

Michael Guy Poirier

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Professional Preparation

2004-2006	Postdoc, Molecular Biology	Northwestern University Advisor: Prof. Jonathan Widom
2002-2004	Postdoc, Biophysics	Université Louis Pasteur Advisor: Dr. Didier Chatenay
2002	Ph.D. Physics	University of Illinois, Chicago Advisor: Prof. John F. Marko
1997	M.S. Physics	University of Illinois, Chicago
1995	B.S. Physics	Truman State University

Appointments

2012 – present	Associate Professor (by courtesy), Department of Molecular Virology, Immunology and Medical Genetics, the Ohio State University Medical Center
2012 – present	Associate Professor (by courtesy), Department of Chemistry & Biochemistry, the Ohio State University
2012 – present	Associate Professor, Department of Physics, the Ohio State University
2009 – 2012	Assistant Professor (by courtesy), Department of Molecular Virology, Immunology and Medical Genetics, The Ohio State University Medical Center.
2008 – 2012	Assistant Professor (by courtesy), Department of Biochemistry, The Ohio State University.
2006 – 2012	Assistant Professor, Department of Physics, The Ohio State University.
2004 – 2006	Postdoctoral Fellow, Department of Biochemistry, Molecular Biology and Cell Biology, Northwestern University.
2002 – 2004	Postdoctoral Researcher, Laboratoire de Dynamique des Fluides Complexes, Université Louis Pasteur.
1997 – 2002	Research Assistant, Department of Physics, University of Illinois, Chicago.
1995 – 1997	Teaching Assistant, Department of Physics, University of Illinois, Chicago.

Honors

2005	Burroughs Wellcome Fund Career Award in Basic Biomedical Sciences
2004	Ruth L. Kirschstein National Research Service Award, Individual Fellowship, National Institutes of Health.
2003	Postdoctoral Award from Le Centre National de Recherche Scientifique, France.
2002	Postdoctoral Award from Le Ministre de la Recherche, France.

Publications (*corresponding author)

Summary: 32 publications; 14 corresponding author publications*; 11 first author publications; 724 citations; h-index 17, i10-index 19.

32. Yi L, North JA, Rose SD and **Poirier MG***. Nucleosomes Accelerate Transcription Factor Dissociation. *Nucleic Acids Res.* 2013 In Press.
31. Musselman CA, Gibson MD, Hartwick EW, North JA, Gatchalian J, **Poirier MG**, and Kutateladze TG. Binding of PHF1 Tudor to H3K36me3 enhances nucleosome accessibility. *Nature Comm.* 2013 In Press.
30. Gao M, Nadaud PS, Chakraborty S, North JA, Bernier M, **Poirier MG***, Jaroniec CP*. Flexible histone tails in large nucleosome arrays probed by magic angle spinning NMR spectroscopy. *J Am Chem Soc.* 2013 Oct 16;135(41):15278-81.
29. North JA, Amunugama R, Klajner M, Bruns AN, **Poirier MG***, Fishel R*. ATP-dependent nucleosome unwrapping catalyzed by human RAD51. *Nucleic Acids Res.* 2013 Aug 1;41(15):7302-12.
28. Law YK, Forties RA, Liu X, **Poirier MG**, Kohler B. Sequence-dependent thymine dimer formation and photoreversal rates in double-stranded DNA. *Photochem Photobiol Sci.* 2013 Aug;12(8):1431-9.
27. Eidahl JO, Crowe BL, North JA, McKee CJ, Shkriabai N, Feng L, Plumb M, Graham RL, Gorelick RJ, Hess S, **Poirier MG**, Foster MP, Kvaratskhelia M. Structural basis for high-affinity binding of LEDGF PWWP to mononucleosomes. *Nucleic Acids Res.* 2013 Apr 1;41(6):3924-36.
26. Sen P, Vivas P, Dechassa, ML, Mooney AM, **Poirier MG** and Bartholomew B. The SnAC domain of SWI/SNF is a histone anchor required for remodeling. *Mol Cell Biol.* 2013 Jan; 33(2):360-70.
25. Shimko JC, Howard CJ, **Poirier MG** and Ottesen JJ “The Preparation of Semisynthetic and Fully Synthetic Histones H3 and H4 to Introduce Modifications in the Nucleosome Core”, *Methods Mol. Biol.* 2013;981:177-92.
24. North JA, Shimko JC, Javid S, Mooney AM, Shoffner MA, Rose SD, Bundschuh R, Fishel R, Ottesen JJ, **Poirier MG***. Regulation of the nucleosome unwrapping rate controls DNA accessibility. *Nucleic Acids Res* 2012 Nov 1;40(20):10215-27.
23. Kodgire P, Mukkavar P, North JA, **Poirier MG**, Storb U. Nucleosome stability dramatically impacts the targeting of somatic hypermutation. *Mol Cell Biol.* 2012 May;32(10):2030-40.
22. Chen A, Vieira G, Henighan T, Howdyshell M, North JA, Hauser AJ, Yang FY, **Poirier MG**, Jayaprakash C and Sooryakumar R. Regulating Brownian Fluctuations with Tunable Microscopic Magnetic Traps. *Phys Rev Lett.* 2011 Aug. 18; 107(8): 87206.
21. Simon M., North JA, Shimko JC, Forties RA, Ferdinand MA, Manohar M, Zhang M, Fishel R, Ottesen JJ and **Poirier MG***. Histone Fold Modifications Control Nucleosome Unwrapping and Disassembly. *Proc. Nat. Acad. Sci. (USA).* 2011 Aug 2;108(31):12711-6.
20. Forties RA, North JA, Javid S, Tappa OP, Fishel R, **Poirier MG** and Bundschuh R. A Quantitative Model of Nucleosome Dynamics. *Nucleic Acids Res.* 2011 Oct;39(19):8306-13.

