

**R. SEKHAR CHIVUKULA**  
**Professor of Physics**  
**Associate Dean, College of Natural Science**  
**Michigan State University**  
January 25, 2016

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### Positions Held

Professor of Physics, Michigan State University (2003–present).  
Associate Dean for Faculty Development, MSU College of Natural Science (2010–present).  
Member, Institute for Advanced Study, Princeton, NJ, Fall 2009.  
Professor of Physics, Boston University (2000–2003).  
Associate Chair for HEP Research, Physics Department, Boston University (1994–2003).  
Associate Professor of Physics, Boston University (1994–2000).  
Director of Graduate Studies, Physics Department, Boston University (1992–1994).  
Assistant Professor of Physics, Boston University (1989–1994).  
Postdoctoral Fellow, Boston University (1987–1989).  
Advisor: Prof. Kenneth Lane.

### Education

Ph.D., Physics (Particle Theory), Harvard University (1987).  
Thesis: “Composite Technicolor Standard Models.”  
Advisor: Prof. Howard Georgi.  
A.M., Physics, Harvard University (1984).  
B.S. with Honor, Physics and Applied Mathematics, Caltech (1983).

### Fellowships, Awards, and Honors

Fellow, American Association for the Advancement of Science (elected 2011).  
CIC Academic Leadership Program (ALP) Fellow (2010).  
APS Outstanding Referee (2010).  
Distinguished Visiting Scholar, Tsinghua University, Beijing, China, 2007-8.  
Fellow, American Physical Society (elected in 1998)  
DOE Outstanding Junior Investigator Award (1992-95).  
NSF Presidential Young Investigator Award (1990-95).  
SSC National Faculty Fellow (1992-94).  
Alfred P. Sloan Research Fellowship (1990-92).

## Major Research Funding

NSF Grant: “Electroweak Symmetry Breaking and Physics Beyond the Standard Model.”  
(with Elizabeth H. Simmons)

Total funding from 9/1/2015 - 8/31/2018: \$510,000 (projected 3-year total). **Current**

NSF Grant: “QCD, Electroweak Symmetry Breaking, and Physics Beyond the Standard Model.”  
(with Elizabeth H. Simmons)

Total funding from 5/15/10 – 4/30/16: \$1,000,000.

NSF Grant: “Electroweak Symmetry Breaking Beyond the Standard Model.”  
(with Elizabeth H. Simmons)

Total funding from 10/1/04 – 9/30/09: \$720,000.

NSF Grant “LHC Theory Initiative.”

(Co-PI with J. Bagger (PI), J. Hewett, L. Orr, and G. Sterman)

8/1/2014 – 7/31/2017: \$170,000 (Year 1) **Current**

NSF Grant “LHC Theory Initiative.”

(Co-PI with J. Bagger (PI), L. Orr, and G. Sterman)

Total funding from 10/1/10– 9/30/13: \$1,377,000.

NSF Grant “LHC Theory Initiative.”

(Co-PI with J. Bagger (PI), L. Orr, and U. Baur)

Total funding from 10/1/07– 9/30/10: \$1,215,807.

Department of Energy Research Grant, Theoretical and Experimental Physics.

Chivukula served as Project Director for the Boston University DOE HEP Grant.

Total funding from 2/1/95 – 1/31/04: \$19,019,900.

Department of Energy Research Contract & Grant, Task E: Theoretical Particle Physics.

Chivukula was one of seven Boston University Co-PIs on this grant.

Total funding from 6/1/89 – 1/31/04: \$7,310,270.

## Additional Research Funding

NSF Presidential Young Investigator Award (1990-95). \$262,500

DOE Outstanding Junior Investigator Award (1992-95). \$75,000

Alfred P. Sloan Research Fellowship (1990-94). \$25,000

SSC Faculty Fellowship (1992-94). \$101,612.

## Major STEM Education Funding

2014 Howard Hughes Medical Institute (HHMI) Award to Michigan State University

LEVERS: Leveraging Engagement and Vision to Encourage Retention in STEM

Chivukula serves as PI for the award

Total funding from 9/1/14 – 8/31/19: \$1,500,000. **Current**

2014 Herbet H. and Grace C. Dow Foundation Award to Michigan State University

The STEM Success Program

Chivukula (along with K. Renn, M. Urban-Lurain, and E. Simmons) serves as a co-PI for the award

Total funding from 10/30/14 – 10/31/2017: \$5,000,000. **Current**

(Funding above includes \$2,500,000 for the establishment of an endowment for student support.)

## Professional Activities

### Major Service to US High Energy Physics

- Member of LHC Theory Initiative Steering Committee and Co-PI of NSF Grant (2005-present)  
Founding co-organizer of LHC-TI, a national initiative to encourage theoretical activity in LHC-related areas, through the award of postdoc and graduate fellowships.  
Website: <http://www.lhc-ti.org>
- University Representative, DOE High-Energy Physics Advisory Panel (2002-5)  
Appointed by APS DPF Executive Committee to represent concerns of US University-based research groups.
- Member, DOE/NSF HEPAP HEP Physicist Resource Committee (2004-5).
- Member, NSF/MPS Workshop on Theoretical Science (2004).
- Member, DOE HEPAP Subpanel and Whitepaper Working Group (1998, 2000)  
on “Planning for the Future of High Energy Physics in the United States.”  
Chaired by Prof. Fred Gilman (CMU), our committee report served as the basis for DOE HEP Physics support for the 2000-2010 decade. See publication 70.  
[http://doe-hep.hep.net/hepap\\_reports.html](http://doe-hep.hep.net/hepap_reports.html)

### Major Service to Professional Organizations

- Consultant, Particle Data Group (1999 – present)  
Theory author of biannual international review of the status of dynamical electroweak symmetry breaking, published in Review of Particle Properties. <http://pdg.lbl.gov/>
- Member, APS/DPF Nominating Committee (2015 – 2016)
- Member, APS Committee on Meetings (2012 – 2014)
- Member, Physical Review Letters Visiting Committee, Sept. 17-18, 2013
- APS Sakurai Prize Committee, 2008 (Vice Chair) & 2009 (Chair)  
Worked with APS to award 2009 prize to the six co-discoverers of the “Higgs Mechanism”
- Member, Editorial Board, Physical Review D (2006-8)
- Divisional Associate Editor, Physical Review Letters (1996-9, 1999-2002)  
Each year consulted in selection of referees for approximately 100 papers and adjudicated approximately 15 author appeals.

### International Service

- Member, International Advisory Committee, Center for High Energy Physics,  
Tsinghua University, China (2008-16)

### Workshop and Conference Organization

- Co-organizer, LHC-TI Fellows Meeting  
Simons Center, SUNY Stony Brook, Mar. 18-19, 2013  
Stanford Linear Accelerator Laboratory, Oct. 13-14, 2011.  
Brookhaven National Laboratory, October 7-8, 2010.

Fermi National Accelerator Laboratory, October 29-30, 2009.  
 University of Wisconsin, April 30, 2008.

Member, International Advisory Committee, ‘Origin of Mass and Strong Coupling Gauge Theories  
 Nagoya University, Nagoya, Japan, Marc 3-6, 2015.

Co-organizer, “New Data from the Energy Frontier”  
 Aspen Winter Workshop, Feb. 13-18, 2011.

