

**Thomas Mehen**

Box 90305, Duke University  
Durham NC 27708-0305

Phone: (919) 660-2555

Fax: (919) 660-2525

Email: mehen@phy.duke.edu

**EDUCATION**

---

**M.A., Ph.D. Physics** (1998) Johns Hopkins University, Baltimore, MD  
Thesis: Phenomenology of Heavy Quarks and Quarkonium  
Advisor: Adam Falk

**B.S. Physics** (1992) University of Virginia, Charlottesville, VA

**EMPLOYMENT**

---

2016-present	Professor	Department of Physics Duke University, Durham, NC
2009-2016	Associate Professor	Department of Physics Duke University, Durham, NC
2002-2008	Assistant Professor	Department of Physics Duke University, Durham, NC
2000-2001	Research Associate	Department of Physics The Ohio State University, Columbus, OH
1997-2000	Research Associate	Division of Mathematics, Physics and Astronomy California Institute of Technology, Pasadena CA

**AWARDS**

---

Outstanding Junior Investigator Award, Department of Energy, Nuclear Physics (2005)  
University Postdoctoral Fellow, The Ohio State University (2000)  
John A. McCone Postdoctoral Scholar, California Institute of Technology (1997-2000)

## TEACHING

---

2017	Instructor, “Advanced Quantum Field Theory”
2017	Instructor, “Electrodynamics ”
2016	Instructor, “Quantum Field Theory”
2015	Instructor, “General Physics I (DKU)”
2015	Instructor, “Quantum Mechancis II”
2014	Instructor, “Mathematical Methods of Physics”
2014	Instructor, “Mathematical Methods of Physics”
2013	Instructor, “Mathematical Methods of Physics”
2013	Instructor, “Quantum Mechancis II”
2009-2012	Instructor, “General Physics”
2009	Instructor, “Advanced Quantum Field Theory”
2008	Instructor, “Effective Field Theory and the Strong Interactions”
2007-2010	Instructor, “Electricity and Magnetism”
2005-2006	Instructor, “Advanced Quantum Mechanics”
2004	Instructor, “Quantum Field Theory I”
2002-2004	Instructor, “Fundamentals of Quantum Mechanics”
1992-1997	Teaching Assistant for Undergraduate Courses, Johns Hopkins U. (Introductory Physics, Quantum Mechanics, Special Relativity and Waves)

## GRADUATE STUDENTS AND POSTDOCTORAL ADVISEES

---

### Past Advisees

#### *Postdoctoral:*

Carlos Schat	Research Faculty, TANDAR Lab.-CNEA, Buenos Aires, Argentina
Brian Tiburzi	Assistant Professor, City College of New York, New York, NY
Chul Kim	Assistant Professor, Seoul National University of Science and Technology, Seoul, Korea
Ahmad Idilbi	Research Assistant Professor, Wayne State University, Detroit, MI
Andriy Badin	Software Developer, Autodesk, Detroit, MI
Jared Vanasse	Postdoc, Ohio University, Athens, OH

#### *Graduate Students:*

Jie Hu	Assistant Professor, Capital Normal University, Beijing, China
Josh Powell	Machine Learning Software Engineer, IBM, Denver, CO
Di-Lun Yang	Postdoc, Nishina CENTER, RIKEN, Wako, Saitama, Japan
Reggie Bain	Instructional Assistant Professor, U. of Houston, Houston, TX
Yiannis Makris	Postdoc, Los Alamos National Laboratory, Los Alamos, NM

### Current Advisees

*Graduate students:* Xiaojun Yao

## PUBLISHED ARTICLES

---

1. “Transverse Vetoes with Rapidity Cutoff in SCET”, A. Horning, D. Kang, Y. Makris, T. Mehen, JHEP 1712 (2017) 43.
2. “Implications of Heavy Quark-Diquark Symmetry for Excited Doubly Heavy Baryons and Tetraquarks”, Phys. Rev. D **96** (2017) no. 9, 094028.
3. “NRQCD Confronts LHCb Data on Quarkonium Production within Jets”, R. Bain, L. Dai, A. K. Leibovich, Y. Makris, T. Mehen, Phys. Rev. Lett. **119** (2017) no.3, 032002.
4. “Transverse Momentum Dependent Fragmenting Jet Functions with Applications to Quarkonium Production”, JHEP 1611 (2016) 144.
5. “Dynamical screening of  $\alpha$ - $\alpha$  resonant scattering and thermal nuclear scattering rate in a plasma”, X. Yao, T. Mehen, B. Müller, Phys. Rev. D **95** (2017) no.11, 116002.
6. “Analytic and Monte Carlo Studies of Jets with Heavy Mesons and Quarkonia”, R. Bain, L. Dai, A. Hornig, A. K. Leibovich, Y. Makris, T. Mehen, JHEP 1606 (2016) 121.
7. “An Effective Field Theory Approach to the Stabilization of  $^8\text{Be}$  in a QED Plasma”, X. Yao, T. Mehen, B. Müller, J. Phys. G **43** (2016) no. 7, 07LT02.
8. “Jet Shapes in Dijet Events at the LHC in SCET”, A. Horning, Y. Makris, T. Mehen, JHEP 1604 (2016) 097.
9. “Hadronic Loops versus Factorization in EFT calculations of  $X(3872) \rightarrow \chi_{cJ}\pi^0$ ”, T. Mehen, Phys. Rev. D **92** (2015) 034019.
10. “Probing Quarkonium Production Mechanisms with Jet Substructure”, M. Baumgart, A. L. Leibovich, T. Mehen, and I. Z. Rothstein, JHEP **1411** (2014) 003.
11. “Production of Stoponium at the LHC”, C. Kim, A. Idilbi, T. Mehen, and Y.-W. Yoon, Phys. Rev. D **89** (2014) 075010.
12. “Line shapes in  $\Upsilon(5S) \rightarrow B^{(*)}\bar{B}^{(*)}\pi$  with  $Z(10610)$  and  $Z(10650)$  using effective field theory”, T. Mehen and J. W. Powell, Phys. Rev. D **88** (2013) 034017.
13. “Anomalous Dimensions of the Double Parton Fragmentation Functions”, S. Fleming, A. K. Leibovich, T. Mehen, and I. Z. Rothstein, Phys. Rev. D **87** (2013) 074022.
14. “The Systematics of Quarkonium Production at the LHC and Double Parton Fragmentation”, S. Fleming, A. K. Leibovich, T. Mehen, and I. Z. Rothstein, Phys. Rev. D **86** (2012) 094012.
15. “On the Role of Charmed Meson Loops in Charmonium Decays”, T. Mehen and D.-L. Yang, Phys. Rev. D **85** (2012) 014002.
16. “The Decay of  $X(3872)$  into  $\chi_{cJ}$  and the Operator Product Expansion in XEFT”, S. Fleming and T. Mehen, Phys. Rev. D **85** (2012) 014016.