19. North JA, Javid S, Ferdinand MB, Chatterjee N, Picking JW, Shoffner M, Nakkula RJ, Bartholomew B, Ottesen JJ, Fishel, **Poirier MG***. Phosphorylation of Histone H3(T118) Alters Nucleosome Dynamics and Remodeling. *Nucleic Acids Res.* 2011 Aug; 39(15): 6465-74.
18. Shimko JC, North JA, **Poirier MG*** and Ottesen JJ. Assembly and Analysis of Fully Synthetic Histone H3 containing Acetyl-Lysine 56 within Nucleosomes. *J Mol Biol.* 2011 Apr 29; 408(2): 187-204.
17. Wong J, **Poirier MG**, Chatenay D and Robert J. Plasmid copy number noise in monoclonal populations of bacteria. *Phys Rev E.* 2010 Jan;81(1 Pt 1):011909..
16. Javid S, Manohar M, Punja N, Mooney A, Ottesen JJ, **Poirier MG***, and Fishel R. Nucleosome remodeling by hMSH2-hMSH6. *Mol Cell.* 2009 Dec 24;36(6):1086-94.
15. **Poirier MG***, Oh E, Tims H, and Widom J. Dynamics and function of compact nucleosome arrays. *Nat Struct Mol Bio.* 2009 Sep;16(9):938-44.
14. Manohar M, Mooney AM, North JA, Nakkula RJ, Picking JW, Edon A, Fishel R, **Poirier MG*** and Ottesen JJ Acetylation of histone H3 at the nucleosome dyad alters DNA-histone binding. *J Biol Chem.* 2009 Aug 28;284(35):23312-21.
13. Forties RA, Bundschuh R, **Poirier MG*** The flexibility of locally melted DNA. *Nucleic Acids Res.* 2009 Aug;37(14):4580-6.
12. Shen HM, **Poirier MG**, Allen MJ, North J, Lai R, Widom J, Storb U The Activation Induced Cytidine Deaminase (AID) efficiently targets DNA in nucleosomes, but only during transcription. *J Exp. Med.* 2009 May 11;206(5):1057-71.
11. **Poirier MG**, Bussiek M, Langowski J, Widom J Spontaneous access to DNA target sites in folded chromatin fibers. *J Mol Biol.* 2008 Jun 13;379(4):772-86.
10. **Poirier MG** and Marko JF, Micromechanical studies of mitotic chromosomes. *Curr Top Dev Biol.* 2003, 55:75-141.
9. **Poirier MG** and Marko JF, Micromechanics of chromatin and chromosomes *Biochem Cell Biol.* 2003 Jun;81(3):209-20.
8. **Poirier MG** and Marko JF, Micromechanical properties of mitotic chromosomes. *J Musc Res Cell Motil.* 2003, 23, 409-431.
7. **Poirier MG** and Marko JF, Mitotic chromosomes are chromatin networks without an internal protein scaffold. *Proc Natl Acad Sci USA* 2002 Nov 26; 99, 15393-15397.
Commented on by Belmont, A. 2002 *Proc Natl Acad Sci U S A.* 2002 Nov 26; 99, 15855-7.
6. Sarkar A, Eroglu S, **Poirier MG**, Nemani A, Gupta P and Marko JF, Dynamics of chromosome compaction during mitosis, *Exp Cell Res.* 2002 Jul 1;277(1):48-56.
5. **Poirier MG** and Marko JF, Effect of internal friction on biofilament dynamics *Phys Rev Lett.* 2002 Jun 3; 88(22):228103.
4. **Poirier MG***, Eroglu S and Marko JF, The bending rigidity of mitotic chromosomes *Mol Biol Cell.* 2002 Jun 13: (6):2170-2179.
3. **Poirier MG***, Monhait T and Marko JF, Reversible hypercondensation and decondensation of mitotic chromosomes studied using combined chemical-micromechanical techniques. *J Cell Biochem.* 2002; 85:422-424.