Co-organizer, “Strong Dynamics beyond the Standard Model”  
 Aspen Center for Physics, May 23 – June 12, 2010

Member, Organizing Committee, “Workshop on Dynamical Electroweak Symmetry Breaking”  
 Odense, Denmark, Sept. 9 – 13, 2008.

Member, International Organizing Committee for “New Physics Beyond the Standard Model”  
 Kavli Institute for Theoretical Physics, Beijing China, Jun. - Nov. 2008.

Co-organizer, Radcliffe Institute Exploratory Workshop on  
 “Higgsles Electroweak Symmetry Breaking in the LHC Era”  
 Radcliffe Institute, Cambridge, MA Jul. 31 – Aug. 4, 2007

Member, SCGT06 International Advisory Committee  
 Nagoya University, Japan, Nov. 21-24, 2006.

Member, Hadron Collider Physics 2004 Local Organizing Committee  
 Michigan State University, East Lansing, MI, Jun. 14-18, 2004.

Co-organizer, Snowmass Working Groups on Strong Symmetry Breaking.  
 Working Groups P1/4 & P3/1, 1 – 21 July 2001.  
 Strong Coupling and Top-Quark Groups, 25 June – 12 July 1996.

Co-organizer, “Top-Color” Working Group of “Workshop on New Strong  
 Dynamics for Run II of the Fermilab Tevatron.” 30 – 31 October 1998 & 9 – 10 April 1999.  
<http://runiicomputing.fnal.gov/strongdynamics/web/strongdynamics.html>

Co-convenor, “Strongly-Interacting Symmetry Breaking: Models” subgroup of “Beyond the  
 Standard Model” working group of APS/DPF long range planning study, 1995.

Co-organizer, Workshop on Electroweak Physics at the TeV Scale.  
 Aspen Center for Physics, Aspen, Colorado, 1993.

### **Other Activities**

Chair, 2010 Sakurai Prize Session, “April” APS meeting, Feb. 15, 2010

Chair, PRL 50th Anniversary Session, St. Louis APS meeting, April 14, 2008

DOE/HEP Laboratory Review Committees: Fermilab (1998, 1999), Argonne (2001), BNL (2003, 2004).

Grant reviewer for the DOE and NSF (US) and NSERC (Canada) programs in high-energy physics.

Manuscript referee for Journal of High-Energy Physics, Modern Physics Letters A,  
 Nuclear Physics B, Physical Review D, Physical Review Letters, and Physics Letters B.

Member, American Physical Society (1986–present).

Member, American Association of Physics Teachers (1996–present).

## Teaching

### Courses at Michigan State University

- PHY415/810: Methods of Theoretical Physics (Fall 2014-15)  
Joint Graduate/Undergraduate Course on Mathematical Physics (w/ E. H. Simmons).
- LB/PHY415: Methods of Theoretical Physics (Spring 2005 – 2014)  
Introduction to Mathematical Physics (w/ E. H. Simmons).
- PHY215: Thermodynamics and Modern Physics (Spring 2010)  
Introduction to Modern Physics and Thermodynamics (w/W. Repko).
- PHY810: Methods of Theoretical Physics. (Fall 2006 – 2008, 2013)  
Graduate core course in mathematical physics.
- PHY905: Advanced Techniques in Quantum Field Theory. (Spring 2007)  
Introduction to methods of advanced quantum field theory.
- PHY405: Directed Study. (Fall 2007)  
Reading Course in String Theory
- PHY905: Special Problems in Physics LHC Physics. (Spring 2006)  
Introduction to Theoretical Collider Physics at the LHC.
- PHY854: Quantum Electrodynamics (Spring 2005)  
Introduction to Quantum Field Theory.
- AST860: Gravitational Astrophysics (Spring 2004)  
Introduction to General Relativity.
- PHY992: Quantum Chromodynamics (Fall 2004)  
Topics in Nonperturbative Supersymmetry.

### Courses at Boston University

- PY511: Quantum Mechanics I (Fall 1990, Fall 1991, Fall 2001, Fall 2002)  
First semester of graduate core course in quantum mechanics.
- PY512: Quantum Mechanics II (Spring 1991, Spring 1992, Spring 2002, Spring 2003)  
Second semester of graduate core course in quantum mechanics.
- PY211: General Physics I (Fall 1992, Fall 1993, Fall 1997, Fall 1998, Fall 1999, Summer 2002)  
Introductory calculus-based mechanics and thermodynamics for scientists and engineers.
- PY751: High-Energy Physics (Spring 1996, Spring 1998, Spring 2000, Spring 2001)  
Advanced graduate course on the Standard Model of particle physics.
- PY731: Theory of Relativity (Spring 1999 & Spring 2001)  
Advanced graduate course on General Relativity.
- PY251: Principles of Physics I (Fall 1996 – Discussion Sections)  
Introductory calculus-based mechanics and thermodynamics for physics majors.
- PY252: Principles of Physics II (Spring 1995 & Spring 1997 – Discussion Sections)  
Introductory calculus-based electromagnetism and optics for physics majors.
- PY501: Mathematical Physics (Fall 1994 & Fall 1995)  
Graduate core course in mathematical methods of physics.
- PY704: Group Theory (Fall 1989)  
Advanced graduate course on Lie Algebras in physics.

### **Michigan State University Doctoral Students**

Pawin Ittisamai – Ph. D, 2014

Thesis: “Strong Dynamics at the LHC”

Arsham Farzinnia – Ph. D, 2012

Thesis: “Above And Beyond The Standard Model’

Stefano DiChiara – Ph. D, 2009

Thesis: “Topics in Particle Theory”

Baradhvaj Panayancheri Coleppa – Ph. D, 2009

Thesis: “Deconstructed Higgsless Models of EWSB”

### **Boston University Doctoral Students**

Bogdan Dobrescu – Ph. D, 1998

Thesis: “Towards a Natural Theory of Electroweak Interactions”

Dimitrios Kominis – Ph.D, 1995

Thesis: “Topics in Higgs Physics”

Vassilios Koulovassilopoulos – Ph. D, 1995

Thesis: “Electroweak Symmetry Breaking with a Non-Standard Higgs Boson”

### **Michigan State University Masters Students**

Alex Blum – M.S., 2005

Felix Braam – M.S., 2007

Michael Flossdorf – M.S., 2007

### **Current Students**

Dennis Foren – (Ph. D expected 2018)

### **Visiting Students**

Jing Ren (Tsinghua Univeristy, China)

Hiroki Uemichi (Nagoya University, Japan)

Tomohiro Abe (Nagoya Univeristy, Japan)

Shinya Matsuzaki (Nagoya Univeristy, Japan)

Masafumi Kurachi (Nagoya University, Japan)

### **External Thesis Examiner**

Thomas Rytov – Ph.D, 2009, Niels Bohr Institute, Copenhagen, Denmark

## Service and Administration

### **Co-organizer of MSU STEM Alliance: (2013-present)**

Lead coalition of MSU Undergraduate STEM Colleges, STEM Ed Research Centers, and interested faculty across the university to promote the use of evidence-based teaching practices, supporting research related to undergraduate STEM education, and increase persistence and degree completion – especially for students from groups traditionally under-represented in STEM.

Grant Development: HHMI, H& G Dow Family Foundation, NSF STC pre-proposal

### **Associate Dean for Faculty Development, College of Natural Science: (2010-present)**

Lead CNS faculty development programs, create, revise, and implement policies for college reappointment, promotion, and tenure, faculty search and mentoring, teaching evaluation, faculty annual evaluation and workload, and faculty development. Co-Organizer, workshop series on “Teaching Essentials for MSU Faculty”.