17. “Heavy Quark Symmetry Predictions for Weakly Bound B-Meson Molecules”, T. Mehen and J. W. Powell, Phys. Rev. D **84** (2011) 114013.
18. “Radiative Decays  $X(3872) \rightarrow \psi(2S)\gamma$  and  $\psi(4040) \rightarrow X(3872)\gamma$  in Effective Field Theory”, T. Mehen and R. P. Springer, Phys. Rev. D **83** (2011) 094009.
19. “Pair Production of Color-Octet Scalars at the LHC”, A. Idilbi, C. Kim, and T. Mehen, Phys. Rev. D **82** (2010) 075017.
20. “Scattering of an Ultrasoft Pion and the  $X(3872)$ ”, E. Braaten, H.-W. Hammer, and T. Mehen, Phys. Rev. D **82** (2010) 034018.
21. “Factorization and Resummation for Single Color-Octet Scalar Production at the LHC”, A. Idilbi, C. Kim, and T. Mehen, Phys. Rev. D **79** (2009) 114016.
22. “Color Octet Bound States at the LHC”, C. Kim and T. Mehen, Phys. Rev. D **79** (2009) 035011.
23. “Hadronic Decays of the  $X(3872)$  to  $\chi_{cJ}$  in Effective Field Theory”, S. Fleming and T. Mehen, Phys. Rev. D **78** (2008) 094019.
24. “Nonperturbative Charming Penguin Contributions to Isospin Asymmetries in Radiative B Decays”, C. Kim, A. K. Leibovich, and T. Mehen, Phys. Rev. D **78** (2008) 054024.
25. “Non-Relativistic Conformal Field Theory and Trapped Atoms: Virial theorems and the State-Operator Correspondence in Three Dimensions”, T. Mehen, Phys. Rev. A. **78** (2008) 013614.
26. “Equivalence of soft and zero-bin subtractions at two loops”, A. Idilbi and T. Mehen, Phys. Rev. D **76**, 094015 (2007).
27. “Pion Interactions in the  $X(3872)$ ”, S. Fleming, M. Kusunoki, T. Mehen, and U. van Kolck, Phys. Rev. D **76**, 034006 (2007).
28. “On the equivalence of soft and zero-bin subtractions”, A. Idilbi and T. Mehen, Phys. Rev. D **75**, 114017 (2007).
29. “Doubly Heavy Baryons and Quark-Diquark Symmetry in Quenched and Partially Quenched Chiral Perturbation Theory”, T. Mehen and B. C. Tiburzi, Phys. Rev. D **74**, 054505 (2006).
30. “Resummation of Large Endpoint Corrections to Color-Octet  $J/\psi$  Photoproduction”, S. Fleming, A. Leibovich and T. Mehen, Phys. Rev. D **74**, 114004 (2006).
31. “Chiral Lagrangian with Heavy Quark-Diquark Symmetry”, J. Hu and T. Mehen, Phys. Rev. D **73**, 054003 (2006).
32. “Doubly Heavy Baryons, Heavy Quark-Diquark Symmetry and NRQCD”, S. Fleming and T. Mehen, Phys. Rev. D **73**, 034502 (2006).
33. “Quarks with Twisted Boundary Conditions in the  $\epsilon$ -Regime”, T. Mehen and B. C. Tiburzi, Phys. Rev. D **72** (2005).

