboratoire de physique théorique, université Paris-XI Orsay.

N. Franco (july 2012):

Lorentzian approach to noncommutative geometry,
département de mathématique, université de Namur.

Evaluating expert for FNRS (Belgium) and the Air Force Office for Scientific Research (USA).

Referee for Acta Applicandae Mathematicae , J. of Geo. and Phys., J. of Math. Phys., SIGMA, J. of Phys. A. Class. & quantum gravity, Foundations of Physics, Intl. J. of modern Phys., Symmetry.

Several reviews written for MathSciNet.

co-organisation of conferences

- workshop *Optimal transport and noncommutative geometry*, Besançon, november 2014;
- conference *Conceptual and technical challenges for quantum gravity*, Roma, september 2014 (organizer of the parallel session *noncommutative geometry*);
- conference *Algebraic QFT - the first 50 years*, Göttingen, july 2009;
- 25th workshop on QFT, Göttingen, january 2010;
- 23rd workshop on QFT, Göttingen, january 2009;
- workshop *Geometry in Lisbon*, IST Lisbon, january 2004.

Co-editor of two volumes of proceedings (see *publications* section).

fundings

- Projet Exploratoire Premier Soutien (with J.-C. Wallet, CNRS 2014): funded the NCG-parallel session of Rome conference *Quantum Gravity* (including the proceedings in J. of Phys.) and the workshop *Optimal transport & NCG* (including the special issue in Contemp. Math.).
- 36 months Marie-Curie European Reintegration Grant, 2009-2012.
- 24 months Marie-Curie Intra European Fellowship, 2006-2007.
- 10 months Bourse bilatérale Etudes et Recherche, program égide, 2005-2006.
- 15 months of postdoctorate from the european network *geometric analysis*, 2003- 2004.
- 6 months of postdoctorate from the agence française de la francophonie, 2002-2003.

Distinctions

- *Ranking for permanent positions:*
 - 2nd for ricercatore-B geometria (2014 Politecnico Torino);
 - 4th for professor of mathematics (2013, 2011, 2010 Metz; 2011 Dijon);
 - 3rd for professor of physics (2013 Corte);
 - 2nd for maître de conférence in mathematics (2007 Metz, 2005 Caen), mathematical physics (2009 Paris-Orsay).
- French qualification in section 25 (mathematics) and 29 (theoretical physics) for professeur and maître de conférence.
- Italian Abilitazione Scientifica Nazionale for associated professor in section 01/A2 (geometry and algebra), 01/A4 (mathematical physics) and 02/A2 (theoretical physics).

Divulgation

- article on *the thermal time hypothesis* (in preparation), special issue of “La Recherche”, november 2016;
- interwied on *the applications of noncommutative geometry to the standard model*, to appear in Futura, <http://www.futura-sciences.com>;
- talk at working group *philosophie et physique*, Rehseis (ENS & University Paris 7) february 2010, organised by A. Afriat, A. de Saint-Ours, E. During.
- interviewed for an article on New Scientist about *the thermal time hypothesis*, january 2008 <http://www.newscientist.com/article/mg19726391.500-is-time-an-illusion.html?full=true>

Others

Computers: Mathematica, Maple, notions in C++, fortran-90 and 77, creation of webpages.

Languages: french, english, italian (fluent), good notions of portuguese and german.

Member of *société mathématique de France*.

Teaching

(the indicated periods correspond to academic years)