2. **Poirier MG***, Nemani A, Gupta P, Eroglu S and Marko JF, Probing chromosome structure with dynamic force relaxation *Phys Rev Lett*. 2001 Jan 8; 86, 360-363.
1. **Poirier M**, Eroglu S, Chatenay D, and Marko JF, Reversible and irreversible unfolding of mitotic newt chromosomes by applied force *Mol Biol Cell*. 200 Jan; 11, 269-276.

Invited Presentations

Summary: 32 invited talks; includes talks at a Keystone Symposia, the ACS national meeting, the ASBMB national meeting and the APS March meeting.

32. Seminar Presenter. University of Colorado Medical School, Regulation and Function of Nucleosome Dynamics, Denver, CO, November, 2013.
31. Seminar Presenter. National Institutes of Health, National Cancer Institute. Transcription factor binding dynamics within chromatin. Bethesda MD, May, 2013.
30. Seminar Presenter. Telluride Workshop on Chromatin Structure and Dynamics, Telluride, CO, August, 2012.
29. Seminar Presenter. Mechanics of the Human Genome. Presented at the Ohio Section of the American Physical Society, Columbus OH, April, 2012.
28. Seminar Presenter. Regulation of Nucleosome Dynamics. Presented at the Biochemistry Seminar Series. Colorado State University, Fort Collins, CO, April, 2012.
27. Seminar Presenter. Unlocking Nucleosome Dynamics with Histone Post-Translational Modifications. Presented at the Biophysical Society, Dynamic DNA Packaging Across Kingdoms: Chromatin and Beyond, Asilomar, CA, July, 2011.
26. Seminar Presenter. Unlocking Nucleosome Dynamics with Histone Post-Translational Modifications. Presented at the Biochemistry Seminar Series. Brigham Young University, Provo, UT, April, 2011.
25. Seminar Presenter. Unlocking Nucleosome Dynamics with Histone Post-Translational Modifications. Presented at the American Society of Biochemistry and Molecular Biology, Washington, D.C. April, 2011.
24. Seminar Presenter. Unlocking Nucleosome Dynamics with Histone Post-Translational Modifications. Presented at the American Physical Society March Meeting, Dallas, TX, March 2011.
23. Seminar Presenter. Unlocking Nucleosome Dynamics with Histone Post-Translational Modifications. Presented at the Keystone Meeting, Histone Code: Fact or Fiction, Midway Utah, Jan 2011.
22. Seminar Presenter. Unlocking Nucleosome Dynamics with Histone Post-Translational Modifications. Presented at the Biochemistry Seminar Series. University of Illinois, Urbana-Champaign, IL, September 2010.
21. Seminar Presenter. Unlocking Nucleosome Dynamics and Remodeling with Histone Post-Translational Modifications. Presented at the Midwest Single Molecule Meeting. Washington University, St. Louis, MO, July 2010.
20. Seminar Presenter. Unlocking Nucleosome Dynamics and Remodeling with Histone Post-Translational Modifications. Presented at the Cornell Biophysics Colloquia series. Cornell University, Ithaca, NY, April 2010.