34. “Even- and odd-parity charmed meson masses in heavy hadron chiral perturbation theory,” T. Mehen and R. P. Springer, Phys. Rev. D **72**, 034006 (2005).
35. “Heavy-Quark Symmetry and the Electromagnetic Decays of Excited Charmed Strange Mesons”, T. Mehen and R. P. Springer, Phys. Rev. D **70**, 074014 (2004).
36. “Determining Pentaquark Quantum Numbers from Strong Decays”, T. Mehen and C. Schat, Phys. Lett. B **588**, 67 (2004).
37. “Resumming the Color Octet Contribution to  $e^+e^- \rightarrow J/\psi + X$ ”, S. Fleming, A. Leibovich and T. Mehen, Phys. Rev. D **68**, 094011 (2003).
38. “ $\Lambda_c^+/\Lambda_c^-$  Asymmetry in Hadroproduction from Heavy-Quark Recombination”, E. Braaten, M. Kusunoki, Yu Jia and T. Mehen, Phys. Rev. D **70**, 054021 (2004).
39. “Isospin Violation in  $e^+e^- \rightarrow B\bar{B}$ ”, R. Kaiser, A. V. Manohar and T. Mehen, Phys. Rev. Lett. **90**, 142001 (2003).
40. “Gauge Fields and Scalars in Rolling Tachyon Backgrounds”, T. Mehen and B. Wecht, J. High Energy Phys. **02**, 058 (2003).
41. “The Leading Particle Effect From Heavy-Quark Recombination”, E. Braaten, Yu Jia and T. Mehen, Phys. Rev. Lett. **89**, 122002 (2002).
42. “Reparametrization Invariance for Collinear Operators”, A. V. Manohar, T. Mehen, D. Pirjol and I. W. Stewart, Phys. Lett. B **539**, 59 (2002).
43. “Charm Anti-Charm Asymmetries in Photoproduction from Heavy-Quark Recombination”, E. Braaten, Yu Jia and T. Mehen, Phys. Rev. D **66**, 014003 (2002).
44. “B Production Asymmetries in Perturbative QCD”, E. Braaten, Yu Jia and T. Mehen, Phys. Rev. D **66**, 034003 (2002).
45. “Dilute Bose-Einstein Condensates with Large Scattering Lengths”, E. Braaten, H.-W. Hammer and T. Mehen, Phys. Rev. Lett. **88**, 040401 (2002).
46. “Range Corrections to Doublet S-Wave Neutron-Deuteron Scattering”, H.W. Hammer and T. Mehen, Phys. Lett. B **516**, 353 (2001).
47. “A Renormalized Equation for the Three-Body System with Short-Range Interactions”, H.W. Hammer and T. Mehen, Nucl. Phys. **A690**, 535 (2001).
48. “Generalized \*-Products, Wilson Lines and the Solution of the Seiberg-Witten Equations”, T. Mehen and M. B. Wise, J. High Energy Phys. **12**, 008 (2000).
49. “On Theories with Lightlike Noncommutativity”, O. Aharony, J. Gomis and T. Mehen, J. High Energy Phys. **09**, 023 (2000).
50. “Quantum Field Theories with Compact Noncommutative Extra Dimensions”, J. Gomis, T. Mehen and M. B. Wise, J. High Energy Phys. **08**, 029 (2000).
51. “Space-Time Noncommutative Field Theories and Unitarity”, J. Gomis and T. Mehen, Nucl. Phys. **B591**, 265 (2000).

52. “Noncommutative Gauge Dynamics from the String World Sheet”, J. Gomis, M. Kleban, T. Mehen, M. Rangamani and S. Shenker, *J. High Energy Phys.* **08**, 011 (2000).
53. “NNLO Corrections to Nucleon-Nucleon Scattering and Perturbative Pions”, S. Fleming, T. Mehen and I. W. Stewart, *Nucl. Phys.* **A677**, 313 (2000).
54. “Conformal Invariance for Non-Relativistic Field Theory”, T. Mehen, I. W. Stewart and M.B. Wise, *Phys. Lett. B* **474**, 145 (2000).
55. “The NN Scattering  ${}^3S_1 - {}^3D_1$  Mixing Angle at NNLO”, S. Fleming, T. Mehen and I. W. Stewart, *Phys. Rev. C* **61** (2000) 044005.
56. “Wigner Symmetry in the Limit of Large Scattering Lengths”, T. Mehen, I. W. Stewart and M.B. Wise, *Phys. Rev. Lett.* **83**, 931 (1999).
57. “Radiation Pions in Two Nucleon Effective Field Theory”, T. Mehen and I. W. Stewart, *Nucl. Phys.* **A665**, 164 (2000).
58. “Renormalization Schemes and the Range of Two Nucleon Effective Field Theory”, T. Mehen and I. W. Stewart, *Phys. Rev. C* **59**, 2365 (1999).
59. “A Momentum Subtraction Scheme for Two Nucleon Effective Field Theory”, T. Mehen and I. W. Stewart, *Phys. Lett. B* **445**, 378 (1999).
60. “Photoproduction of  $h_c$ ”, S. Fleming and T. Mehen, *Phys. Rev. D* **58**, 037503 (1998).
61. “Summing  $O(\beta_0^n \alpha_s^{n+1})$  Corrections To Top Quark Decays”, T. Mehen, *Phys. Lett. B* **417**, 353 (1998).
62. “Leptoproduction of  $J/\psi$ ”, S. Fleming and T. Mehen, *Phys. Rev. D* **57**, 1846 (1998).
63. “Testing Quarkonium Production with Photoproduced  $J/\psi + \gamma$ ”, T. Mehen, *Phys. Rev. D* **55**, 4338 (1997).
64. “Scale Setting in Top Quark Decays”, T. Mehen, *Phys. Lett. B* **382**, 267 (1996).
65. “Excited Heavy Mesons Beyond Leading Order in the Heavy Quark Expansion”, A. F. Falk and T. Mehen, *Phys. Rev. D* **53**, 231 (1996).

## PREPRINTS

---

1. “Implications of  $SU(2)_L \times U(1)$  symmetry for  $SIM(2)$  invariant neutrino masses”, A. Dunn and T. Mehen, arXiv:hep-ph/0610202.

## PUBLISHED PROCEEDINGS

---

1. “New Tests of NRQCD from Quarkonia within Jets”, QCD Evolution 2015 Workshop, Jefferson National Accelerator Lab, Newport News, VA, PoS QCDEV2015 (2016) 017.
2. “Exotic Quarkonium Spectroscopy:  $X(3872)$ ,  $Z_b(10610)$ , and  $Z_b(10650)$  in Non-Relativistic Effective Theory”, 9th International Workshop on  $e^+e^-$  collisions from Phi to Psi (PHIPSI13), Sep. 9-12, 2013, Rome, Italy, *Int. J. Mod. Phys. Conf. Ser.* **35** (2014) 1460431.