Websites: <http://naturalscience.msu.edu>, <http://TeachingEssentials.msu.edu>

### **University Committee on Academic Policy, Michigan State University: (2006-10)**

Served as College representative to and as Chair (2007-9) of committee which oversees undergraduate academic policy. Accomplishments during tenure include: adoption of “Undergraduate Learning Assistant” policy and major revision of policy on “Integrity of Scholarships and Grades”.

UCAP Representative, ECAC: Executive Committee of Academic Council (2007-9)

UCAP Representative, Faculty Council (2007-9)

UCAP Representative, Academic Council (2007-9)

UCAP Representative to University Committee on Liberal Learning (2006-8)

UCAP Representative to Military Education Consultative Committee (2006-7)

### **Other College and University Service at Michigan State University**

Member, MSU Faculty and Organizational Development Advisory Board (2009-12)

Judge, Graduate Academic Conference (2011)

CNS Zeits Fellowship Committee (2010)

Member, CNS Position Management Committee (2007-9)

### **Departmental Leadership at Michigan State University**

Co-Chair, Lattice QCD Faculty Cluster Hire Search (2015-16)

Chair, HEPT Postdoc and Research Faculty Search (2004-14)

Co-Chair, HEP Seminar Committee (2004-7,2008-present)

Coordinator, MSU-Nagoya University GCOE Cooperative Agreement, 2008-13.

High-Energy Physics Representative, Physics Department Advisory Committee (2004-10)

Organizer, Retirement Symposium for Prof. Wu-Ki Tung, 2007

### **Other Departmental Service at Michigan State University**

Member, HEE Search Committee (2005-6,2008-9)  
Member, Cowen Chair Search Committee (2005-6)  
Member, Ad hoc Graduate Brochure Revision Committee (2005)  
Member, Physics Department Graduate Admission and Recruiting Committee (2004)  
Member, Departmental Promotion Committee (PTRC Subcommittee) (2004)  
Member, Distinguished Lectureship Committee (2004)

### **Major responsibilities at Boston University**

Associate Chair for Particle Physics, BU Physics Department (1994 – 2003).  
Provide oversight and planning for all particle physics programs and share general responsibilities for coordination of departmental academic and research programs. Oversee faculty tenure and reappointment submissions, provide guidance to faculty submitting new proposals, & prepare departmental endorsements/nominations.

Project Director, DOE/HEP Grant (1994 – 2003).  
Oversee administration of program with an annual budget of order \$2M which funds the activity of 17 faculty . Serve as the primary liaison between DOE grant monitors, BU Office of Sponsored Programs, and PIs. Coordinate submission of renewal & supplemental proposals, and plan annual site visits.

Member, University Committee on Promotion and Tenure (2001-2002).  
Reviewed approximately 30 files and made recommendations to the Provost.

Member, CAS Committee on Appointments, Promotion, and Tenure (1996-1997).  
Reviewed approximately 15 files and made recommendations to the Dean.

Director of Graduate Studies in Physics (1992 – 1994)  
Reviewed support for and progress of *all* graduate students, assigned teaching fellowships.

### **Other roles at Boston University**

Physics Department Undergraduate Curriculum and Advising Committee (2002-2003)  
Physics Department Graduate Committee (1992-2002)  
Physics Department Comprehensive Exam Committee (1989-1992, 2001-2002)  
Physics Faculty Search Committees in Particle Experiment and Particle Theory (1995-2000)  
Physics Department Chair Review Committee (1995-1996)  
Physics Department Merit Committee (1994, 1995)  
CAS Faculty Advisor, Dean Ralph W. Taylor Academic Advising Center (2002-2003)  
CAS Associate Dean Search Committee (1994)



### Peer-Reviewed Publications

1. “The Color Discriminant Variable and Scalar Diquarks at the LHC”, R. S. Chivukula, P. Ittisimai, K. Mohan, and E. H. Simmons, arXiv:1507.06676 and MSUHEP-150723. Phys. Rev. **D92** 075020, 2015.
2. “Vacuum Stability and Triviality Analyses of the Renormalizable Coloron Model”, R. S. Chivukula, A. Farzinnia, and E. H. Simmons, arXiv:1504.03012 and MSUHEP-150412. Phys. Rev. **D92** 055002, 2015.
3. “Distinguishing Di-jet Resonances at the LHC”, R. S. Chivukula, Elizabeth H. Simmons, Natascia Vignaroli, arXiv:1412.3094 and MSUHEP-141209, Phys. Rev. **D91** 055019 (2015).
4. “Review of Particle Physics, 2014”, K.A. Olive et. al. (Particle Data Group), Chin. Phys. **C38** 090001, (2014).
5. “Distinguishing Flavor Non-universal Colorons from Z’ Bosons at the LHC” R. S. Chivukula, Pawin Ittisamai, and E. H. Simmons, arXiv:1406.2003 [hep-ph] and MSUHEP-140608, Phys. Rev. **D91** 055021, 2015.
6. “LHC Constraints on a Higgs Partner from an Extended Color Sector,”, R. S. Chivukula, A. Farzinnia, J. Ren and E. H. Simmons, arXiv:1404.6590 [hep-ph] and MSUHEP-130425. Phys. Rev.**D90** 015013, 2014.
7. “Constraints on the Scalar Sector of the Renormalizable Coloron Model”, R. S. Chivukula, Arsham Farzinnia, Jing Ren, and Elizabeth H. Simmons, arXiv:1307.1064 and MSUHEP-130703, Phys. Rev. **D88** 075020, 2013. Erratum Phys. Rev. D 89, 059905 (2014).
8. “Distinguishing Color-Octet and Color-Singlet Resonances at the Large Hadron Collider”, Anupama Atre, R. S. Chivukula, Pawin Ittisamai, and Elizabeth H. Simmons, arXiv:1306.4715 and MSUHEP-130619. Phys.Rev. **D88** 05502, 2013.
9. “Same-Sign Dileptons from Colored Scalars in the Flavorful Top-Coloron Model”, R. S. Chivukula, Elizabeth H. Simmons, and Natascia Vignaroli, arXiv:1306.2248 and MSUHEP-130610. Phys. Rev. **D88** 034006, 2013.
10. “Hadron Collider Production of Massive Color-Octet Vector Bosons at Next-to-Leading Order”, R. S. Chivukula, Arsham Farzinnia, Jing Ren, Elizabeth H. Simmons, arXiv:1303.1120 and MSUHEP-130305. Phys. Rev. **D87**, 094011, 2013.
11. “A Flavorful Top-Coloron Model”, R. S. Chivukula, Elizabeth H. Simmons, and Natascia Vignaroli, arXiv:1302.1069 and MSUHEP-130205. Phys. Rev. **D87**, 075002, 2013.
12. “Discovering Strong Top Dynamics at the LHC”, R. S. Chivukula, Baradhwaj Coleppa, Pawin Ittisamai, Heather E. Logan, Adam Martin, Jing Ren, and Elizabeth H. Simmons, arXiv:1207.0450 and Physical Review **D86**, 095017, 2012.
13. “Discovering Higgsless Electroweak Symmetry Breaking at LHC-8”, Chun Du, Hong-Jian He, Yu-Ping Kuang, Bin Zhang, Neil D. Christensen, R. Sekhar Chivukula, and Elizabeth H. Simmons, arXiv:1206.6022 and Physical Review **D86**, 095011, 2012.
14. “Review of Particle Physics, 2012”, J. Beringer et al. (Particle Data Group), Phys. Rev. **D86** 010001, 2012.