- 2015-16: assistant professor in *meccanica analitica* (24h), università di Genova,
and for the theoretical part fo the course *modelli* (24h) università di Trieste.
- 2014-15: assistant professor in *general relativity for mathematicians* (6h), università di Trieste.
- 2011-12: assistant professor in *statistics for biology* (36h), università di Roma *Tor Vergata*.
- 2009-10: oberassistant *mathematical technics for physics* (42h), Universität Göttingen.
- 2008-09: advanced lectures *Noncommutative geometry* (42h),
oberassistant *thermodynamics & statistical physics* (42h), Universität Göttingen.
- 2007-08: oberassistant *quantum mechanics* (42h), Universität Göttingen.
- 2005-07: partly encharged of the advanced course *introduzione alla gravità quantistica* (20h/year)
with G. Amelino-Camelia, università di Roma *Sapienza*.
- 2004-05: assistant professor in *descriptive geometry* with M. Frégier (120h/year),
école supérieure d'architecture de Marseille Luminy.
- 2002-03: advanced course *introduction à la géométrie non commutative et ses applications à la physique* (20h), university Mohammed 1, Oujda Maroc.
- 2001-02: assistant professor in *mechanics* and *fortran programming*, (ATER: 96h),
université de Provence.
- 1998-01: teaching assistant in *mathematics, special relativity, quantum mechanics* and
electromagnetism with T. Schücker (monitorat: 64h/year), université de Provence.

Students

Agostino Devastato, Ph.D 2011-15 with F. Lizzi, Napoli *Federico II*:

Particle physics and Symmetries in Noncommutative Geometry.

Aspects of quantum symmetries in noncommutative spacetimes.

- graduating thesis “tesi di laurea”, 2006-07 with G. Amelino-Camelia, Roma *Sapienza*:
Giulia Gubitosi, *Simmetria di Noether in θ -Minkovski*;
Flavio Mercati, *Simmetria di Noether in κ -Minkovski*.
- three M1 undergraduate research projects, 2001-02 université de Provence:
black holes, gamma ray burst, gravitational lensing.

Member of two PhD commissions, see section Administration.

Talks**conferences as a plenary speaker**

The standard model in noncommutative geometry after the discovery of the Higgs, and beyond,
Quantum Gravity Meeting, Roma 07/15.

Twisted spectral triple for the standard model,
Arbre de Noël du GDR “géométrie non-commutative”, Besançon 11/14.

Higgs mass in noncommutative geometry,
Algebraic quantum field theory: its status and its future, ESI Wien 05/14.

Noncommutative geometry and physics, Spectral geometry with a cut-off,
Arbre de Noël du GDR “géométrie non-commutative”, Caen 12/13.

Pythagoras theorem in Noncommutative Geometry,
Quantum geometry and matter, SISSA Trieste 04/13.

Kantorovich metric in Noncommutative Geometry,
Quantum Probabilities 33, CIRM Luminy, 10/12;
“Monge-Kantorovich optimal transportation problem, transport metrics and their applications”
int. conference in honor of the centenary of Kantorovich, St. Petersburg, 6/12.

Metric aspect of quantum space: minimal length, Pythagoras theorem, Higgs field,
Workshop “New trends in algebraic quantum field theory”, Frascati 09/12.

Gauge fluctuation in Noncommutative Geometry and Carnot-Carathéodory distance,
ERC workshop “Geometric Analysis and sub-Riemannian and Metric Spaces”, Pisa 10/11.

Noncommutative Geometry with applications to quantum physics,
2nd winter workshop “Non Perturbative Quantum Field Theory”, INLN, Nice 10/11.

Minimal length in quantum space and integrations of the line element in noncommutative geometry,
Easter quantum gravity workshop, Roma 04/12;
Planckland, SISSA 02/12.

The metric aspect of noncommutative geometry,
EINSTEIN at SISSA, Trieste 07/10.

The harmonic oscillator as a quantum standard meter,
Workshop quantum gravity, Roma 05/10.

A view on optimal transport from noncommutative geometry,
Journées franco-italiennes de géométrie non-commutative, Besançon 02/11;
Workshop NCG: topics in mathematics and mathematical physics, LPT Orsay 11/09.

Spectral distance in the Moyal plane,
Workshop groupes quantiques et géométrie non-commutative, CIRM Marseille 09/10;
Workshop on Algebraic Geometry and Physics, St Jean de Monts 05/10;
2nd annual meeting of the ncg network, København 10/09.