3. “Octetonium at the LHC”, C. Kim and T. Mehen, Proceedings of Pre-SUSY 2009: Beyond the Standard Model Physics and LHC Signatures (BSM-LHC), June 2-4, 2009, Boston, MA, Nucl. Phys. Proc. Suppl. 200-202 (2010) 179-182.
4. “X(3872) in Effective Field Theory”, S. Fleming and T. Mehen, Proceedings of 10th Conference on the Intersections of Particle and Nuclear Physics (CIPANP 2009), May 26-3, 2009, San Diego, CA, AIP Conf. Proc. 1182 (2009) 491-494.
5. “ $J/\psi$  Photoproduction at Large  $z$  in Soft-Collinear Effective Theory”, S. Fleming, A. Leibovich and T. Mehen, Proceedings of the Ringberg Workshop on New Trends in HERA Physics 2005, Ringberg Castle, Tegernsee, Germany, 2-7 Oct 2005 World Scientific, (2006).
6. “Excited  $D_s$  (and Pentaquarks) in Chiral Perturbation Theory”, T. Mehen, Krakow Epiphany Conference on Hadron Spectroscopy, Krakow, Poland, January 8, 2005. Acta. Phys. Polon. **B** 36 (2005).
7. “Recent Developments in Heavy Quark and Quarkonium Production”, T. Mehen, Presented at the 23rd International Symposium on Multiparticle Dynamics (ISMD 2003) Krakow, Poland, Sep. 5-11, 2003, *Acta Phys. Polon.* B35 (2004) 121.
8. “Charm Production Asymmetries from Heavy Quark Recombination”, T. Mehen, Proceedings of CIPANP 2003: 8th Conference on the Intersections of Particle and Nuclear Physics, New York, NY, May 19-24, 2003, AIP Conf. Proc. **698**, 508 (2004).
9. “Charm Production Asymmetries from Heavy Quark Recombination”, T. Mehen, Proceedings of the 7th International Conference on Strangeness in Quark Matter (SQM 2003), Atlantic Beach, North Carolina, Mar. 12-17, 2003, *J. Phys. G* 30 (2004) S295.
10. “Heavy Quark Recombination and Charm Production Asymmetries”, T. Mehen, Proceedings of DPF 2002: The Meeting of the Division of Particles and Fields of the American Physical Society, May 24-28, 2002, Williamsburg, VA.
11. “Nucleon-Nucleon Effective Field Theory at NNLO: Radiation Pions and  $^1S_0$  Phase Shift”, T. Mehen and I. W. Stewart, Proceedings of the INT Workshop on Nuclear Physics with Effective Field Theory II, University of Washington, Seattle, WA, Feb. 25-26, 1999, published by World Scientific, Singapore, 2000.
12. “Perturbative Pions in effective field theory for nucleon interactions”, Proceedings of the 3rd Workshop on Chiral Dynamics - Chiral Dynamics 2000: Theory and Experiment, Newport News, Virginia, 17-22 Jul (2000), Published in \*Newport News 2000, Chiral dynamics\* 434-435.
13. “Leptoproduction of  $J/\psi$ ”, T. Mehen, Proceedings of the 29th International Conference on High Energy Physics, TRIUMF, Vancouver, Canada, July 23-29, 1998, published by World Scientific, Singapore, 1999.

## SELECTED INVITED TALKS AND SEMINARS

---

1. “Quarkonium Production in Jets at LHCb”, Beijing Capital Normal University, Beijing China, November 7, 2017.

2. “Heavy Quark-Diquark Symmetry: Doubly Heavy Baryons and Tetraquarks”, 12th Quarkonium Working Group, Peking University, Beijing, China, November 6, 2017.
3. “X(3872), XEFT, and  $\bar{P}$ PANDA”, Hadronic Physics with Lepton and Hadron Beams, Jefferson Lab, Newport News, VA, September 7, 2017.
4. “Quarkonium Production within Jets”, Meeting of the APS Division of Particles and Fields, Fermilab, Batavia, IL, August 1, 2017.
5. “SCET and TMD Fragmentation Jet Functions”, 2nd TMD Collaboration Meeting, Temple U., Philadelphia, PA, June 29, 2017.
6. “Quarkonium Production within Jets”, Topical Workshop on QCD Structure of Nucleons in the Modern Era, UCLA, Los Angeles, CA, May 5, 2017.
7. “Transverse Momentum Dependent Fragmenting Jet Functions with Applications to Quarkonium Production”, 7th Workshop of the APS Topical Group on Hadronic Physics, Washington DC, February 2, 2017.
8. “Production of Heavy Mesons and Quarkonia within Jets”, Theory Seminar, UCSD Particle Theory Seminar, San Diego, CA, October 4, 2016.
9. “Production of Heavy Mesons and Quarkonia within Jets”, Theory Seminar, U. Paris-Sud, Orsay, France, September 8, 2016.
10. “Hadronic Loops versus Factorization in EFT calculations of  $X(3872) \rightarrow \chi_{cJ}\pi^0$ ”, Quarkonium Working Group, Pacific Northwest National Laboratory, Richland, WA, June 9, 2016.
11. “Production of Heavy Mesons and Quarkonia within Jets”, Theory Seminar, University of Arizona, Tucson, AZ, February 1, 2016.
12. “Production of Heavy Mesons and Quarkonia within Jets”, Theory Seminar, UC-Irvine, Irvine, CA, November 20, 2015.
13. “Production of Heavy Mesons and Quarkonium with Jets”, 2015 Fall Meeting of the APS Division of Nuclear Physics, Santa Fe, NM, October 28, 2015.
14. “Production of Heavy Mesons and Quarkonia within Jets at the LHC”, Theory Seminar, CCNY, New York, NY, July 27, 2015.
15. “New Tests of NRQCD from Quarkonia within Jets”, QCD Evolution 2015 Workshop, Jefferson National Accelerator Lab, Newport News, VA, May 27, 2015.
16. “New Tests of Quarkonium Production Mechanisms using Jet Substructure”, APS Topical Group on Hadronic Physics, Baltimore, MD, April 10, 2015.
17. “Probing Quarkonium Production Mechanisms with Jet Substructure”, Quarkonium Working Group, CERN, Geneva, Switzerland, November 14, 2014.
18. “Production of Stoponium at the LHC”, Quarkonium Working Group, CERN, Geneva, Switzerland, November 11, 2014.



