

Curriculum Vitæ

NAKAD Roger

Born April 14, 1985.
Citizenship: Lebanese.

Professional address:

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Present position

2011-2012: **Postdoctoral researcher** at the Max Planck Institute for Mathematics, Bonn-Germany.

Education

2009-2011: **Ph.D in Mathematics**, University of Nancy I, France.
Thesis entitled: “Special submanifolds of Spin^c manifolds”.
Advisor: Prof. Oussama Hijazi.

Jury: Vestislav Apostolov (referee), Jean Pierre Bourguignon (president), Oussama Hijazi, Emmanuel Humbert, Sebastián Montiel (referee), Andrei Moroianu.

2007-2008: **Master’s degree, research in Fundamental Mathematics**, at the University of Paul Verlaine, Metz, France.
Master’s Thesis: “L’opérateur de Dirac en géométrie spinorielle complexe”.
Advisor: Prof. Oussama Hijazi.

2006-2007: **Master of Pure Mathematics**, Lebanese University.

2005-2006: **License of Pure Mathematics**, Lebanese University.

2002-2003: **Official Lebanese Baccalaureate**, General Sciences, with honors.

Languages and computer skills

- Arabic (my mother tongue).
- French: reading, speaking and writing.
- English: reading, speaking and writing.
- Unix, Linux, Windows, Latex, Matlab.

Professional experiences

2008-2009: Monitor at the Institute Élie Cartan, University of Nancy 1.
Courses and tutorials in mathematics for first year Bachelor.

2009-2010: Monitor at the Institute Élie Cartan, University of Nancy 1.
Courses and tutorials of *calculus and math* for first year Bachelor.

2010-2011: Monitor at the Institute Élie Cartan, University of Nancy 1.
Courses and tutorials of maths for first year Bachelor.

Fields of interest

- The Spin^c Dirac operator on submanifolds and geometric applications.
- The energy-momentum tensor on low dimensional Spin^c manifolds and their hypersurfaces.
- Spinorial characterization of hypersurfaces immersed into Spin^c manifolds.
- Kähler structures and CR structures on manifolds via spinors.
- The Spin^c Dirac operator on manifolds with boundary.

Publications and preprints

[1] **Lower bounds for the eigenvalues of the Dirac operator on Spin^c manifolds**, J. Geom. Phys. 60 (2010), 1634-1642.

[2] **The energy-momentum tensor on Spin^c manifolds**, IJGMMP Vol. 8, No. 2, 2011.

[3] **The Hijazi inequalities on complete Riemannian Spin^c manifolds**, Advances in Mathematical Physics, vol. 2011, Article ID 471810, doi:10.1155/2011/471810.

[4] **The energy-momentum tensor on low dimensional Spin^c manifolds**, with Georges Habib, to appear in International Journal of Mathematics.

[5] **Hypersurfaces of Spin^c manifolds and Lawson correspondence**, with Julien Roth, to appear in Annals of Global Analysis and Geometry.

[6] **The Spin^c Dirac Operator on hypersurfaces and applications**, with Julien Roth, submitted 2012.

[7] **The twisted Spin^c Dirac operator on Kähler submanifolds of the complex projective space**, with Georges Habib, submitted 2012.

Work in progress

[1] **Universal inequalities for the eigenvalues of the Dirac operator on Spin^c manifolds**, with Ola Makhoul.

[2] **Spin^c characterization of CR structures**, with Rafael Herrera.

[3] **Non-compact boundary of Spin^c manifolds and eigenvalue estimates**, with Nadine Grosse.

[4] **Imaginary Killing spinors on Spin^c manifolds**.

Talks, conferences and mini-courses

Talks on the seminar of the Differential Geometry team at the Insitute Élie Cartan, UHP Nancy

- November 2008: **Hypersurfaces of 3-dimensional space forms**.
- March 2009: **The spectrum of the Dirac operator on submanifolds**.
- October 2009: **Kählerian spinors I**.
- October 2009: **Kählerian spinors II**.
- March 2010: **On the energy-momentum tensor of Spin^c manifolds**.
- November 2010: **Spin^c structures on CR manifolds**.

Invitations

- May 2009: **Spin^c structures and the Dirac operator**, in the Ph.D Students' Seminar at the mathematics Institute of Luxembourg.
- December 2010: **Spin^c structures on manifolds**, in the Ph.D Students' Seminar at the Institute Élie Cartan, Nancy.
- December 2010: **Spinorial characterization of immersed surfaces**, "Laboratoire d'analyse et de mathématiques appliquées" at the University of Marne-la-Vallée, Paris.
- January 2011: **The energy-momentum tensor on Spin^c manifolds**, in the Geometry Seminar of the mathematics Institute of Luminy, Marseille.
- February 2011: **Spin^c structures on hypersurfaces and applications**, in the Geometry Seminar of the mathematics Institute of Brest.
- March 2011: **The Spin^c Dirac operator and applications**, in the Geometry Seminar of the mathematics department of the Lebanese University, Fanar.