15. “Probing Color Octet Couplings at the Large Hadron Collider”, Anupama Atre, R. S. Chivukula, Pawin Ittisamai, Elizabeth H. Simmons, and Jiang-Hao Yu, arXiv:1206.1661 and Physical Review **D86** 054003, 2012.
16. “Production of Massive Color-Octet Vector Bosons at Next-to-Leading Order”, R. S. Chivukula, Arsham Farzinnia, Roshan Foadi, and Elizabeth H. Simmons, arXiv:1111.7261 [hep-ph], and Phys.Rev. **D 85** 054005, 2012.
17. “Technipion Limits from LHC Higgs Searches”, R. S. Chivukula, Pawin Ittisamai, Jing Ren, and Elizabeth H. Simmons, arXiv:1110.3688 [hep-ph] and Phys. Rev. **D 84**, 115025, 2011. Erratum: Phys. Rev. **D 85**, 119903, 2012.
18. “The Flavor Structure of the Three-Site Higgsless Model”, Tomohiro Abe, R. S. Chivukula, Elizabeth H. Simmons, and Masaharu Tanabashi, arXiv:1109.5856 [hep-ph], and Physical Review **D85** 035015, 2012.
19. “Simplified Models for LHC New Physics Searches”, D. Alves *et. al.*, arXiv:1105.2838, and J. Phys. **G39** (2012) 105005.
20. “LHC Limits on the Top-Higgs in Models with Strong Top-Quark Dynamics”, R. S. Chivukula, Baradhvaj Coleppa, Heather E. Logan, Adam Martin, and Elizabeth H. Simmons, arXiv:1108.4000 [hep-ph], and Phys. Rev. **D 84**, 095022, 2011.
21. “Patterns of Custodial Isospin Violation from a Composite Top”, R. S. Chivukula, Roshan Foadi, and Elizabeth H. Simmons, MSUHEP-110526, arXiv:1105.5437 [hep-ph], and Phys. Rev. **D 84**, 035026, 2011.
22. “Top-Higgs and Top-pion Phenomenology in the Top Triangle Moose Model”, R. S. Chivukula, Baradhvaj Coleppa, Heather E. Logan, Adam Martin, and Elizabeth H. Simmons, arXiv:1101.6023 [hep-ph], and Phys. Rev. **D 83**, 055013, 2011.
23. “Review of Particle Physics, 2010,”, K. Nakamura *et al.* [Particle Data Group Collaboration], J. Phys. G **G37**, 075021, 2010.
24. “Axigluons cannot explain the observed top quark forward-backward asymmetry”, R. S. Chivukula, Elizabeth H. Simmons, and C.-P. Yuan, MSUHEP-100701, arXiv:1007.0260 [hep-ph], and Phys. Rev. D. **82** 094009, 2010.
25. “Global Symmetries in Lee-Wick Theories”, R. S. Chivukula, Arsham Farzinnia, Roshan Foadi, and Elizabeth H. Simmons, MSUHEP-100614, arXiv:1006.2800 [hep-ph], and Phys. Rev. D **82** 035015 (2010).
26. “Condensate Enhancement and  $D$ -Meson Mixing in Technicolor Theories”, R. S. Chivukula and Elizabeth H. Simmons. MSUHEP-100531, arXiv:1005.5727 [hep-lat], and Phys. Rev. D **82**, 033014, 2010.
27. “Custodial Isospin Violation in the Lee-Wick Standard Model”, R. S. Chivukula, Arsham Farzinnia, Roshan Foadi, and Elizabeth H. Simmons, MSUHEP-100201, arXiv:1002.0343, and Phys. Rev. D. **81** 095015, 2010.
28. “The Limits of Custodial Symmetry”, R. S. Chivukula, Stefano Di Chiara, Roshan Foadi, and Elizabeth H. Simmons. MSUHEP-090807, arXiv:0908.1079 [hep-ph], and Phys. Rev. D **80** 095001, 2009.

29. “ $W_L W_L$  Scattering in Higgsless Models: Identifying Better Effective Theories”, Alexander S. Belyaev, R. S. Chivukula, Neil D. Christensen, Elizabeth H. Simmons, Hong-Jian He, Masafumi Kurachi, and Masaharu Tanabashi, MSUHEP-090715, arXiv:0907.2662 [hep-ph], and Phys. Rev. D. **80** 055022, 2009.
30. “The Top Triangle Moose: Combining Higgsless and Topcolor Mechanisms for Mass Generation”, R. S. Chivukula, Neil D. Christensen, Baradhwaj Coleppa, and Elizabeth H. Simmons, MSUHEP-090630 and arXiv:0906.5567 [hep-ph], Phys. Rev. D. **80** 035011, 2009.
31. “ $Z \rightarrow b\bar{b}$  and Chiral Currents in Higgsless Models”, T. Abe, *et. al.*, MSUHEP-090223 and arXiv: 0902.3910 [hep-ph], Phys. Rev. D. **79** 075016, 2009.
32. “Four-site Higgsless Model with Wave Function Mixing”, R. S. Chivukula and Elizabeth H. Simmons, Phys. Rev. **D78** 077701, 2008.
33. “General Sum Rules for WW Scattering in Higgsless Models: Equivalence Theorem and Deconstruction Identities”, R. S. Chivukula, Hong-Jian He, Masafumi Kurachi, Elizabeth H. Simmons, and Masaharu Tanabashi, arXiv:0808.1682v1 [hep-ph] and MSUHEP-080812, Phys. Rev. D, **78** 095003, 2008.
34. “Review of Particle Physics, 2008”, C. Amsler et al., Phys. Lett. **B667** 1,2008.
35. “Low-Energy Effective Theory, Unitarity, and Non-Decoupling Behavior in a Model with Heavy Higgs-Triplet Fields,” R. S. Chivukula, Neil D. Christensen, and Elizabeth H. Simmons. arXiv0712.0546, MSUHEP-071204, Phys. Rev. **D77** 035001, 2008.
36. “Hypercharge-Universal Topcolor”, Felix Braam, Michael Flossdorf, R. S. Chivukula, Stefano Di Chiara, and Elizabeth H. Simmons. arXiv:0711.1127, MSU-HEP-071107, Phys.Rev. **D77** 055005, 2008.
37. “LHC Signatures of New Gauge Bosons in Minimal Higgsless Model”, Hong-Jian He, Yu-Ping Kuang, Yong-Hui Qi, Bin Zhang, Alexander Belyaev, R. S. Chivukula, Neil D. Christensen, Alexander Pukhov, Elizabeth Simmons. arXiv:0708.2588, MSUHEP-070817, Phys. Rev. **D78** 031701(R) , 2008.
38. “Unitarity and Bounds on the Scale of Fermion Mass Generation,” R. S. Chivukula, Neil D. Christensen, Baradhwaj Coleppa, and Elizabeth H. Simmons. hep-ph/0702281, MSUHEP-070227, Phys. Rev. **D75** 073018, 2007.
39. “The Three Site Model at One-Loop,” R. S. Chivukula, Shinya Matsuzaki, Elizabeth H. Simmons, and Masaharu Tanabashi. hep-ph/0702128, MSUHEP-070221, Phys. Rev. **D75** 075012, 2007.
40. “Deconstruction and Elastic  $\pi\pi$  Scattering in Higgsless Models”, R. S. Chivukula, Hong-Jian He, Masafumi Kurachi, Elizabeth H. Simmons, and Masaharu Tanabashi, hep-ph/0612070, MSUHEP-061206, and Phys. Rev. **D75** 035005, 2007.
41. “Review of Particle Physics, 2006,” W.-M. Yao et al., J. Phys. G33:1-1232,2006.
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50. “Extended Technicolor Corrections to the  $Zb\bar{b}$  Vertex”, E. H. Simmons, R. S. Chivukula, and S. B. Selipsky, Proceedings of *Beyond the Standard Model III*, (Ottawa, Canada, June 1992). Ottawa Standard Model 1992, 411-415.
51. “Topics in Symmetry Breaking Phenomenology”, R. S. Chivukula and M. Golden), in Proceedings of the *International Workshop on Electroweak Symmetry Breaking*, (Hiroshima, Japan, Nov. 12-15, 1991), W. A. Bardeen, J. Kodaira, and T. Muta, eds., World Scientific (Singapore, 1992), 265-276.
52. “Techniomega Production at the SSC”, R. S. Chivukula, in *Proceedings of the 1988 DPF Summer Study on High Energy Physics in the 1990’s* (Snowmass, Col. June 27 - July 15, 1988), S. Jensen, ed., World Scientific (Singapore, 1989).
53. “Technirho Production at the SSC”, R. S. Chivukula, in *Proceedings of the 1988 DPF Meeting* (Storrs, Conn., August 15-18, 1988.), K. Haller ed., World Scientific (Singapore, 1988). DPF Conf. 1988, 723-727.
54. “Technivector Meson Production at the SSC”, R. S. Chivukula, in *Proceedings of the 12<sup>th</sup> Johns Hopkins Workshop on Current Problems in Particle Theory* (Baltimore, MD., June 8-10, 1988), G. Domokos and S. Kovesi-Domokos, eds., World Scientific (Singapore, 1988).
55. “Compositeness and QCD at the SSC”, V. Barnes, et. al., in *Proceedings of the Workshop on Experiments, Detectors, and Experimental Areas for the Superconducting Super Collider* (July 7-17, 1987, Berkeley, CA), R. Donaldson and M. G. D. Gilchriese eds., World Scientific (Singapore, 1987).
56. “CP Conserving  $K_S \rightarrow \pi^+\pi^-\pi^0$ ”, R. S. Chivukula and A. Manohar, Harvard preprint HUTP-86/A050, unpublished.