19. “Novel Fragmentation Functions in Quarkonium Production”, Nuclear Theory Seminar, Los Alamos National Laboratory, Los Alamos, NM, June 17, 2014.
20. “Fragmentation Functions and Fragmenting Jet Functions in Quarkonium Production”, Particle Theory Seminar, Argonne National Laboratory, Argonne, IL, May 13, 2014.
21. “Fragmentation Functions and Fragmenting Jet Functions in Quarkonium Production”, Nuclear Theory Seminar, Brookhaven National Laboratory, Upton, NY, April 25, 2014.
22. “Fragmenting Jet Functions in Quarkonium Production”, SCET Workshop 2014, IAS-TUM, Munich, Germany, March 28, 2014.
23. “Recent Developments in Quarkonium Production and Spectroscopy”, Particle Theory Seminar, University of Chicago, Chicago, IL, December 14, 2013.
24. “Exotic Quarkonium Spectroscopy:  $X(3872)$ ,  $Z(10610)$  and  $Z(10650)$  in Non-Relativistic Effective Theory”, PhiPsi13, University of Rome, Italy, September 11, 2013.
25. “Double Parton Fragmentation Functions and Quarkonium Production” (with A. Leibovich), ESI Program on Jets and Quantum Fields for LHC and Future Colliders, Erwin Schrödinger Institute, July 25, 2013.
26. “Recent Developments in Quarkonium Production and Spectroscopy”, Particle Theory Seminar, TUM, Munich, Germany, July 18, 2013.
27. “ $X(3872)$ ,  $Z(10610)$ , and  $Z(10650)$  in Non-Relativistic Effective Theory”, Workshop on Threshold Phenomena, IHEP, Beijing, China, April 27, 2013.
28. “Effective Field Theory for Heavy Meson Molecules”, Bethe Forum on Exotic Hadrons, Bonn, Germany, April 30, 2012.
29. “Effective Field Theory for Heavy Meson Molecules”, UC Berkeley Particle Theory Seminar, Berkeley, CA, February 27, 2012.
30. “Effective Field Theory for Charm Meson Molecules”, U. of Maryland Nuclear Physics Seminar, College Park, MD, March 9, 2011.
31. “Effective Field Theory for Heavy Hadron Molecules (but mostly  $X(3872)$ )”, Institute for Nuclear Theory Workshop, “Frontiers of QCD”, Seattle, WA, November 17, 2011.
32. “Charmed Exotics and the  $X(3872)$ ”, Quark Confinement and the Hadron Spectrum IX, Universidad Complutense de Madrid, Madrid, Spain, September 3, 2010.
33. “Charming Exotic Mesons and the Strong Interactions”, Department Colloquium, North Carolina State University, Raleigh, March 22, 2010.
34. “ $X(3872)$  Decays in X-EFT”, VII Latin American Symposium on Nuclear Physics and Applications, Santiago, Chile, December 17, 2009.

35. “Phenomenology of Color Octet Scalars at the LHC”, Theory Seminar, Perimeter Institute, Waterloo, Canada, October 23, 2009.
36. “Effective Field Theories and Multiple Scales in Quantum Physics”, Center for Theoretical and Mathematical Sciences Workshop, “Theory and Applications of Multiscale Modelling”, Duke University, Durham, NC, September 11, 2009.
37. “Hadronic Molecules”, 19th Int. Conference on Few-Body Physics, U. Bonn, Germany, September 2, 2009.
38. “ $X(3872)$  Decays to Quarkonia in X-EFT”, Workshop on Charmed Exotics, Physikzentrum, Bad Honnef, Germany, August 11, 2009.
39. “XEFT and  $X(3872)$  Decays to Quarkonia”, Kavli Institute for Theoretical Physics, Beijing, China, August 4, 2009.
40. “Resummation in Heavy Particle Production”, Berkeley Workshop on Early LHC Physics, LBNL, Berkeley, CA, May 7, 2009.
41. “Non-Relativistic Conformal Field Theory and Trapped Cold Atoms”, Theory Seminar, Yale University, New Haven, CN, March 23, 2009.
42. “X-EFT and  $X(3872)$  Decays to Quarkonia”, International Workshop on Heavy Quarkonia 2008, Nara Women’s University, Nara, Japan, December 3, 2008.
43. “New Application of Non-Relativistic EFT’s with Large Scattering Lengths:  $X(3872)$  and Trapped Cold Atoms”, Seminar, Argonne National Lab, Chicago, IL, March 11, 2008.
44. “Effective Field Theory and Strongly Interacting Systems: from Charmed Hadrons to Cold Atoms”, Department Colloquium, University of Arizona, Tucson, AZ, February 29, 2008.
45. “New Applications of Non-Relativistic EFT’s with Large Scattering Lengths:  $X(3872)$  and Trapped Cold Atoms”, Seminar, University of Arizona, Tucson, AZ, February 28, 2008.
46. “Non-Relativistic Conformal Field Theory and Trapped Cold Atoms at Unitarity”, North Carolina State University, Raleigh, NC, December 7, 2007.
47. “Effective Field Theories for Strongly Interacting Particles: from Charmed Hadrons to Cold Atoms” Physics Colloquium, University of North Carolina at Wilmington, Wilmington, NC, November 30, 2007.
48. “New Applications of Non-Relativistic EFT’s:  $X(3872)$  and Trapped Cold Atoms”, University of Maryland, College Park, MD, October 24, 2007.
49. “Pion Interactions in the  $X(3872)$ ”, Plenary Talk, International Workshop on Heavy Quarkonium 2007, October 19, 2007, DESY, Hamburg, Germany.
50. “Pion Interactions in the  $X(3872)$ ”, Massachusetts Institute of Technology, Boston, MA, April 4, 2007.