19. Seminar Presenter. Histone Post-Translational Modifications Buried in the Nucleosome Dyad Facilitate Nucleosome Disassembly and Repositioning. Presented at The American Chemical Society Annual Meeting. August, 2009.
18. Seminar Presenter. Facilitating a Novel DNA Mismatch Repair Function with Histone Post-Translational Modifications. Presented at The Physics Colloquium. Institut de Physique et Chimie des Matériaux de Strasbourg. Strasbourg, France. June, 2009.
17. Seminar Presenter. Connecting Chemical and Physical Alterations to DNA Organization. Presented at The Department of Physics Colloquium. University of Illinois, Chicago. Chicago, IL. April 2009.
16. Seminar Presenter. How Histone Post-Translational Modifications Function When They Are Buried Under DNA. Presented at The Department of Molecular Virology, Immunology and Medical Genetics Seminar. Columbus, Ohio. December, 2008.
15. Discussant. The Physics of Genome Folding and Function. Presented at Lorentz Workshop. Leiden, The Netherlands. October, 2008.
14. Poster Presenter. Molecular Mechanisms of Histone Modifications within the Nucleosomal DNA-Histone Interface. Presented at The Burroughs Wellcome Fund Career Awardees' Summer Conference. Dana Point, California. June, 2007.
13. Seminar Presenter. Understanding How Wrapped DNA is Biologically Active. Presented at of Biochemistry Seminar. The Ohio State University. Columbus, OH. April 2007.
12. Seminar Presenter. Dynamics of Nucleosome Arrays. Presented at The Midwest Microscopy Microanalysis Society. March, 2007.
11. Seminar Presenter. Accessibility and Structure within Nucleosome Arrays. Presented at The American Physical Society March Meeting. March, 2007.
10. Seminar Presenter. Understanding How Wrapped DNA is Biologically Active. Presented at The Department of Biochemistry Seminar. The Ohio State University. Columbus, OH. April, 2007.
9. Seminar Presenter. Accessibility and Structure within Nucleosome Arrays. Presented at The Asia and Pacific Workshop on Biological Physics. National University of Singapore. Singapore. July, 2006.
8. Seminar Presenter. Chromosome Architecture, Mechanics and Function. Presented at The Department of Physics Colloquium. Brandeis University. Waltham, MA. January, 2005.
7. Seminar Presenter. Chromosome Architecture, Mechanics and Function. Presented at The Department of Physics Colloquium. University of Texas, Austin. Austin, TX. January, 2005.
6. Seminar Presenter. Chromosome Architecture, Mechanics and Function. Presented at The Department of Physics Colloquium. University of Arizona. Tucson, AZ. January, 2005.
5. Seminar Presenter. Chromosome Architecture, Mechanics and Function. Presented at The Department of Physics Colloquium. The Ohio State University. Columbus, OH. December, 2004.
4. Seminar Presenter. Two Examples of Mesoscopic Properties within Biological Systems. Presented at The Department of Physics Colloquium. Indiana University. Bloomington, IN. April, 2004.

3. Seminar Presenter. Combining Elasticity and Biochemistry to Study Mitotic Chromosome Structure. Presented at The International Symposium on Chromosome Research at the Nano-Era. Osaka University. December, 2003.
2. Seminar Presenter. Two Examples of Mesoscopic Properties within Biological Systems. Presented at The Laboratoire de Physique des Solides Seminar. Université Paris-Sud. Paris, France. November, 2003.
1. Seminar Presenter. Two Examples of Mesoscopic Properties within Biological Systems. Presented at The Department of Physics Colloquium. University of Illinois, Urbana-Champaign. Champaign, IL. September, 2003.