- April 2011: **Lawson correspondence for surfaces in 3-dimensional homogeneous manifolds**, in the Geometry Seminar of the Max Planck Institute for Mathematics in Bonn, Germany.
- October 2011: **Spin^c spinors and their geometric applications**, in the Junior trimester program at the Hausdorff Institute for Mathematics in Bonn, Germany.
- November 2011: **Surfaces in 3-dimensional Thurston geometries via Spin^c spinors**, in the Geometry Seminar of the mathematics department of the University of Potsdam, Germany.
- November/December 2011: **The Spin^c Dirac equation on surfaces**, in the Geometry Seminar of the mathematics department of the University of Hamburg, Germany and in the Differential Geometry meeting at the mathematics department of the Lebanese University, Fanar.
- January 2012: **Hypersurfaces of Kähler and Sasaki manifolds**, in the Geometry and Global Analysis Seminar of the mathematics institute of the University of Humboldt-Berlin, Germany.
- January 2012: **Spin^c structures on homogeneous manifolds and geometric applications**, in the Geometry Seminar of the mathematics department of the University of Tours, France.
- March 2012: **Immersions of surfaces via Spin^c Killing spinors**, in the third Killing-Weierstrass colloquium, Braniewo, Poland.
- April 2012: **Isometric immersions in complex space forms via Spin^c spinors**, in the geometry oberseminar of the Max Planck Institute for Mathematics in Leipzig, Germany.
- May 2012: **Spin^c spinors on low dimensional manifolds and applications**, in the geometry seminar of Centro de Investigación en Matemáticas, A.C. (CIMAT), Guanajuato, Mexico.
- May 2012: **Spin^c Killing spinors on Sasaki manifolds**, in the Oberseminar of Global Analysis of the mathematics department of the University of Regensburg, Germany.
- May 2012: **Isometric immersions into 4-dimensional manifolds and Killing Spinors**, in the research seminar of the group "Differential Geometry and Analysis" in Marburg, Germany.

Mini-courses

- October 2011: **Spin^c structures on manifolds and geometric applications**, a mini-course given at the Max Planck Institute for Mathematics in Bonn, Germany.

Conferences and summer school

- December 2008: A stay at “École Normale Supérieure de Lyon” as part of **the meeting of mathematicians awarded by the Academy of Sciences**.
- January 2009: **A Differential Geometry Meeting** at the Institute Élie Cartan, Nancy.

- April 2009: **A Differential Geometry Meeting** at the Institute Fourier, Grenoble.
- April 2009: **A Differential Geometry Meeting** at the Institute Élie Cartan, Nancy 2009Bis.
- May 2009: **Geometric and nonlinear analysis**, conference at the University of Cergy-Pointoise, Paris.
- June 2009: **Spectral Theory and Geometry**, an international congress in honor of P. Brard et S. Gallot, at the Institute Fourier, Grenoble.
- October 2009: **Journées Nancéiennes de Gómfrie** at the Institute Élie Cartan, Nancy.
- October 2009: **An international congress in mathematics** at the University of Saarland-Saarbrücken, Germany.
- December 2009: Conference in **fundamental group and hyperbolic geometry** at the mathematics Institute of Toulouse, France.
- January 2010: **A Geometric Meeting** at the Institute Élie Cartan, Nancy.
- June 2010: **Summer School in Geometric Analysis**, University of Aegean, Samos, Greece.
- June 2010: “Journées Nancéiennes de Géométrie” at the Institute Élie Cartan, Nancy, **Aspects géométriques de la relativité générale**.
- October 2010: **Workshop on Geometric Analysis**, Roscoff, France.
- January 2011: **Journées Nancéiennes de Géométrie** at the Institute Élie Cartan, Nancy.
- May 2011: **Aspects conformes de la géométrie**, a conference at the University of Pierre et Marie Curie, Paris 6.
- June 2011: **Journée Metz-Nancy des doctorants de mathématiques** at the Institute Élie Cartan, Nancy.
- June 2011: **Geometric and Nonlinear Analysis: Meeting in Lorraine** at the Institute Élie Cartan, Nancy.
- January 2012: **Journées Nancéiennes de Géométrie** at the Institute Élie Cartan, Nancy.
- March 2012: **A conference on algebraic and geometric aspects of Dirac operators**, at the University of Lorraine, Metz campus.