51. "On the Equivalence of Soft and Zero-Bin Subtractions," Massachusetts Institute of Technology, Boston, MA, March 14, 2007.
52. "New Charmed Resonances and Effective Field Theory," Massachusetts Institute of Technology, Boston, MA, February 28, 2007.
53. "New Charmed Resonances and Effective Field Theory," Caltech, Pasadena, CA, January 8, 2007.
54. "Heavy Quark-Diquark Symmetry and  $\chi$ PT for Doubly Heavy Baryons", Yale University, New Haven, CT, December 12, 2006.
55. "QCD, Effective Field Theory, and Charmed Hadrons", Physics Colloquium, Virginia Tech, Blacksburg, VA, November 17, 2006.
56. "Heavy Quark-Diquark Symmetry and  $\chi$ PT for Doubly Heavy Baryons", Joint Meeting of the Pacific Region Particle Physics Communities, Honolulu, HI, October 30, 2006.
57. "Heavy Quark-Diquark Symmetry and  $\chi$ PT for Doubly Heavy Baryons", 5th International Workshop on Chiral Dynamics, Chapel Hill, NC, September 21, 2006.
58. "Endpoint Resummation in Quarkonium Production", SCET Workshop 2006, University of Arizona, Tucson, AZ, March 30, 2006.
59. "Doubly Heavy Baryons and Heavy Quark-Diquark Symmetry", U. of Arizona, Tucson, AZ, January 12, 2006.
60. "Doubly Heavy Baryons and Heavy Quark-Diquark Symmetry", Ohio State U., Columbus, OH, December 9, 2005.
61. "Doubly Heavy Baryons and Heavy Quark-Diquark Symmetry", U. of Maryland., College Park, MD, November 16, 2005.
62. "Doubly Heavy Baryons and Heavy Quark-Diquark Symmetry", Jefferson Lab, Newport News, VA, November 7, 2005.
63. "Excited Charmed Mesons and Chiral Perturbation Theory", U. of Milan, Milan, Italy, July 19, 2005.
64. "Excited Charmed Mesons and Chiral Perturbation Theory", ECT\* Workshop: Resonances in QCD, Trento, Italy, July 14, 2005.
65. "Excited Charmed Mesons and Chiral Perturbation Theory", Ohio Center for Technology and Science Workshop: Effective Theories in Physics from Nana to Tera, Columbus, OH, June 17, 2005.
66. "Excited Charmed Mesons and Chiral Perturbation Theory", Institute for Nuclear Theory Workshop: Effective Field Theories, QCD and Heavy Hadrons, Seattle WA, April 7, 2005.
67. "Excited  $D_s$  (and Pentaquarks) in Chiral Perturbation Theory", Krakow Epiphany Conference on Hadron Spectroscopy, Krakow, Poland, January 8, 2005.
68. "Endpoint Resummation in Quarkonium Production", Quarkonium Working Group International Workshop on Heavy Quarkonium, IHEP Beijing, China, October 12-15, 2004.

69. “Resummation for Quarkonium Production in  $e^+e^-$  Colliders”, DIS 2004 XII International Workshop on Deep Inelastic Scattering, Strbske Pleso, High Tatras, Slovakia, April 14-18, 2004.
70. “Recent Developments in Heavy Quark and Quarkonium Production”, 33rd International Symposium on Multiparticle Dynamics”, Krakow, Poland, September 5-11, 2003.
71. “Soft-Collinear Effective Theory and Resummation for Quarkonium Production”, Effective Summer in Berkeley Meeting, Lawrence-Berkeley National Laboratory Workshop, Berkeley, CA, July 24, 2003.
72. “Charm Production Asymmetries from Heavy Quark Recombination”, Conference on the Intersections of Particle and Nuclear Physics 2003, New York, NY, May 19-24, 2003.
73. “Charm Production Asymmetries from Heavy Quark Recombination”, 7th International Conference on Strangeness in Quark Matter, Atlantic Beach, NC, March 12-17, 2003.
74. “SCET: Reparametrization Invariance and Resummation for Quarkonium Production”, Caltech, Pasadena, March 3, 2003.
75. “Reparametrization Invariance in SCET”, Benasque Center for Science Workshop: Pushing the Limits of QCD, Benasque, Spain, July 19, 2002.
76. “Heavy Quark Recombination and Charm Production Asymmetries”, 5th International Conference on Hyperons, Beauty and Charm Hadrons, Vancouver, BC, Canada, June 25-29, 2002.
77. “Heavy Quark Recombination and Charm Production Asymmetries”, American Physical Society, 2002 Meeting of the Division of Particles and Fields, College of William and Mary, Williamsburg, VA, May 24-28, 2002.
78. “Soft-Collinear Effective Theory”, Mini-Symposium on QCD, Brookhaven National Laboratory, Upton, NY, May 7, 2002.
79. “Heavy Quark Recombination and Charm Production Asymmetries”, Fermilab, Batavia, IL, May , 2002.
80. “Field Theory on Noncommutative Spaces”, Ohio State U., Columbus, OH, April 3, 2001.
81. “Field Theory on Noncommutative Spaces”, Massachusetts Institute of Technology, Boston, MA, March 20, 2001.
82. “Effective Field Theory for Nuclear Physics”, Effective Field Theories and Effective Interactions, Institute for Nuclear Theory, University of Washington, Seattle, WA, July 6, 2000.
83. “Effective Field Theory for Two Nucleons”, TRIUMF, Vancouver, B.C. Canada, January 18, 2000.
84. “Nucleon-Nucleon Effective Field Theory at NNLO: Radiation Pions and  $^1S_0$  Phase Shift”, Nuclear Physics with Effective Field Theory II, Institute for Nuclear Theory, University of Washington, Seattle, WA, Feb. 25–26, 1999.
85. “Renormalization Schemes and Radiation Pions in Effective Field Theory of Nuclei”, UCSD, San Diego, CA, January 25, 1999.

