Curriculum Vitae

Nicholas Dominick Koslap Petraco

Professor

City University of New York
John Jay College of Criminal Justice
Department of Sciences
524 West 59^{th} St., New York, NY, 10019
and
Faculty of Chemistry and Faculty of Criminal Justice
City University of New York Graduate Center

Electronic Mail: npetraco@{gmail.com, jjay.cuny.edu}
Web: `https://jjcweb.jjay.cuny.edu/npetraco/main.html`

Educational Background:

University of Waterloo
Faculty of Mathematics
Dept. of Applied Mathematics
Waterloo, Ontario, Canada

Post-doctoral Fellowship

September 2002 - August 2004

Post doctoral research under the direction of Prof. Josef Paldus involved the diagrammatic formulation of generalized Hilbert space multireference coupled cluster theory to compute physical properties for excited states of medium sized molecules. Also, a new Clifford algebra/Unitary group theoretical approach was developed for the evaluation of arbitrary spin-symmetry-adapted matrix elements arising in configuration interaction and coupled cluster quantum chemical computations.

University of Georgia
Center for Computational
Quantum Chemistry
Athens, Georgia

Ph.D. Theoretical Chemistry

July 1998 - May 2002

Graduate research under the direction of Prof. Henry F. Schaefer involved investigation of the intruder state problem in perturbation and coupled cluster theories of electronic structure, as well as the prediction of fragmentation pathways, hyperfine coupling constants and molecular properties of small and medium sized organic compounds using *ab initio* electronic structure theory.

Colgate University
Hamilton, New York

A.B. Chemistry

August 1994 - May 1998
(*Magna Cum Laude*)

Undergraduate research under the direction of Prof. John C. Cochran included the synthesis, characterization and theoretical analysis of organo-tin complexes.

Professional Experience:

Full Professor	Department of Sciences City University of New York John Jay College of Criminal Justice and Faculty of Chemistry The Graduate Center of CUNY New York, New York	August 2017 - Present

Currently teaching introduction to statistics for scientists, applied multivariate statistics and machine learning, applied Bayesian methods, physical chemistry I (statistical mechanics/equilibrium thermodynamics), physical chemistry II (quantum mechanics, theoretical spectroscopy and scientific computing), computational quantum chemistry and general introductory chemistry. Conducting research into the application of statistical pattern recognition to physical evidence in forensic science.

Associate Professor	Department of Sciences City University of New York John Jay College of Criminal Justice and Faculty of Chemistry The Graduate Center of CUNY New York, New York	January 2010 - August 2017
Assistant Professor	Department of Sciences City University of New York John Jay College of Criminal Justice and Faculty of Chemistry The Graduate Center of CUNY New York, New York	September 2004 - December 2009
Calculus 1 Instructor	Faculty of Mathematics Department of Applied Mathematics University of Waterloo Waterloo, Ontario, Canada	September 2003 - December 2003

Delivered lectures, graded and tutored introductory calculus for scientists and engineers.

Teaching Assistant	Center for Computational Quantum Chemistry and Department of Chemistry University of Georgia Athens, Georgia	January 2002 - April 2002

Graded and tutored graduate level advanced molecular quantum mechanics course. In addition, delivered course lectures pertaining to second quantization, diagrammatic techniques and non variational methods of electron correlation.

Summer Program Lecturer and Mentor	Center for Computational Quantum Chemistry University of Georgia Athens, Georgia	June 2000 - August 2002

Lectured on molecular quantum mechanics each summer to undergraduates and first-year graduate students. Topics included configuration interaction theory, second quantization, diagrammatic techniques, perturbation theory and coupled cluster theory. Served as mentor to students on applications oriented quantum chemistry research projects.

Teaching Assistant	Department of Chemistry University of Georgia Athens, Georgia	August 1998 - May 2000

Taught general chemistry laboratory sections, tutored general and organic chemistry students.

Summer Research Assistant	Department of Chemistry Colgate University Hamilton, New York	June 1996 - August 1996 and June 1997 - August 1997

Characterized the reaction between phenylacetylene and trialkyl substituted tin hydrides using both experimental and semi-empirical theoretical techniques.

Teaching Assistant	Department of Chemistry Colgate University Hamilton, New York	August 1995 - May 1997

Provided laboratory instruction for general and organic chemistry.