## Colloquia and Plenary Talks

- “New Resonances: Theory and Experiment”  
PHENO 2015, University of Pittsburgh, May 4, 2015.
- “The Jet Energy Profile as a BSM Analysis Tool at the LHC”  
SCGT15, Nagoya University, Mar. 3-6, 2015.
- “Flavor and Scalar Sectors of an Extended Electroweak Symmetry Breaking Sector”  
KMI Mini-Workshop on “Strong Coupling Gauge Theories Beyond the Standard Model”,  
Nagoya, Japan, Mar. 5-7, 2014.
- “So a Higgs has been Discovered ... now What?”  
Discussion meeting on EWSB and Flavours in Light of LHC, Indian Institute of Technol-  
ogy, Guwahati, India, Feb 20-22, 2014.
- “A Flavorful Top-Coloron Model”  
“LHC: The First Part of the Journey”, Kavli Institute for Theoretical Physics, Santa  
Barabara CA July 8-12, 2013.
- “Vector Boson Signals of Electroweak Symmetry Breaking”  
7th Workshop on TeV Physics at the LHC: In Honor of Prof. Yu-Ping Kuang”, Tsinghua  
University, Beijing, China, Nov. 12-14, 2012.  
KMI-GCOE Workshop on Strong Coupling Gauge Theories in the LHC Perspective”, 4-7  
Dec. 2012, Nagoya University.
- “Technicolor in Light of LHC Data”  
Mini-Workshop on Conformality in Strong Coupling Gauge Theories at LHC and Lattice,  
Kobayashi-Maskawa Institute, Nagoya University, Mar. 18, 2012.  
“Origins of Mass 2012” workshop at NORDITA, Stockholm, Sweden. June 3, 2012.
- “Dynamical Electroweak Symmetry Breaking Meets ... LHC Data”  
Twelfth Workshop on High Energy Physics Phenomenology (WHEPP-XII), Mahabalesh-  
war, India, Jan. 10, 2012.
- “Technicolor in the LHC Era”  
Kobayashi-Maskawa Institute Inauguration Conference, Nagoya University, Oct. 26, 2011.
- “Custodial Symmetry: Past and Present”  
Workshop on Implications of EWSB, Madison, WI, May 8, 2011.
- “Technicolor and Lattice Gauge Theory”  
LATTICE 2010, Sardinia, Italy, June 19, 2010.
- “Limits of Custodial Symmetry”  
SCGT09, Nagoya University, Dec. 9, 2009.
- “Higgsless Electroweak Symmetry Breaking”  
Workshop on Physics at the LHC, Triumf, Vancouver, CA, April 28, 2009.
- “The Symmetries of QCD”

Aspen Center for Physics, July 9, 2009  
University of Chicago, May 14, 2009.  
Fermi National Accelerator Laboratory, March 11, 2009.

- “Technicolor and Cosmology”  
Workshop on Dynamical Electroweak Symmetry Breaking, University of Southern Odense, Sept. 8, 2008
- “The Three-Site Higgsless Model”  
New Physics Beyond the Standard Model, Kavli Institute for Theoretical Physics China, Beijing, China, July 2, 2008.
- “HELP WANTED: A Dynamical Electroweak Symmetry Breaking Wishlist”  
Lattice Gauge Theory for LHC Physics Workshop, Lawrence Livermore National Laboratory, May 2, 2008.
- “Mass in QCD: Symmetries of a Quantum Field Theory”  
University of New Mexico, Albuquerque, Oct. 26, 2007.  
Institute for Theoretical Physics, Chinese Academy of Sciences, Dec. 13, 2006.  
Michigan State University, Nov. 3, 2006.  
University of Cincinnati, Feb. 16, 2006.  
University of North Carolina, Chapel Hill, Oct. 3, 2005.
- “Dzero and Future Physics”  
Dzero Workshop, Michigan State University, June 21, 2007.
- “A No Higgs Example: The Three Site Model”  
The LHC Early Phase for the ILC, Fermilab, April 12-14, 2007.
- “New Approaches to Electroweak Symmetry Breaking”  
PHENO 2006, Madison, WI, May 17, 2006.
- “Dynamical Electroweak Symmetry Breaking: From Technicolor to Extra-Dimensions...and Back Again”  
Workshop on Collider Physics, Argonne National Laboratory, May 9, 2006.
- “Effective Higgsless Models”  
Recontres de Moriond, Electroweak Interactions and Unified Theories, La Thuile, Italy, Mar. 11-18, 2006.
- “Higgsless Models: AdS<sub>5</sub>, Ideal Delocalization, and Unitarity”  
Workshop on Flavor Physics and Its Origin, Ochanomizu University, Tokyo, Japan, Dec. 13-14, 2005.
- “Higgsless Models: AdS<sub>5</sub> and Ideal Delocalization”  
KIAS-KAIST Workshop on Particle Physics, Seoul, Korea, Oct. 10-14, 2005.
- “Electroweak Corrections in Higgsless Models”

KEK Theory Meeting, March 3-5 2005.  
Aspen Winter Conference, Feb. 13-19, 2005.