Temperature for double-cone in 2D CFT from modular theory,
24th qft workshop, universität Leipzig 06/09.

Line element in noncommutative geometry,
The Planck scale, 25th Max Born symposium, Wrocław 07/09.

The standard model from the metric point of view,

2nd workshop noncommutative geometry & quantum gravity, Lisboa 09/08;

First annual meeting of ncg network, Dublin 06/08.

Metric interpretation of gauge fields in noncommutative geometry,

4th central european seminar on particle physics and qft, Vienna 11/07.

Unruh/Hawking temperature and the thermal time hypothesis,

4th Aegean summer school: black holes, Mytilene (Greece) 09/2007.

Algebraic structure of renormalization, ERG 06, Lefkada (Greece) 09/06.

Is life a thermal horizon ?, DICE 06, Piombino (Italy) 09/06.

Noncommutative geometry, Noncommutative spaces,

Workshop phenomenology of Planck scale physics, Roma 06/06.

Thermal time hypothesis: overview and application,

NEB XII: recent developments in gravity, Nafplio (Greece) 06/06.

Smoother than a circle: a metric interpretation of gauge field from noncommutative geometry,

International meeting on differential geometry, Deva (Romania) 09/05;

Oporto's meeting on geometry and physics, Porto 07/05;

International conference on high energy and math. physics, Marrakech 04/05.

Time interpretation of von Neumann algebra automorphisms,

Workshop noncommutative manifold, ICTP, Trieste 10/04.

What kind of noncommutative geometry for quantum gravity ?

Workshop noncommutative geo. & quantum gravity, universidade Lusofona, Lisboa 07/04.

Physical introduction to Dirac operator, Workshop geometry in Lisbon 01/04.

La distance en géométrie non commutative et le champ de Higgs, GDR 2001 Marseille.

Modèle standard en géométrie non commutative, Rencontres jeunes chercheurs, Aussois 12/2000.

conferences as a contributed talks

Quantum length, quantum geodesics,

14th Marcel Grossman meeting, Roma 07/15.

Twisted spectral triple and the standard model of elementary particles,

14th Marcel Grossman meeting, Roma 07/15.

Twisted spectral triple for the standard model and spontaneous breaking of the grand symmetry,

Deutschen Physikalischen Gesellschaft Frühjarstagun, Berlin 03/15;

Workshop "New trends in algebraic qft", INFN-Frascati 02/15;

7th Int. Workshop DICE "Spacetime, Matter, Quantum Mechanics", Castiglicello 09/14.

Spectral geometry with a cut-off,

Frontiers of fundamental physics 14, Marseille 07/14;

1st italo-spanish meeting of mathematics, Bilbao 07/14.

Grand symmetry, spectral action, and the Higgs mass,

Workshop on noncommutative field theory and gravity, Corfou 09/13.

Minimal length in quantum space and integrations of the line element in noncommutative geometry,
 Workshop “Modern trends in algebraic quantum field theory”, Pavia 09/11;
 11th Hellenic workshop on elementary particles physics and gravity, Corfou 09/11;
 Workshop “Harmonic analysis, quantization and noncommutative geometry”, Scalea 09/11.

Noether symmetry on noncommutative spacetime,
 Workshop “Quantum groups and physics”, Caen 09/10.

Emergence of time in quantum gravity: is there more light at noon or midnight ?
 Workshop “Temps & émergence”, Ecole Normale Supérieure, Paris 10/11;
 Workshop “Math., phys. and conceptual aspects of quantum gravity”, APC univ. Paris 7, 03/11.

Geometrical modular action for disjoint intervals and boundary conformal theory,
 Workshop “Noncommutativity and Physics”, Bayrischzell 05/10;
 Deutschen Physikalischen Gesellschaft Frühjahrstagung, Bonn 03/10.

Spectral distance in the Moyal plane,
 Deutschen Physikalischen Gesellschaft Frühjahrstagung, Bonn 03/10.