Grants:

Pfizer Pharmaceuticals Research Award
Title: *Pillistics*
Co-PI with T. A. Kubic and J. A. Reffner, John Jay
Project period: 2010-2012

National Institute of Justice
Title: *Interpretation of Ignitable Liquid Residues in Fire Debris Analysis: Effect of Competitive Adsoprtion, Development of an Expert System and Assessment of of the False Positive/Incorrect Assignment Rate*
Co-PI with J. G. Rankin, Marshall University
Project period: 2011-2013

National Institute of Justice

Title: *Application of Machine Learning to Toolmarks: Statistically Based Methods for Impression Pattern Comparisons*
PI Nicholas D. K. Petraco, John Jay
Project period: 2009-2012

PSC-CUNY Research Award
Title: *Further Quantum Chemical Computations on Molecules of Forensic Interest*

PSC-CUNY Research Award
Title: *Quantum Chemical Computations on Molecules of Forensic Interest*

RF-CUNY Start-up Award

Professional Societies and Committees:

1. American Academy of Forensic Sciences (AAFS)
2. AAFS Academy Standards Board (ASB), Consensus Body for Firearms and Toolmarks
3. Associate Editor, Journal of Forensic Sciences
4. National Institute of Standards and Technology (NIST) Organization for Scientific Area Committees (OSAC) for Physics and Pattern Evidence
    - Firearms/Toolmark Subcommittee
    - Firearms/Toolmark Subcommittee Task Group for Measurement Uncertainty
    - Firearms/Toolmark Subcommittee Task Group for Technology
5. Institute for Electronics and Electrical Engineers (IEEE)

Publications:

Book Chapters:

1. Nicholas Petraco and Nicholas D. K. Petraco, "Impression Evidence; Footwear and Toolmark Cases from the Crime Scene to the Court Room," In: Saferstein, *Forensic Science Handbook*, CRC Press, Boca Raton, FL; (2016).
2. Nicholas Petraco and Nicholas D. K. Petraco, "A Guide to the Analysis of Household Dust Specimens and their Statistical Significance," In: Saferstein, *Forensic Science Handbook*, CRC Press, Boca Raton, FL; (2016).
3. Nicholas D. K. Petraco, "How Statistical Pattern Comparison Methods can be Applied to Tool Marks," In: Nicholas Petraco, *Color Atlas of Forensic Tool Mark Identification*, CRC Press, Boca Raton; (2010).

Journal Articles:

1. James E. Hamby, David J. Brundage, Nicholas D. K. Petraco and James W. Thorpe, "A Worldwide Study of Bullets Fired From 10 Consecutively Rifled 9MM RUGER Pistol Barrels—Analysis of Examiner Error Rate," *J Forensic Sci* (**64** (2), 551-557 (2019)

2. John E. Murdock, Nicholas D. K. Petraco, John I. Thornton, Michael T. Neal, Todd J. Weller, Robert M. Thompson, James E. Hamby, and Eric R. Collins, "The Development and Application of Random Match Probabilities to Firearm and Toolmark Identification," *J Forensic Sci* **62** (3), 619-625 (2017)

3. Stephanie M. Pollut, Peter Diaczuk, Carol J. Gambino, Nicholas D. K. Petraco, "Environmental Effects on Cartridge Case Primer Shear Impressions" *Forensic Science Journal* **15** (1), 9-18 (2016). Online: `http://fsjournal.cpu.edu.tw/content/vol15.no.1/FSJv15_2.pdf`

4. Martin Baiker, Nicholas D. K. Petraco, Carol Gambino, Rene Pieterman, Peter Shenkin and Peter Zoon, "Virtual and Simulated Striated Toolmarks for Forensic Applications" *Forensic Science International* **261**, 43-52 (2016)

5. James E. Hamby, Stephen Norris and Nicholas D. K. Petraco, "The Examination, Evaluation and Identification of Fired 9mm Cartridge Cases Fired from 1,632 Different GLOCK 9mm Semiautomatic Pistols Manufactured Over a 21 Year Period Using Optical Comparison Microscopy and IBIS Pattern Recognition," *J Forensic Sci* **61** (1), 170-176 (2016)

6. Theodore V. Vorburger, Jun-Feng Song and Nicholas D. K. Petraco, "Topography Measurements and Applications in Ballistics and Tool Mark Identifications," *Surface Topography: Metrology and Properties* **4** (1), 1-35 (2016). Online: `https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4864997/pdf/nihms774377.pdf`

