

(March 2, 2012)

CURRICULUM VITÆ

Kevin Wray

CONTACT
INFORMATION

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RESEARCH
INTERESTS

The mathematical aspects related to classical and quantum field theories. In particular, the study of Yang-Mills equations on principal G -bundles and their solutions. Also, I am currently looking into the relationship between knot theory and quantum gravity in (2+1)-dimensions and the relationship between topological invariants and background (in)dependent actions. As well as applying the theory of characteristic classes defined on principal G -bundles towards new ideas in physics. Recently I've been thinking alot about the OSV conjecture, refined Chern-Simons theory and the refined topological string.

EDUCATION

UC Berkeley, Berkeley, California TBA
Doctor of Philosophy

Universiteit van Amsterdam (cum laude), Amsterdam, The Netherlands May, 2010
Master of Science in Theoretical Physics May 2010, Thesis *Extended Topological Gauge Theories in Codimension Zero and Higher*, Advisor Prof. dr. Robbert Dijkgraaf

Mathematical Research Institute (cum laude), Utrecht, The Netherlands July, 2008
Master Class in Mathematical Physics (with emphasis in Quantum Groups and Affine Lie Algebras) July 2008, Thesis *A Geometrical Interpretation of Classical Yang-Mills Theories*, Advisor Prof. dr. Robbert Dijkgraaf

East Carolina University, Greenville, North Carolina USA May, 2007
B.S. in Physics May 2007

East Carolina University, Greenville, North Carolina USA May, 2007
B.S. in Mathematics May 2007

ACADEMIC
EXPERIENCE

Instructor October, 2007
Gave a graduate level seminar for the Mathematical Research Institute of the Universiteit Utrecht on Linear Skein Theory and its relationship to the Temperley-Leib algebras and the Kauffman bracket polynomial.

- WI406036 Seminar in Mathematical Physics, September - December, 2007.

Invited Speaker April, 2007

I was invited by the North Carolina Academy of Science to give a lecture on gravitational waves at the annual meeting of 2007. In the talk I derived the Einstein field equations from the Einstein-Hilbert action and then showed how they predict the “waving” of spacetime. This was followed by a review of LISA and LIGO, how they could detect this “waving”, and their mission objectives.

- Annual Meeting of the North Carolina Academy of Sciences, April, 2007.

Teaching Assistant

January - May, 2007

Duties included helping the professor with grading of tests and homework. Also, organization and execution of tutor sessions and problem classes.

- PHYS 4224 Classical Mechanics, Spring 2007.

Invited Speaker

February, 2007

I was invited by Dr. Orville Day of East Carolina University to give a lecture on the Calculus of Variation to his students of general relativity.

- PHYS 3716 General Relativity, February, 2007

Research

October, 2005 - May, 2007

Joint collaboration with Dr. Gregory Lapicki in the analysis of the validity of using the Plane Wave Born Approximation when calculating K shell cross sections in various atomic collisions. This research has led to a paper that is currently being written and should be submitted in the near future.

- Research in Theoretical Atomic Physics

CONFERENCES AND SUMMER SCHOOLS Summer School on Quantization and Related Topics, University of Notre Dame, May 2011

String-Math 2011, University of Pennsylvania, June 2011

Summer School on String Topology, Compactified Moduli Spaces and Algebraic Structures, University of California, Berkeley, June 2011

SCHOLARSHIPS AND GRANTS In 2008 I was awarded the HSP Huygens scholarship from NUFFIC. The scholarship was for 45,000 euros over two years.

PAPERS With Dijkgraaf, R. *A Geometrical Interpretation of Classical Yang-Mills Gauge Field Theories*

With Dijkgraaf, R. *Extended Topological Gauge Theories in Codimension Zero and Higher*

PAPERS IN PREPARATION With Lapicki, G. *On the Validity of Using the PWBA in the Calculation of K Shell Cross Sections from Proton-Helium Collisions*

Introduction to Fiber Bundles, Gauge Transformations, and Yang-Mills Theory

Higher-Dimensional Algebra and Physics: The Role of Gerbes in Topological Field Theories

PROFESSIONAL EXPERIENCE Department of Chemistry: East Carolina University, Greenville, North Carolina USA
research assistant

October, 2003 - December, 2004

I was hired by Dr. Paul Gemperline to work in his chemometric laboratory. My research was helping with the developing of chemometric methods for monitoring, understanding, and controlling evolving chemical systems and chemical processes, especially for batch chemical reactions and processes used in manufacture of pharmaceutical products.

Department of Physics: East Carolina University, Greenville, North Carolina USA

research assistant

May, 2005 - August, 2006

I was hired by Dr. Jun Lu to work in the biomedical Laser laboratory. My research projects included both numerical and analytical solutions to the Maxwell equations in various types of boundary conditions. I used FORTRAN and Mathematica to analyze the physical systems via the Finite Element Method and was able to supply analytical solutions for the case of nice boundary conditions.

Department of Mathematics: UC Berkeley, Berkeley, California USA

Graduate Student Instructor (GSI)

August, 2010 - December, 2010

I was a GSI for Prof. Martin Olsson's Math 1B course (second calculus sequence).

Department of Mathematics: UC Berkeley, Berkeley, California USA

Graduate Student Instructor (GSI)

January, 2011 - May, 2011

I was a GSI for Prof. Ming Gu's Math 54 course (Linear Algebra and Differential Equations).

Department of Mathematics: UC Berkeley, Berkeley, California USA

Lecturer

June, 2011 - August, 2011

I taught math 53 (Multivariable Calculus).

Department of Mathematics: UC Berkeley, Berkeley, California USA

Graduate Student Instructor (GSI)

August, 2011 - December, 2011

I was a GSI for Prof. Denis Auroux's Math 53 course.

Department of Mathematics: UC Berkeley, Berkeley, California USA

Graduate Student Instructor (GSI)

January, 2012 - May, 2012

I was a GSI for Prof. John Neu's Math 53 course.

REFERENCES AND
COLLABORATORS

- Mina Aganagic
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Professor of Physics, University of California - Berkeley

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- Denis Auroux
Professor of Mathematics, University of California - Berkeley

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USA
- Robbert Dijkgraaf
University Professor of Mathematics, Universiteit van Amsterdam
University Professor of Physics, Universiteit van Amsterdam
President, Royal Netherlands Academy of Arts and Sciences (KNAW)

Kloveniersburgwal 29
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The Netherlands
- Nicolai Reshetikhin
Professor of Mathematics, University of California - Berkeley
Professor of Mathematics, Universiteit van Amsterdam

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Universiteit van Amsterdam
Sciencepark 904
1098 XH Amsterdam
The Netherlands
- Jan de Boer
Professor of Physics, Universiteit van Amsterdam

Institute for Theoretical Physics
Universiteit van Amsterdam
Valckenierstraat 65, J/K 3.57
1018 XE Amsterdam
The Netherlands

- Kostas Skenderis
Associate Professor of Physics, Universiteit van Amsterdam
Associate Professor of Mathematics, Universiteit van Amsterdam

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