- “Electroweak Symmetry Breaking: with Dynamics”  
15th International Topical Conference on Hadron Collider Physics, HCP2004, Michigan State University, June 14-18, 2004.  
Aspen Winter Conference, Feb. 2-7, 2004.
- “Strong Dynamics and Electroweak Symmetry Breaking”  
IXth Mexican Workshop on Particles and Fields, Colima, Mexico, Nov. 17-22, 2003.
- “A Vision for the Year 20-20”  
International Workshop on Future Hadron Colliders, Fermilab, Oct. 16-18, 2003.
- “Precision Constraints on Hidden Local Electroweak Gauge Symmetries”  
Strong-Coupling Gauge Theories 2002, Nagoya, Japan, Dec. 10-13, 2002.
- “Flavor Physics and Fine-Tuning in Theory Space”  
Frontiers Beyond the Standard Model, Minneapolis, MN, October 10-12, 2002.
- “Physics at Very High Energies”  
10th International Workshop on Deep Inelastic Scattering (DIS2002), Cracow, Poland, 30 April - 4 May 2002.  
Snowmass 2001, Snowmass, CO, July 3, 2001.  
2nd Annual VLHC Collaboration Meeting, Port Jefferson, NY, Oct. 16-18, 2000.
- “Physics at the VLHC”  
Snowmass 2001 Forum on Future Facilities, Snowmass, CO, July 11, 2001.
- “On The Other Hand: Physics Without a Light Higgs Boson”  
Linedrive Seminar Series, Fermilab, May 24, 2001.
- “Limits on the Mass of a Composite Higgs Boson”  
Snowmass 2001, Snowmass, CO, July 9, 2001.  
PHENO 2000, University of Wisconsin, Madison, Wisconsin, April 17-19, 2000.  
Recontres de Moriond: ElectroWeak Interactions and Unified Theories, Les Arcs, France, Mar. 11-18, 2000.
- “Strong Dynamics and Technicolor at Future Colliders”  
Circle Line Seminar Series, Fermilab, Dec. 2, 1999.
- “Avenues for Dynamical Symmetry Breaking”  
Hadron Collider Physics XIII, Mumbai, India, Jan. 14-20, 1999
- “Top-Color”  
Workshop on New Strong Dynamics for Run II of the Fermilab Tevatron, Fermilab, Oct. 30-31, 1998.



- “Dynamical Electroweak Symmetry Breaking and the Third Generation”  
Aspen Winter Conference on Particle Physics, Aspen, CO, Jan. 25-31, 1998.  
Hadron Collider Physics XII, Stony Brook, NY, June 5-11, 1997.
- “Custodial Symmetry and Bounds on the Higgs Boson Mass”  
International Workshop on Perspectives on Strong Coupling Gauge Theories (SCGT96),  
Nagoya, Japan, Nov. 13-16, 1996.
- “Physics of the Standard Model and Beyond”  
VII Brazilian Physical Society Particles and Fields Meeting, Serra Negra, Brazil, Sept.  
2-6 1996.
- “Dynamical Electroweak Symmetry Breaking and the Top Quark”  
SLAC Summer Institute Topical Workshop, SLAC, July 19-21, 1995.
- “Isospin Breaking and the Top Quark Mass in Models of Dynamical Electroweak Symmetry  
Breaking”  
Yukawa International Seminar ‘95, Kyoto, Japan, Aug. 21-25, 1995.  
Workshop on Top Quark Physics, Iowa State University, May 25-26, 1995.
- “Strong  $WW$  Scattering”  
International Symposium on Vector Boson Self-Interactions, University of California, Los  
Angeles, Feb. 1-3, 1995.
- “Constraints on ETC Generation of the Top-Quark Mass”  
Conference on “Origin of Fermion Masses and Mixings”, Fermilab, Oct. 14, 1994.
- “Physics Beyond the Standard Model: Prospects and Perspectives”  
DPF ‘94, Albuquerque, NM, Aug. 2-6, 1994.
- “Phenomenology of a Non-Standard Higgs”  
Conference on “Continuous Advances in QCD”, University of Minnesota, Minneapolis,  
Feb. 19, 1994.
- “The Dynamics of Electroweak Symmetry Breaking”  
Worcester Polytechnic Institute, Worcester MA, Nov. 8, 1993.  
Johns Hopkins University, Baltimore MD, April 29, 1993.  
Dartmouth University, Hannover NH, Nov. 13, 1992.  
Northeastern University, Boston MA, March 18, 1992.  
GEM Collaboration Meeting, Tucson AZ, March 9, 1992.  
The Ohio State University, Columbus OH, Feb. 19, 1992.
- “Beyond the Standard Model”  
XVIth International Symposium on Lepton-Photon Interactions, Cornell University, Aug.  
10-15, 1993
- “Hiding the Electroweak Symmetry Breaking Sector”

High Energy Physics with Colliding Beams, Yale University, Oct. 2-3, 1992.

- “Topics in Electroweak Symmetry Breaking”  
International Workshop on Electroweak Symmetry Breaking, Hiroshima, Japan, Nov. 12-15, 1991.
- “What’s the Matter in the Universe?”  
Harvard University, Cambridge MA, April 16, 1990.
- “Electroweak Symmetry Breaking and Particle Physics in the 1990’s”  
Southeast Sectional APS meeting, Tuscaloosa AL, Nov. 11, 1989.
- “Technivector Meson Production”  
15th Johns Hopkins Workshop, Baltimore MD, June 8-10, 1988.

### **Summer & Winter School Lectures**

- “Physics Beyond the Standard Model”  
Maria Laach Abbey, Germany, Sept. 9-10, 2013. 4 lectures.
- “The Standard Model and Beyond”  
CTEQ 2013 Summer School, Pittsburgh, PA, July 16, 2013. 2 lectures.
- “Composite Higgs Bosons and Effective Field Theory”  
Theoretical Advanced Studies Institute, Boulder, CO, June 19-21, 2013. 3 lectures
- “The Quest for Electroweak Symmetry Breaking”  
PASI 2012: Exploring the Terascale and Beyond, University of Buenos Aires, Argentina.  
Mar. 5 and 6, 2012. 2 lectures.
- “Symmetries of QCD: Pedagogical Lectures”  
Workshop on LHC Physics, National Center for Theoretical Sciences, Taiwan,  
Oct. 25-26, 2010. 2 lectures.
- “Dynamical Electroweak Symmetry Breaking”  
Tsinghua University LHC Summer School, Beijing, China, Aug. 16-20, 2010. 2 lectures.
- “Particle Physics I & II”  
(w/E. Simmons), Nagoya University GCOE Winter School, Feb. 18 & 20, 2009, Aqua  
Villa, Isa-Shima, Japan.
- “Strong Dynamics: Theory and Phenomenology”  
CERN/FNAL Hadron Collider Physics Summer School, FNAL Aug. 12-22, 2008. 2 lec-  
tures.
- “Mass in QCD: Symmetries of a Quantum Field Theory”

Wei-Hai Summer Forum on the Frontiers of High-Energy Physics  
Wei-Hai, China, July 8, 2008.