7. Nicholas D. K. Petraco, Loretta Kuo, Helen Chan, Elizabeth Phelps, Carol Gambino, Patrick McLaughlin, Frani Kammerman, Peter Diaczuk, Peter Shenkin, Nicholas Petraco and James Hamby, "Estimates of Striation Pattern Identification Error Rates by Algorithmic Methods," *AFTE J.* **45** (3), 235 (2013)

8. Jeremy Monkres, Christopher Luckie, Nicholas D. K. Petraco, Allison Milam, "Comparison and Statistical Analysis of Land Impressions from Consecutively Rifled Barrels," *AFTE J.* **45** (1), 3 (2013)

9. Nazia Mahmood, Nicholas Petraco, Yi He, " Determination of Elemental fingerprints of beer samples using inductively coupled plasma – mass spectrometry (ICP-MS): Statistical analysis and potential application to forensic sample comparison," *Anal. Bioanal. Chem.* **402**(2), 861 (2012)

10. Nicholas D. K. Petraco, Peter Shenkin, Jacqueline Speir, Peter Diaczuk, Peter A. Pizzola, and Nicholas Petraco, "Addressing the National Academy of Sciences Challenge for Toolmarks: A Method for Statistical Pattern Comparison of Striated Toolmarks", *J. Forensic Sci.* **57**(4), 900 (2012)

11. Carol Gambino, Patrick McLaughlin, Loretta Kuo, Frani Kammerman, Peter Shenkin, Peter Diaczuk, Nicholas Petraco, James Hamby and Nicholas D. K. Petraco, "Forensic Surface Metrology: Tool Mark Evidence", *Scanning* **33**(1-7), 272 (2011)

12. Nicholas D. K. Petraco, Carol Gambino, Thomas A. Kubic, Dayhana Olivo and Nicholas Petraco, "Statistical Discrimination of Footwear: A method for the comparison of accidentals on shoe outsoles inspired by facial recognition techniques," *J. Forensic Sci.* **54**(2),353 (2010)

13. Nicholas Petraco, Nicholas D. K. Petraco, Lisa Faber, and Peter A. Pizzola, "Preparation of Tool Mark Standards with Jewelry Modeling Waxes," *J. Forensic Sci.* **54**(2),353 (2009)

14. Nicholas Petraco, Thomas A. Kubic and Nicholas D. K. Petraco, "Case Studies in Forensic Soil Examinations," *Forensic Sci. International* **178**(2-3), 23 (2008)

15. Nicholas D. K. Petraco, Mark Gil, Peter A. Pizzola and Thomas A. Kubic, "Statistical Discrimination of Several Gasoline Samples From Casework," *J. Forensic Sci.* **53**(5), 1092 (2008)

16. Danielle Sapse and Nicholas D. Petraco, "Substituted ninhydrin and Ruhemann's Purple derivatives. Reaction energetics and comments on consequences for the law," J. Mol. Modeling **13**, 943 (2007)

17. Christopher Yung-Fou Chen, Nicholas D. K. Petraco, Christopher J. Barden and Jeffrey Cheng-Lung Lee, "An Electron Correlated Examination of the Reactivity of Fingerprint Reagent Ninhydrin" *Proceedings of the Taiwanese Academy of Forensic Science* (2007)

18. Nicholas D. Petraco, "Easy Spin-Symmetry-Adaptation. Exploiting the Clifford Algebra Unitary Group. Derivation of Working Equations for Arbitrary Time-Independent Spin-Adapted Matrix Elements," *Proceedings of the* 26^{th} *International Colloquium on Group Theoretical Methods in Physics* (2007)

19. Nicholas D. Petraco, Gloria Proni, Jennifer J. Jackiw and Anne-Marie Sapse, "Amino acid alanine reactivity with the fingerprint reagent ninhydrin. A detailed ab-initio computational study," *J. Forensic Sci.* **51**, 1267 (2006)

20. Nicholas Petraco, Nicholas D. Petraco, Peter A. Pizzola, "An Ideal Material for the Preparation of Known Toolmark Test Impressions," *J. Forensic Sci.* **50**, 1407 (2005).

21. Josef Paldus, Xiangzhu Li and Nicholas D. K. Petraco, "General-Model-Space State-Universal Coupled Cluster Method: Diagrammatic Approach," *J. Math. Chem.* **35**, 215 (2004).