86. “Renormalization Schemes and the Range of the Nucleon-Nucleon Effective Theory”, Physics of Strangeness, Institute for Nuclear Theory, University of Washington, Seattle, WA, Nov. 4, 1998.
87. “Leptoproduction of  $J/\psi$ ”, 29th International Conference of High Energy Physics, TRIUMF Laboratory, Vancouver, B.C. Canada, July 23–29, 1998.
88. “Color-Octet Mechanisms in Photo- and Electroproduction of  $J/\psi$ ”, Pheno 1997 Symposium: Recent Developments in Phenomenology, University of Wisconsin, Madison, WI, March, 17-19, 1997.
89. “Excited Heavy Mesons Beyond Leading Order in the Heavy Quark Expansion”, U. of Maryland, College Park, MD September, 1995.
90. “Excited Heavy Mesons Beyond Leading Order in the Heavy Quark Expansion”, Visiting Scientist Summer Program, Brookhaven National Laboratory, Upton, NY, July, 1995.

## EXTERNAL FUNDING

---

Project Title: **Effective Field Theory for Precision Jet and Heavy Flavor Physics**

Authors: **S. Fleming (PI), C. Lee, (Co-PI), T. Mehen (Co-PI), I. W. Stewart (Co-PI) and I. Vitev(PI)**

Source of Support: **Department of Energy, DE-FOA-0001269**

Support Type: **Declined**

Total Award Amount: **\$1,500,000**

Total Award Period: **10/1/2015-9/31/2020**

Project Title: **Proposal for a Topical Collaboration in Nuclear Theory for the Coordinated Theoretical Approach to Transverse Momentum Dependent Hadron Structure in QCD**

Authors: **J. Qiu (Spokesperson), W. Detmold (Spokesperson), M. Burkardt (Co-PI), M. Engelhardt (Co-PI), S. Fleming (Co-PI), L. Gamberg (Co-PI), X. Ji (Co-PI), C. Lee, (Co-PI), K.-F. Liu (Co-PI), S. Liuti (Co-PI), T. Mehen (Co-PI), A. Metz (Co-PI), J. Negele (Co-PI), A. Prokudin (Co-PI), I. W. Stewart (Co-PI), T. Rogers (Co-PI), R. Venugopalan (Co-PI), I. Vitev (Co-PI), and F. Yuan (Co-PI)**

Source of Support: **Department of Energy, DE-FOA-0001269**

Support Type: **Current**

Total Award Amount: **\$2,500,000**

Total Award Period: **10/1/2015-9/31/2020**

Project Title: **Lattice and Effective Field Theory Studies of Quantum Chromodynamics**  
Authors: **S. Chandrasekharan, T. Mehen, and R. Springer (PI)**  
Source of Support: **Department of Energy, DE-FG02-05ER41368**  
Support Type: **Current**  
Total Award Amount: **\$1,065,000**  
Total Award Period: **3/15/14-3/14/17**

Project Title: **Lattice and Effective Field Theory Studies of Quantum Chromodynamics**  
Authors: **S. Chandrasekharan, T. Mehen, and R. Springer (PI)**  
Source of Support: **Department of Energy, DE-FG02-05ER41368**  
Support Type: **Past**  
Total Award Amount: **\$1,007,000**  
Total Award Period: **3/15/11-3/14/14**

Project Title: **Lattice and Effective Field Theory Studies of Quantum Chromodynamics**  
Authors: **S. Chandrasekharan, T. Mehen, and R. Springer (PI)**  
Source of Support: **Department of Energy, DE-FG02-05ER41368**  
Support Type: **Past**  
Total Award Amount: **\$1,010,000**  
Total Award Period: **3/15/08-3/14/11**

Project Title: **Lattice and Effective Field Theory Studies of Quantum Chromodynamics**  
Authors: **S. Chandrasekharan, T. Mehen, and R. Springer (PI)**  
Source of Support: **Department of Energy, DE-FG02-05ER41368**  
Support Type: **Past**  
Total Award Amount: **\$850,000**  
Total Award Period: **3/15/05-3/14/08**

Project Title: **Heavy Quarks, QCD, and Effective Field Theory**  
Authors: **Thomas Mehen**  
Source of Support: **Department of Energy, DE-FG02-05ER41376**  
Support Type: **Past**  
Total Award Amount: **\$225,000**  
Total Award Period: **6/15/05-6/14/08**