- “Physics with Extra Dimensions and Deconstruction” & “Perspectives on High-Energy Physics”  
Frontiers in Particle Physics 2006, Aug. 7-11, 2006, Beijing, China.
- “The Origin of Mass in QCD”  
SLAC Summer Institute, Aug. 2-13, 2004.
- “Strong Electroweak Symmetry Breaking”  
Theoretical Advanced Studies Institute, Boulder, CO, June 6 – July 12, 2004.
- “Technicolor and Compositeness”  
Theoretical Advanced Studies Institute, Boulder, CO, June 5-30, 2000.
- “Models of Electroweak Breaking”  
“Probing the Standard Model of Particle Interactions”, Les Houches, France, July 28 -  
Sept. 5, 1997.
- “An Introduction to Dynamical Electroweak Symmetry Breaking”  
Advanced School on Electroweak Theory, Maó, Menorca, June 16-22, 1996.

### **Invited Seminars & Parallel Session Talks**

- “Identifying Dijet Resonances at the LHC”  
Fermi National Laboratory, CMS Physics Center, May 26, 2015.
- “Dynamical Electroweak Symmetry Breaking”  
Particle Data Group Meeting, Lawrence Berkeley Laboratory, June 23, 2013.
- “New Physics Signatures in High Mass VV Resonances and Multi-Boson Production”,  
LPC Workshop on Gauge Boson Couplings, Fermilab, Aug. 19, 2013.
- “So a Higgs Boson has been discovered. Now what?”  
Notre Dame University, April 2, 2013.
- “Dynamical Electroweak Symmetry Breaking in the LHC Era”  
University of Pittsburgh, Friday, Dec. 2, 2011.
- “LHC Limits on a Top-Higgs Boson”  
Uli Baur Memorial Symposium, SUNY Buffalo, Sept 24, 2011
- “Higgsless Models of Electroweak Symmetry Breaking: LHC Phenomenology”  
National Center for Theoretical Sciences, Taiwan, Oct. 27, 2010.
- “Limits of Custodial Symmetry”  
Recontres de Blois, July 17, 2010.

- “Technicolor and Lattice Gauge Theory”  
Southampton University Seminar/Workshop, July 7, 2010.
- “An Introduction to Dynamical Electroweak Symmetry Breaking and Related Models”  
Aspen Center for Physics, May 28, 2010.
- “GCOE Seminar: Effective Theories of Electroweak Symmetry Breaking”  
Nagoya University, Dec. 7, 2009.
- “Higgsless Models of Electroweak Symmetry Breaking”  
University of Kentucky, Sept. 4, 2009.
- “Alternative Theories of Electroweak Symmetry Breaking”  
PANIC2008, Eilat, Israel, Nov. 13, 2008.
- “The Three Site Higgsless Model”  
Yale University, New Haven, CT, June 3, 2008.  
Tsinghua University, Beijing, China, Dec. 12, 2006.
- “The Three Site Model: LHC/ILC Phenomenology”  
Higgsless Electroweak Symmetry Breaking in the LHC Era, Radcliffe Institute Exploratory  
Workshop, Aug. 3, 2007.
- “Dynamical Electroweak Symmetry Breaking: From Technicolor to Extra-Dimensions...and  
Back Again”  
Wayne State University, Feb. 16, 2007
- “Oblique Corrections in Extended Electroweak Theories”  
Joint DPF/JSPS Meeting, Honolulu, Hawaii, Oct. 29, 2006.
- “Higgsless Models: Lessons from Deconstruction”  
University of Cincinnati, Feb. 16, 2006.  
University of North Carolina, Chapel Hill, Oct. 4, 2005.  
Argonne National Laboratory, June 3, 2005.  
Fermilab, June 2, 2005.
- “Higgsless Models: AdS<sub>5</sub>, Ideal Delocalization, and Unitarity”  
Tohoku University, Sendai, Japan, Dec. 16, 2005.
- “Electroweak Corrections in Higgsless Models”  
University of Michigan, Feb. 25, 2005.  
Syracuse University, Nov. 12, 2004.
- “Deconstructed QCD, Generalized Weinberg Sum Rules, and  $S$ ”  
Argonne National Laboratory, Apr. 13, 2004.
- “A Vision for the Year 20-20”  
HEP Group Journal Club, MSU, Nov. 13, 2003.
- “The Standard Model in the New Millennium”  
Michigan State University, Apr. 18, 2003.
- “Quarks to the Cosmos”

Quarknet, Boston University, Aug. 21, 2000.

- “Strong Dynamics and Technicolor at Future Colliders”  
Boston University, Feb. 16, 2000.
- “Triviality and Bounds on the Higgs Boson Mass”  
Bartol/Univ. of Delaware, Dec. 9, 1999.
- “The Dynamics of Electroweak Symmetry Breaking”  
Brookhaven National Laboratory, May 13, 1999.
- “The Standard Model at the Millenium”  
Brookhaven National Laboratory, May 12, 1999.
- “Custodial Symmetry and Bounds on the Higgs Boson Mass”  
University of Massachusetts, Amherst MA, Nov. 21, 1997.  
Jefferson National Laboratory, Oct. 27, 1997.
- “Strong-Coupling Electroweak Symmetry Breaking and New Phenomena – A Guide to Snowmass Results”  
HEPAP Subpanel Meeting, Stanford Linear Accelerator, June 26, 1997.
- “Isospin Breaking and the Top Quark Mass in Models of Dynamical Electroweak Symmetry Breaking”  
IInd Recontres de Vietnam, Ho Chi Minh City, Vietnam, Oct. 26, 1995.
- “Dynamical Electroweak Symmetry Breaking”  
Superkamiokande Detector Laboratory, Kamioka, Japan, Aug. 19, 1995.
- “Dynamical Electroweak Symmetry Breaking and the Top Quark”  
Institute for Mathematical Sciences, Madras, India, Aug. 7, 1995.
- “Constraints on Technicolor from  $Z \rightarrow b\bar{b}$ ”  
Michigan State University, East Lansing MI, March 22, 1994.  
University of Pennsylvania, Philadelphia PA, Dec. 8, 1993.
- “Top Quark Search”  
Institute of Theoretical Physics, Santa Barbara CA, Jan. 21, 1994.
- “Critical Constraints on Chiral Hierarchies”  
Johns Hopkins University, Baltimore MD, April 30, 1993.  
Yale University, New Haven CT, Dec. 11, 1992.  
Joint Theory Seminar, Mass. Inst. of Tech., Cambridge MA, Oct. 28, 1992.
- “QCD with Many Light Flavors”  
Superconducting Super Collider Laboratory, Feb. 24, 1993.
- “Hiding the Electroweak Symmetry Breaking Sector”  
University of Massachusetts, Amherst MA, Nov. 9., 1992.
- “The Dynamics of Electroweak Symmetry Breaking”  
Sante Fe Workshop, Sante Fe NM, July 28, 1992.
- “Topics in Electroweak Symmetry Breaking”

Brookhaven National Laboratory, Upton NY, Oct. 30, 1991.