22. Ľuboš Horný, Nicholas D. K. Petraco and Henry F. Schaefer III, "Odd carbon long linear chains $HC_{2n+1}H$ (n=4-11): Properties of the neutrals and radical anions," *J. Am. Chem. Soc.* **124**, 14716 (2002).

23. Nicholas D. K. Petraco, Ľuboš Horný, Henry F. Schaefer III and Ivan Hubač, "Brillouin-Wigner Coupled Cluster Theory: Fock-Space Approach," *J. Chem. Phys.* **117**, 9580 (2002).

24. John C. Cochran, V. Prindle, H. A. Young, M. H. Kumar, S. Tom, Nicholas D. K. Petraco, C. Mohoro and B. Kelley, "Alkyl- and acyl-substituted vinylstannanes: Synthesis and reactivity in electrophilic substitution reactions," *Syn. React. Inorg. Met.* **32**, 885 (2002).

25. Nicholas D. K. Petraco, Wesley D. Allen and Henry F. Schaefer III, "The Fragmentation Path for Hydrogen Dissociation from Methoxy Radical," *J. Chem. Phys.* **116**, 10229 (2002).

26. Ľuboš Horný, Nicholas D. K. Petraco, Chaeho Pak and Henry F. Schaefer III, "What is the Nature of Polyacetylene Neutral and Anionic Chains $HC_{2n}H$ and $HC_{2n}H^-$ that have recently been observed?" *J. Am. Chem. Soc.* **124**, 5861 (2002).

27. Shawn T. Brown, Nicholas D. K. Petraco, Yukio Yamaguchi, and Henry F. Schaefer III, "$\tilde{X}\ ^3\Sigma^-$ and $\tilde{A}\ ^3\Pi$ Electronic States of Disilaketenylidene (SiSiO): Analysis of the Renner

Effect. Comparison with the Analogous Multiple Bonded Systems SiCO, CSiO, and CCO," *Polyhedron* **21**, 599 (2002).

28. Nicholas D. K. Petraco, David A. Modarelli and John C. Cochran, "The Structure of the Intermediate Radical in the Hydrostannation of Phenylacetylene," *Syn. React. Inorg. Met.* **31**, 757 (2001).

29. Yukio Yamaguchi, Shawn T. Brown, Nicholas D. K. Petraco and Henry F. Schaefer III, "The 2-Silaketenyl Radical (HCSiO): Ground and First Excited Electronic States," *J. Mol. Struct.* **556**, 293 (2000).

30. Nicholas D. K. Petraco, Shawn T. Brown, Yukio Yamaguchi and Henry F. Schaefer III, "The 2-Silaketenylidene (CSiO) Radical: Electronic Structure of the $\tilde{X}\ ^3\Sigma^-$ and $\tilde{A}\ ^3\Pi$ States," *J. Phys. Chem. A* **104**, 10165 (2000).

31. Nicholas D. K. Petraco, Steven S. Wesolowski, Matthew L. Leininger and Henry F. Schaefer III, "Coupled-Cluster Studies of the Hyperfine Splitting Constants of the Thioformyl Radical," *J. Chem. Phys.* **112**, 6245 (2000).

32. Nicholas D. K. Petraco, Shawn T. Brown, Yukio Yamaguchi and Henry F. Schaefer III, "The Silaketenylidene (SiCO) Molecule: Characterization of the $\tilde{X}\ ^3\Sigma^-$ and $\tilde{A}\ ^3\Pi$ States," *J. Chem. Phys.* **112**, 3201 (2000).

33. Yukio Yamaguchi, Nicholas D. K. Petraco, Shawn T. Brown, and Henry F. Schaefer III, "The 1-Silaketenyl Radical (HSiCO): Ground and First Excited Electronic States," *J. Chem. Phys.* **112**, 2168 (2000).