Ongoing Research Support

Current

- 02/01/2008-08/31/2018 **National Institutes of Health, R01 GM083055**
 “Characterization of Four Histone H3 Modifications in the DNA-Histone Interface.”
 Principal investigator: Michael G Poirier
 Goal: Investigate the function of post-translational modifications in the DNA-histone interface of the nucleosome with biochemical and biophysical experiments.
- 04/01/2013-03/31/2016 **National Institutes of Health, R21 CA174583**
 “Nanoscale tools for functional studies of cancer-relevant chromatin modifications”
 Principle Investigator: Carlos Castro
 Goal: Develop DNA origami nanostructures for detect multiple histone post translational modifications within single nucleosomes.
- 09/01/2010-08/31/2014 **National Science Foundation**
 Proto-IRG Funding from The Center for Emergent Materials, an NSF funded Materials Research Science and Engineering Center,
 “Magnetic Resonance Studies of Chromatin Structure and Dynamics.”
 Principal Investigator: Michael G Poirier
 Goal: Determine chromatin material properties with magnetic resonance studies.

Completed

- 09/01/2005 - 08/31/2013 **Burroughs Wellcome Fund, Career Award in Basic Biomedical Research**
 “A study of DNA accessibility within nucleosome arrays.”
 Principal investigator: Michael G Poirier
 Goal: This award funds the person not a specific project.
- 01/01/2011-12/31/2013 **Ohio State University Pelotonia Fellowship**
 “A study of the molecular mechanism by which human Rad51 and MSH2/MSH6 clear their own path for DNA repair.”
 Principal Investigator: Michael G Poirier
 Goal: Provide Pre-doctoral training for Mr. Justin North, a second year graduate student working in my laboratory.
- 09/01/2010-08/31/2012 **National Science Foundation**
 Proto-IRG Funding from The Center for Emergent Materials, an NSF funded Materials Research Science and Engineering Center,
 “Magnetic Resonance Studies of Chromatin Structure and Dynamics.”
 Principal Investigator: Michael G Poirier
 Goal: Determine chromatin material properties with magnetic resonance studies.
- 07/01/2010-06/30/2012 **American Heart Association**

“A study of the influence of histone core post translational modifications on nucleosome positioning.”

Principal Investigator: Michael G Poirier

Goal: Provide Pre-doctoral training for Mr. Alex Mooney, a second year graduate student working in my laboratory.

02/01/2009-01/31/2011

National Science Foundation

Seed Funding from The Center for Emergent Materials, an NSF funded Materials Research Science and Engineering Center,

“Heterogeneous Magnetic Particles for Force and Torque Sensing: A New Approach for Single Molecule Biology.”

Principal Investigator: Michael G Poirier

Goal: Develop new magnetic nanoparticles for single molecule torque measurements.

07/01/2008-06/30/2010

American Heart Association

“A study of the molecular mechanisms by which histone modifications in the nucleosome dyad symmetry axis function.”

Principal Investigator: Michael G Poirier

Goal: Provide Pre-doctoral training for Mr. Justin North, a second year graduate student working in my laboratory.

Teaching

Summary: Taught 12 undergraduate level and 5 graduate level physics courses.

PHYS 6809 Introduction to Biophysics, Fall 2013

PHYS 1250 Mechanics, Thermal Physics and Waves, Fall 2012

PHYS 111 Mechanics and Heat, Fall 2007, Winter 2008, Fall 2010 (2 sections), Fall 2011 (2 sections), Winter 2012.

PHYS 780 Introduction to Biophysics, Spring 2008, Spring 2009, Spring 2010. Spring 2011.

PHYS 594/294 Introduction to Nanoscience, Winter 2008, Winter 2009, Winter 2010 Winter 2011.