Project Title: **Quantum Chromodynamics and Nuclear Physics  
at Extreme Energy Density**  
Authors: **S. Bass, S. Chandrasekharan, T. Mehen, B. Müller (PI),  
and R. Springer**  
Source of Support: **Department of Energy, DE-FG02-96ER40945**  
Support Type: **Past**  
Total Award Amount: **\$1,125,000**  
Total Award Period: **11/15/01-11/14/04**

## SERVICE

---

- Departmental Activities

1. *Core Course Committee* (2013- present)
2. *Colloquium Committee* (2009- 2015 )
3. *Undergraduate Curriculum Committee* (2011-2013)
4. *Graduate Assessment Committee* (2010)
5. *Reappointment Committee* (Prof. Ayana Holloway) (2009)
6. *Graduate Admissions Committee* (2008, 2009, 2011, 2012)
7. *Physics Department Webmaster* (2002-2006)
8. *High Energy Experimentalist Search Committee* (2003) (Chair: Prof. Seog Oh)
9. *Graduate Qualifying Exam* (2003-2010)
10. *Quantum Mechanics Placement Exams* (2002 - 2003) (with Prof. Roxanne Springer)
11. *Honors Thesis Committee* (2003)  
Jacob Foster (Berndt Mueller).
12. *Master's Thesis Defense Committee* (Advisor in Paranthesis)  
Kyle Kalutkiewicz (Thomas Mehen)  
Yujing Zhang (Mark Kruse)
13. *Ph.D. Committees* (2003-present)  
Josh Albert (Chris Walter)  
Reginald Bain (Thomas Mehen)  
Marco Bertolini (Ronen Plessner)  
David Bjergaard (Ayana Arce)  
Brian Bunton (Roxanne Springer)  
D. J. Cecile (Shailesh Chandrasekharan)  
Jianrong Deng (Al Goshaw)

Kevin Finelli (Mark Kruse)  
Staci Hemmer (John Thomas)  
Arunkumar Jagannathan (John Thomas)  
George Laskaris (Haiyan Gao)  
Yiannis Makris (Thomas Mehen)  
Arman Margaryan (Roxanne Springer)  
Abhijit Mehta (Harold Baranger)  
Bryon Neufeld (Berndt Mueller)  
Chris Pollard (Ashutosh Kotwal)  
Josh Powell (Thomas Mehen)  
Hung-Ming Tsai (Berndt Mueller)  
Xing Xong (Haiyan Gao)  
Di-Lun Yang (Berndt Mueller)  
Qiang Ye (Haiyan Gao)  
Wangzhi Zheng (Haiyan Gao)

14. *Preliminary Exam Committee* (2009-present)

Michael Eggleston (Ayana Arce)  
Minyu Feng (Al Goshaw)  
Forrest Friesen (Calvin Powell)  
Justin Raybern (Kate Scholberg)  
Meizhen Shi (Dan Gauthier)  
Xiaojun Yao (Berndt Mueller)  
Yang Zhang (Haiyan Gao)

15. *Executive Committee* (2003-2009)

16. *Nuclear/Particle Theory Group Seminar Organizer* (2002-2009)

- University Activities

1. *Lecturer at Duke-Kunshan University (DKU) General Physics I* (2015)

- Professional Activities

1. Triangle Nuclear Theory Colloquium Organizer (2007-2014)  
*Joint nuclear theory Colloquium for Duke, UNC, and NC State*



2. *Journal Referee* (2002-present)
  - European Journal of Physics A
  - European Journal of Physics C
  - European Physics Letters
  - Journal of High Energy Physics
  - Journal of Physics G: Nuclear and Particle Physics
  - Nuclear Physics A
  - Physics Letters B
  - Physical Review D
  - Physical Review Letters
3. *Reviewer Scientific Proposals*
  - DoE Nuclear Theory, Early Career Award Application (2014)
  - DoE Nuclear Theory, Early Career Award Application (2013)
  - DoE Nuclear Theory Early Career Award Application (2009)
  - DoE Nuclear Theory, Theory Group Renewal Grant proposal (2008)
4. *Workshop Organizer*
  - “SCET2013” at Duke University, Durham, NC, March 14-16, 2013.
  - <http://indico.cern.ch/event/SCET2013>
5. *INT Workshop Organizer* with Prof. Sean Fleming (U. Arizona) and Prof. Anna Stasto (Penn State U.)
  - “Frontiers in QCD” at the Institute for Nuclear Theory (INT), University of Washington, Seattle, WA, September 19 - November 18, 2011.
  - <http://www.int.washington.edu/PROGRAMS/11-3/>
6. *ECT\* Workshop Organizer* with Profs. Nora Brambilla (Milan), Antonio Vairo (Milan) and Prof. Joan Soto (Barcelona)
  - “Heavy Quarkonium and Related Heavy Quark States” at the European Center for Theoretical Studies in Nuclear Physics and Related Areas (ECT\*), Trento, Italy, August 17 - 31, 2006.
  - <http://www.ect.it/>
7. *INT Workshop Organizer* with Prof. Iain Stewart, MIT
  - “Effective Field Theory, QCD, and Heavy Hadrons” at the Institute for Nuclear Theory (INT), University of Washington, Seattle, WA, March 21 - June 10, 2005.
  - <http://int.phys.washington.edu/PROGRAMS/05-1.html>
8. *Textbook Reviewer* (2002)
  - Quantum Mechanics*, by Ernest S. Abers, Prentice Hall, New Jersey, 2004.