Workshop Presentations:

1. "Statistical Things You Can Do With Toolmarks: What's in the Future and What You Can Say Today". Association of Firearms and Toolmark Examiners Annual Training Seminar, Charleston WV, June 3, 2018.
2. "Statistical Things You Can Do With Toolmarks: What's in the Future and What You Can Say Today". National Institute of Standards and Technology (NIST), NFEA 2018, Gaithersburg, May 17, 2018.
3. "Statistical Things You Can Do With Toolmarks". Association of Firearms and Toolmark Examiners Annual Training Seminar, Denver, May 14, 2017.
4. "Workshop on Current Firearms and Toolmark Research: Confocal, Interferometric, Focus Variation 3D Microscopies and Statistical Pattern Recognition". California Criminalistics Institute, Firearms and Toolmark Academy, Sacramento, March 20, 2014.
5. "How good a match it is? How to compute testable measures of confidence, credibility and weight of evidence for your Geometric-Morphometric based I.D. systems ". American Academy of Forensic Sciences Annual Meeting, Seattle, February 11, 2014.
6. "Introduction to Chemometrics with R for Forensic Scientists". University of New Haven, Henry C. Lee College of Criminal Justice and Forensic Sciences, November 3, 2012.

7. "The Use of R and Multivariate Statistical Techniques for Surface Metrology". 2^{nd} Seminar on Surface Metrology for the Americas, Worcester Massachusetts, October 15, 2012.

8. "Statistical Analysis of Forensic Data using R". Marshall University, Forensic Science Center, January 13, 2012.

9. "Computational Strategies for Tool Marks: Statistical Pattern Recognition for Tool Marks on Metal with Extensions to Bone". American Academy of Forensic Sciences Annual Meeting, Atlanta, February 21, 2012.

10. "Application of Multivariate Statistical Analysis to Surface Metrology: Pattern Recognition for Forensic Firearms and Tool Mark Analysis". Seminar on Surface Metrology for the Americas, Worcester Massachusetts, October 25, 2011.

11. "Concepts of Statistical Inference and Quantitative Pattern Recognition". Scientific Working Group for Shoeprint and Tire Tread Evidence (SWGTREAD), General Meeting, Fredericksburg Virginia, September 26, 2011.

12. "Basic Statistical Concepts for Questioned Document Examiners". American Society For Questioned Document Examiners, Annual General Meeting, Philadelphia, August 23, 2011.

13. "Multivariate Analysis for Forensic Scientists: Statistical Pattern Recognition for Physical Evidence Analysis and Chemometrics". National Institute of Justice Workshop, Allentown Pennsylvania, June 15-18, 2010.

Scientific Presentations:

1. Lecture (*Invited*): "Approaches to Physical Evidence Research In the Forensic Sciences". National Commission on Forensic Science, Washington D.C., January 10, 2017.

2. Lecture (*Invited*): "Assessment of Forensic Data with Confidence and Credibility: Focus on the Needs of the Law Enforcement and Intelligence Communities". Department of Homeland Security, Science and Technology Directorate, Washington D.C., June 30, 2016.

3. Lecture: "How good a match is it? Prototype Software To Render Quantitative CMS Statements". Association of Firearms and Toolmark Examiners Annual Training Seminar, New Orleans, May 31 , 2016.

4. Lecture (*Invited*): "Quantitative Firearms and Toolmark Analysis: New Developments and Software". National Institute of Standards and Technology (NIST) International Biometric Performance Conference: Technical Colloquium on Quantifying the Weight of Evidence, Gaithersberg, Maryland, May 6, 2016.

5. Lecture (*Invited*): "Quantitative Forensic Tool Mark Analysis". Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, North Carolina, March 2, 2016.

6. Lecture (*Invited*): "Advanced Pattern Recognition Applied to Forensic Evidence: Frequentist and Bayesian Measures of Association". FACSS: SciX, Providence, Rhode Island, September 29, 2015.

7. Lecture (*Invited*): "Current Research in Forensic Toolmark Analysis". Federal Bureau of Investigation Laboratory, Quantico, Virginia, April 30, 2015.

8. Lecture (*Invited*): "Application of Statistical Pattern Recognition to Materials and Trace Evidence Analysis". Department of Materials Science and Engineering, Rutgers University School of Engineering, Piscataway, New Jersey, April 14, 2015.

9. Lecture (*Invited*): "Quantitative Provenance. Using Bayesian Networks to Help Quantify the Weight of Evidence In Fine Arts Investigations: A Case Study: Red Black and Silver". South Hampton Arts Center, Authentication in Art Panel: The Last Jackson Pollock: Solving the Mystery, South Hampton, New York, July 24, 2014.