Temperature for double-cone in 2D CFT from modular theory,
 Conf. in honor of J. Roberts, Vietri sul Mare 09/09.

Noncommutative geometry and its application to the standard model,
 Deutschen Physikalischen Gesellschaft Frühjahrstagung, München 03/09.

The standard model from the metric point of view,
 NoMaP, Bruxelles 07/08;
 22nd qft workshop, DESY Hamburg, 06/08;
 School “new paths towards quantum gravity”, Holbaek (Denmark) 05/08.

Spectral distance on the circle,
 Workshop on noncommutative manifolds II, ICTP, Trieste 10/07;
 British Mathematical Council, Swansea 04/07;
 Workshop noncommutative spacetime geometries, Alessandria (Italy) 03/07.

Distance in noncommutative geometry, Workshop ncg & the structure of spacetime,
 Isaac Newton Institute, Cambridge 09/06.

Thermal time hypothesis: overview and application,
 Loops 05, Potsdam 10/05.

What kind of noncommutative geometry for quantum gravity ?
 40th winter school on theoretical physics, Ladek Zdrój (Poland) 02/04.

invited talks (invited by)

On twisting real spectral triples,
 dpt de mathématiques, université de Lille 01/16;
 SISSA & università di Trieste 10/15.

Twisted spectral triple for the standard model, and beyond,
 LPT Paris-sud Orsay, 07/15 (J. C. Wallet);
 APC Paris-Diderot, 07/15 (M. Lachièze Rey);
 CPT Aix-Marseille Université, 06/15;
 séminaire de physique mathématique Paris-Diderot, 06/15.

The standard model in noncommutative geometry and spontaneous breaking of the grand symmetry,
 Institut Camille Jordan, Université Claude Bernard Lyon 1, 04/15 (J. Kellendonk);
 Institut de mathématique de Jussieu, Paris 04/15 (A. Zuk);
 Labo. phys. subatomique et cosmologie, université J. Fourier, Grenoble 04/15 (A. Barrau);
 Labo. phys. théorique et mathématique, université de Tours 04/15 (X. Martin),
 AEI Max Planck Institute for Gravitation, Golm 03/15 (D. Oriti);
 SISSA Trieste 10/14 (L. Dabrowski).

Higgs mass in noncommutative geometry,
 LAPTh Annecy 03/14 (Bjorn Hermann) Université de Louvain-la-Neuve 12/13 (P. Bieliavsky);
 LPT Orsay, Paris-sud 10/13 (J.-C. Wallet);
 Centre de physique théorique, Marseille 10/13 (C. Duval).

Spectral geometry with a cut-off,
 University of Nijmegen 12/13 (van Suijlekom);
 Université de Louvain-la-Neuve 12/13 (P. Bieliavsky).

Géométrie non-commutative et distance de Monge-Kantorovich: l'exemple du plan de Moyal,
 Département de mathématiques, université d'Angers, 04/13 (V. Rubstov) ;
 C*-académie, université d'Orléans 03/13 (J. Renault);
 Institut Camille Jordan, Lyon 02/13 (F. Vignes-Tourneret);
 Département de mathématiques, université de Lorraine, Metz 01/13 (H. Oyono) ;
 Institut für Mathematik, Göttingen 11/12 (K.-H. Rehren);
 Institut de mathématique de Jussieu, Paris 11/12 (G. Skandalis).

The metric aspect of noncommutative geometry: from the Monge problem to the Higgs field,
 Università di Napoli Federico II, 02/12.

On Pythagoras theorem in noncommutative geometry,
 LATP, Marseille 04/12;
 Département de mathématiques de Besançon 03/12 (U. Franz).

Minimal length in quantum spacetime & integration of the line element in NCG,
 DESY, Hambourg, 5/12 (K. Fredenhagen);
 Centre de physique théorique, Marseille 03/12 (C. Duval);
 SISSA, Trieste 11/11 (L. Dabrowski);
 Département de mathématiques, université Metz 03/11 (S. Mehdi).