Advised Personnel

Summary: Advised 9 graduate students, 1 postdoc, 1 research scientist and 13 undergraduate students

Graduate Students:

Marek Simon (Physics, 2006-2012), Presidential fellowship, postdoctoral fellow with Wolfgang Fischle, Max Planck Institute for Biophysical Chemistry.

Robert Forties (Physics, 2007-2011), NSF predoctoral fellowship, postdoctoral fellow with Michelle Wang, HHMI Investigator, Cornell University

Justin North (Physics, 2007-2012), AHA predoctoral fellowship, Pelatonia fellowship, postdoctoral fellow with Robert Tabita, Dept. of Microbiology, Ohio State University.

Thomas Haver (Biophysics, 2008-2009);

Alex Mooney (Physics, 2008-2012), AHA predoctoral fellowship, Software design leader at Epic, a healthcare software company based in Madison, Wisconsin

Morgan Welsh (Physics, 2009-present)

Yi Luo (Biophysics, 2010-present)

Omar Tabbaa (Physics, 2010-2011)
Matthew Brehove (2011-present)
Matthew Gibson (2012-present)

Undergraduate Students:

Joseph Wayman 2007 - 2008; graduate school at Cornell University
Jonathan Picking 2008 - 2010; graduate school at OSBP, The Ohio State University, awarded a Summer Undergraduate Research Fellowship.
Matthew Shoffner 2008 - 2011
Liana Bonano 2008 - 2009
Malcolm McCauley 2009 - 2010
Shayne Reichard 2009 - 2010
Malika Randeria 2009, summer
Megan Segbers 2010, summer; REU student, Xavier University
Aaron Burns 2009 – 2011; graduate school at OSBP, The Ohio State University
Sean Rose 2010-present
Amelia Heston 2010-2012
Gino Pace 2011-2012
Kimberly DiMauro 2011-2012
Andrew Slater 2012-2013
Alan Scott Hutchinson 2012-2013 academic year REU student, Columbus State Univ
Kingsley Nwokelo 2013-present, academic year REU student.
Jillian Zhang 2013-present
Gaurav Shastri 2013-present

Postdoctoral Researcher:

Paula Vivas (PhD, University of Illinois, Chicago) 2009 – 2013, Currently a postdoc in the Ohio State University Medical School.

Research Associate:

Robin Nakkula 2006 - 2010

Service and Professional Memberships

2002-present Reviewer: Biochemistry, Biophysical Journal, Chromosoma, Epigenetics & Chromatin, FEBS Letters, Journal of Molecular Biology, Nature Communications, Nucleic Acids Research, Physical Review E, Plos One, The Proceedings of the National Academy of Sciences, Science and Virology.
2006-present Faculty Member, Ohio State Biochemistry Program, the Ohio State University
2006-present Faculty Member, Biophysics Graduate Program, the Ohio State University
2006-present *Course Development:* Developed a new course on nano- and biotechnology to expose undergraduates in the colleges of biological sciences, physical sciences and engineering to new collaborative science. 2006-2009.
2007-present *Minority Outreach:* Hosted 5 minority physics undergraduate students and successfully recruited 1 minority student to become a graduate student in the Department of Physics at OSU. Helped develop an APS funded bridge program to help students from under represented groups successfully apply to graduate school in Physics and complete a PhD degree.
2007-present *International Meetings:* Chaired sessions at the American Physical Society March meeting and the American Chemical Society Annual Meeting.

2008	Reviewer for l'Agence Nationale de la Recherche
2009	Reviewer for NIH Challenge Grants
2011-present	Faculty Trainer, Cellular, Molecular and Biochemical Sciences Training Program, OSU
2011	Adhoc editor, PLOS Computational Biology
2011	Reviewer for MRC New Investigator Research Grants
2012-2016	External advisory board member for P01-GM088409
2012	Reviewer for NIH K99/R00
2013	Adhoc review for the NIH Pioneer Awards
2013	Adhoc member of NIH Study Section for ES12-006 (R21) and ES12-007(R01)
2013-2018	Editorial Board Member, Journal of Biological Chemistry
2014	Adhoc member of Molecular Genetics A NIH Study Section