10. Lecture (*Invited*): "Current Research in Forensic Toolmark Analysis: Helping to satisfy the "new" needs of forensic scientists with state of the art microscopy, computation and statistics". American Bar Association, Criminal Justice Section: Fifth Annual Prescription for Criminal Justice Forensics, New York, June 6, 2014.

11. Lecture: "Error Rates and Random Match Probabilities (RMP) Based on the RUGER 10-Barrel Test and the GLOCK Cartridge Case Tests". Association of Firearms and Toolmark Examiners Annual Training Seminar, Seattle, May 14, 2014.

12. Lecture: (*Keynote*) "Forensic Toolmark Analysis Via Machine Learning: An Overview". European Academy of Forensic Sciences Annual Meeting, The Hague, August 22, 2012.

13. Lecture: "Semi-Automated Open Source 3D Tool Mark Visualization and Identification System". National Institute of Justice Pattern and Impression Evidence Symposium, Clearwater, Florida, August 8, 2012.

14. Poster: "The Application of Empirical Bayes Methods to the Identification of Toolmarks". National Institute of Justice Pattern and Impression Evidence Symposium, Clearwater, Florida, August 8, 2012.

15. Lecture: (*Invited*) "Computational Strategies for Toolmarks: Principal Component Analysis and Other Methods". National Institute of Standards and Technology (NIST), Measurement Science & Standards in Forensic Firearms Analysis, Gaithersburg, July 12, 2012.

16. Poster: "Environmental Effects on Fired Cartridge Cases Primer Shear". Association of Firearms and Toolmark Examiners Annual Training Seminar, Buffalo, June 24, 2012.

17. Lecture: "Confocal Microscopy and Striated Tool Marks: A Statistical Study and Potential Software Tools For Practitioners ". Association of Firearms and Toolmark Examiners Annual Training Seminar, Chicago, May 19, 2011.

18. Lecture: "Did Colonel Mustard Really Kill Miss Scarlet in the Library with the Lead Pipe? Identifying Clues Through NIJ Research". American Academy of Forensic Sciences Annual Meeting, Washington D.C., February 22, 2011.

19. Lecture: "Computational Pattern Recognition of Striation Patterns: Fired Cartridge Cases and Chisel Striation Patterns". American Academy of Forensic Sciences Annual Meeting, Washington D.C., February 22, 2011.

20. Lecture: "Forensic Surface Metrology, Firearms and Tool Mark Evidence". International Conference on Surface Metrology, Worcester Polytechnical Institute, Worcester, M.A., October 25. 2010.

21. Lecture: "Application of Chemometrics and Advanced Pattern Recognition to Trace Evidence Analysis". FACSS, Rayleigh, N.C., October 19. 2010.

22. Lecture: "Application of Advanced Computational Pattern Recognition to Trace Evidence Analysis". Hofstra University, Department of Chemistry, New York, October 13. 2010.

23. Lecture: "Confocal Microscopy and Tool Mark Analysis: Pushing Out the Frontiers of Forensic Science". Olympus Tech Tour, New York, September 21. 2010.

24. Lecture: "Addressing the National Academy of Sciences' Challenge: Methods for Statistical Pattern Comparison of Striated Tool Marks". National Institute of Justice Pattern and Impression Evidence Symposium, Clearwater, Florida, August, 2. 2010.

25. Poster: "The Statistical Significance of the Aggregate Trace Evidence found in Household Dust Specimens". National Institute of Justice Trace Evidence Symposium, Clearwater, Florida, August, 3. 2009.

26. Lecture: "Statistical Pattern Comparisons of Striated Tool Marks: Defending Against Daubert and Frye Challenges". American Academy of Forensic Sciences Annual Meeting, Denver, February 19, 2009.

27. Lecture: "The Synergy Between Criminalistics, Chemistry, and Mathematics". Department of Forensic Science, Pennsylvania State University, State College , Pennsylvania, January 21, 2009.

28. Lecture: "Efforts to Meet the Daubert Challenge: Statistical Discrimination of Liquid Gasoline Samples from Casework". Faculty of Chemistry, City University of New York, New York, New York, October 29, 2008.

29. Lecture: "Addressing Daubert and Frye: Statistical Pattern Recognition of Physical Evidence". Department of Chemistry and Physical Sciences, Cedar Crest College, Allentown, Pennsylvania, October 16, 2008.

30. Poster: "Time Series Forecasting of Footwear Accidental Patterns". Mid-Western Association of Forensic Scientists Annual Meeting, October 6, 2008.