Distances en GNC: du transport optimal au plan de Moyal en passant par la go. sous-riemannienne,
 Institut Camille Jordan, Lyon 05/11 (D. Perrot);
 Département de mathématiques, université de Bourgogne, Dijon 04/11 (C. Klein).

Von-Neumann algebra in physics by examples,
 Séminaire de logique, LIPN Paris-nord 03/11 (D. Mazza).

Spectral distance in the Moyal plane,
 Born-Hilbert seminar, Universität Göttingen 04/10 (K. H. Rehren).

Action géométrique du groupe modulaire en théorie conforme des champs avec bord,
 Equipe CALIN, LIPN Paris-nord 02/11 (G. H. E. Duchamp);
 CPT Marseille 10/10 (C. Rovelli);
 Institut Camille Jordan, Lyon 04/10 (D. Perrot);
 LPT Orsay, Paris-sud 03/10 (J.-C. Wallet);
 Département de mathématiques, université Metz, 03/10 (J.-L. Tu).

L'hypothèse du temps thermodynamique,

REHSEIS, université Denis Diderot & ENS, Paris 02/10 (A. de Saint Ours).

L'aspect métrique de la géométrie non-commutative,

Equipe CALIN, LIPN Paris-nord 02/11 (G. H. E. Duchamp);

Département de mathématiques, Besançon 03/10 (E. Ricard);

Laboratoire de mathématiques, Clermont-Ferrand 02/10 (S. Paycha).

Noncommutative space and time,

LPT Orsay, Paris-sud 04/09 (J. C. Wallet);

Laboratoire physique théorique, Tours 03/09 (K. Noui).

Distances en géométrie non-commutative,

Institut de mathématiques de Jussieu, Paris 01/09 (Andrzej Zuk);

Département de mathématiques, Mulhouse 01/09 (M. Bordemann).

The standard model from the metric point of view,

Born-Hilbert seminar, universität Göttingen, 03/08 (K. H. Rehren).

L'élément de longueur en géométrie non-commutative,

Département de mathématiques, Mulhouse 04/08 (K. Ebrahimi-Fard);

Section de mathématiques, université de Genève 04/08 (P. de la Harpe).

Essai pour une analyse de Noether sur espaces non-commutatifs,

Laboratoire physique théorique, Tours 11/08 (K. Noui);

Laboratoire physique théorique, Paris-Orsay 12/07 (J. C. Wallet).

Algebraic Birkhoff decomposition for the continuous renormalization group,

Equipe CALIN, laboratoire d'informatique de Paris-Nord, 02/11 G. H. E. Duchamp);

Max Planck Intitut für Mathematik, Bonn 07/07 (K. Ebrahimi-Fard);

Université Mohammed 1, Oujda 02/04 (E. H. Tahri and T. Ouali).

Distance spectrale sur le cercle,

Département de mathématiques, université de Metz 02/07 (M. Benhameur);

IML Marseille 01/07 (A. Wasserman).

Is life a thermal horizon ?

Laboratoire de physique théorique, université de Tours 01/07 (K. Noui);

School math. science, university of Nottingham 12/06 (J. Louko).

Distance de Carnot-Carathéodory et fluctuation de la métrique en géo. non comm.,

Universités de Metz, Rennes, Toulouse 04/06;

Université Lyon 1 04/05 (A. Frabetti);

Université de Caen 03/05 (L. Vainerman).

Unruh effect for bounded trajectories and the thermal time hypothesis,

Laboratoire d'Annecy de physique théorique, 01/05 (L. Gallot);

Perimeter Institute, Waterloo 10/03 (F. Girelli).

Distances in noncommutative geometry,

Universidade Lusofona, Lisboa 12/03 (A. Mikovic);

Sissa, Trieste 03/2002 (L. Dabrowski).

Neutrinos massifs et modèle standard en géométrie non commutative,

Institut des sciences nucléaires, Grenoble 03/2001 (D. Santos).