31. Lecture: "Towards Surpassing the Daubert Standard: A Method for Statistical Pattern Recognition of Screwdriver Striation Marks". North Eastern Association of Forensic Scientists 34^{th} Annual Meeting, White Plains, New York, October 4, 2008.

32. Lecture: "Addressing Daubert and Frye: Statistical Approaches to Toolmark Analysis". North Eastern Association of Forensic Scientists 34^{th} Annual Meeting, White Plains, New York, October 1, 2008.

33. Lecture: "Fingerprinting of Gasoline using Gas Chromatography and Statistical Pattern Recognition". Mid-Atlantic Regional Meeting (MARM) of the American Chemical Society, Queens, N.Y., May 18, 2008.

34. Lecture: "Statistical Discrimination of Gasoline Samples From Casework". American Academy of Forensic Sciences Annual Meeting, Washington D. C., February 18, 2008.

35. Poster: "Statistical Discrimination of Footwear: A method for the comparison of accidentals on shoe outsoles inspired by facial recognition techniques". North Eastern Association of Forensic Scientists 33^{rd} Annual Meeting, Bolton Landing, New York, October 31, 2007.

36. Lecture: "Algebraic Symmetries in Quantum Chemistry: Clifford Algebra and Para-Fermi Algebra in Correlated Many-Electron Theories". Department of Chemistry, Queens College, New York, New York, March 26, 2007.

37. Lecture: "An Electron Correlated Examination of the Reactivity of Fingerprint Reagent Ninhydrin," 2006 National Meeting of the Taiwanese Academy of Forensic Science, Taipei, Taiwan, November 10, 2006.

38. Lecture: "What Quantum Chemistry Can Do for Forensic Science," Department of Chemistry, Brooklyn College, New York, New York, September 1, 2006.

39. Lecture: "Easy Spin-Symmetry-Adaptation. Exploiting the Clifford Algebra Unitary Group. Derivation of Working Equations for Arbitrary Time-Independent Spin-Adapted Matrix Elements," 26th International Colloquium on Group Theoretical Methods in Physics, New York, New York, June 29 2006.

40. Lecture: "Amino acid alanine reactivity with the fingerprint reagent ninhydrin. A detailed ab-initio computational study," University of Rouen, Rouen, France, June 26 2006.

41. Poster: "Brillouin-Wigner Coupled Cluster Theory: Fock-Space Approach," 6th Triennial Meeting of the World Association of Theoretically Oriented Chemists, Locarno, Switzerland, August 2 2002.

42. Lecture: "The Fragmentation Path for Hydrogen Dissociation from Methoxy Radical," University of Waterloo, Waterloo, Canada, December 14 2001.

43. Poster: "The Fragmentation Path for Hydrogen Dissociation from Methoxy Radical," Molecular Quantum Mechanics: The Right Answer for the Right Reason, An International Conference in Honor of Ernest R. Davidson, University of Washington, Seattle, Washington, July 22 2001.

44. Poster: "The 2-Silaketenylidene (CSiO) Radical: Electronic Structure of the $\tilde{X}\ ^3\Sigma^-$ and $\tilde{A}\ ^3\Pi$ States," 29th Southeastern Theoretical Chemistry Association Conference, University of Georgia, Athens, Georgia, May 20 2000.

45. Poster: "The Silaketenylidene (SiCO) Molecule: Characterization of the $\tilde{X}\ ^3\Sigma^-$ and $\tilde{A}\ ^3\Pi$ States," 5th Triennial Meeting of the World Association of Theoretically Oriented Chemists, Imperial College, London, England, August 2 1999.

46. Poster: "Coupled-Cluster Studies of the Hyperfine Splitting Constants of the Thioformyl Radical," 28th Southeastern Theoretical Chemistry Association Conference, University of Memphis, Memphis, Tennessee, April 22 1999.

Scientific Conference Sessions Organized:

1. National Institute of Justice Patten and Impression Evidence Symposium 2012, Organizing Committee.

2. National Institute of Justice Patten and Impression Evidence Symposium 2010, Organizing Committee.

3. Eastern Analytical Symposium 2009, Chemometrics and Pattern Recognition in Forensic Science Session.

4. North Eastern Association of Forensic Scientists (NEAFS) 35^{th} Annual Meeting 2009, Criminalistics Session.