- “Multijet Physics at Hadron Colliders”  
Cornell University, Ithaca NY, April 10, 1991.
- “Aspects of Dynamical Electroweak Symmetry Breaking”  
The Ohio State University, Columbus OH, Feb. 20, 1991.
- “Walking Technicolor”  
Tata Institute of Fundamental Research, Bombay, India, July 13 1990.  
University of Michigan, Ann Arbor MI, Jan. 12, 1989.  
Lawrence Berkeley Laboratory, Berkeley CA, Dec. 5, 1988.  
Brookhaven National Laboratory, Upton NY, Nov. 14, 1988.  
University of Pittsburgh, Pittsburgh PA, Nov. 2, 1988.
- “Technicolor Dark Matter”  
Superconducting Supercollider Laboratory, Dallas TX, May 31, 1990.
- “Technicolor Cosmology”  
Northeastern University, Boston MA, May 14, 1990.  
University of California at San Diego, San Diego CA, Jan. 31, 1990.  
Institute for Theoretical Physics, Santa Barbara CA, Jan. 19, 1990.  
University of Toronto, Toronto ON, Oct. 24, 1989.
- “Cosmology and Dark Matter”  
University of Toronto, Toronto ON, March 5, 1989.
- “Technibaryon Spectroscopy”  
Harvard University, Cambridge MA, March 8 1989.
- “Limits on a Light Higgs Boson”  
Joint Theory Seminar, Mass. Inst. of Tech., Cambridge MA, March 1, 1989.  
University of Pennsylvania, Philadelphia PA, Jan. 30, 1989.
- “Dynamical Electroweak Symmetry Breaking”  
Brown University, Providence RI, Feb. 23, 1989.
- “Particle Physics in the 1990s”  
Boston University, Boston MA, Jan. 17, 1989.
- “Technivector Meson Production”  
APS Division of Particles and Fields Meeting, Storrs CT, Aug. 1988.  
Workshop on High Energy Physics in the 1990s, Snowmass CO, July 1988.
- “Higgs Decay into Goldstone Bosons”  
“High Energy Physics in the 1990s”, Snowmass CO, July 1988.
- “Flavor Symmetries and ETC”  
Aspen Center for Physics, July 1988.  
Yale University, New Haven CT, March 1988

## Other Professional Talks

- “The Dow STEM Scholars Program”  
Co-Integrate Mathematics Seminar, MSU Create for STEM Institute  
w/K. Renn and R. Rennie, Jan. 25, 2016
- “Learning Analytics and Student Success”  
Lunch presentation, MSU Seminars in Research and Instructional Technology  
Jan. 6, 2016
- “Data-Driven Education Models”  
Panel speaker, Global Engineering Dean’s Council meeting.  
Dec. 2, 2015, Adelaide, Australia.
- “Learning Analytics at MSU”  
MSU WFLAL/LEAD Workshop for Faculty and Administrative Leaders  
Organizer and Presenter, Oct. 21, 2015
- “Documenting and Evaluating Teaching”  
MSU F&OD Panel Presentation, May 11, 2015
- “Negotiation Workshop”  
ICTP Workshop on Professional Development for Women, 3 hrs., Oct. 12-16, 2015, Trieste,  
Italy.
- “Student Analytics at MSU”  
MSU Analytics IT Platform “Kick-off” meeting, March 10, 2015.  
MSU UGAAD Medium (Associate Deans and Advising Directors) Meeting, March 24,  
2015.  
Instructional Brown Bag Seminar, Oct. 2, 2015.
- “From Associate Professor to Professor”  
MSU F&OD Panel Presentation, Feb. 19, 2015.
- “Associate Dean: What does this role entail?”  
MSU F&OD Panel in series on Workshops for Faculty on Leadership and Academic Life,  
Nov. 30, 2011.
- “Career Panel: Particle Theory Postdoc and Faculty Jobs”  
LHC-TI Workshop, Simons Center, SUNY Stony Brook, Mar. 18, 2013.  
LHC-TI Workshop, SLAC, Oct. 13, 2011  
LHC-TI Workshop, BNL, Oct. 7, 2010  
LHC-TI Workshop, FNAL, Oct. 30, 2009.
- “Panel on Dual-Career Academic Couples”  
“Leaky Pipeline” Seminar, MSU (org. by Cynthia Jordan), April 28, 2010.
- “Academicjobsonline.org: Online Postdoc Applications”  
Aspen Center for Physics, July 9, 2009  
DPF Executive Committee, May 4, 2009
- “The MSU High-Energy Physics Group”

Nagoya GCOE Kickoff Conference, Feb. 17, 2009.

- “The Importance of Engagement”  
MSU Faculty Leaders Workshop on Faculty Governance, Oct. 13, 2008.
- “LHC-TI: NSF Proposal Reviews”  
May 17, 2006, PHENO 2006, Madison, Wisconsin.
- “Introduction to University-Based Program”  
April 18-19, 2004, HEPAP Meeting, Washington DC.
- “Universities and the FY04 Budget”  
March 6-7, 2003, HEPAP Meeting, Berkeley, CA.

### **Outreach Talks and Activities**

- “Tritium, Quarks, and Atoms”  
Physics BBQ Aspen Science Center, presented at Rocky Mountain College Carbondale, CO, July 22, 2015.
- “Atoms”  
Girl Scout STEM Day Visit, Michigan State University, Jan. 19, 2013.
- “Newsflash: CERN Reports on the Higgs”  
Aspen Grassroots TV Interview, July 6, 2012.
- “Nature’s Fundamental Forces”  
Frontiers in Science Weekend Workshop Series for teachers, Nov. 12, 2011.
- Presentation on “Feynman: A Graphic Novel”, by Jim Ottaviani  
Schuler Books, Eastwood Towne Centre, Oct. 18, 2011.
- “String Theory: A View from the Outside”  
MSU REU Student Seminar, Aug. 2 2013.  
MSU REU Student Seminar, June 14. 2012.  
MSU REU Student Seminar, August 1, 2011.  
MSU REU Student Seminar, June 25, 2010.  
MSU REU Student Seminar, June 11, 2009.  
MSU REU Student Seminar, June 12, 2008.  
MSU REU Student Seminar, July 5, 2007.  
MSU REU Student Seminar, July 25, 2006.  
MSU Society of Physics Students, Feb. 27, 2006.
- “Particle Physics Mysteries”  
Middle School Girls Math Science Conference, East Lansing High School, Feb. 12, 2011.  
Middle School Girls Math Science Conference, East Lansing High School, Feb. 13, 2010.  
Middle School Girls Math Science Conference, East Lansing High School, Feb. 7, 2009.  
Middle School Girls Math Science Conference, East Lansing High School, Feb. 9, 2008  
Middle School Girls Math Science Conference, East Lansing High School, Feb. 10, 2007  
Middle School Girls Math Science Conference, East Lansing High School, Feb. 11, 2006.



- “Light and Atoms”
  - Spartan Science Day, MSU Lyman Briggs College, April 1, 2011
  - Spartan Science Day, MSU Lyman Briggs College, Mar. 20, 2009
- “Mysteries of the Quantum World”
  - “VIPP Talented Korean High School Student Institute,” Michigan State University, Nov. 14, 2011.
  - “VIPP Talented Korean High School Student Institute,” Michigan State University, Feb. 10, 2011.
  - “VIPP Korean Teachers Workshop,” Michigan State University, July 30, 2010.
  - “VIPP Talented Korean High School Student Institute,” Michigan State University, Feb. 1, 2010.
- “Gravity: From Newton to Einstein”
  - “VIPP Korean Teachers Workshop,” Michigan State University, July 30, 2010.
- “Cosmic Forces of Nature: Gravity”
  - “Grandparents University,” Michigan State University, June 30, 2010.
  - “VIPP Korean Teachers Workshop,” Michigan State University, July 29, 2009.
  - “VIPP Korean Teachers Workshop,” Michigan State University, July 24, 2008.
  - “Grandparents University,” Michigan State University, June 25, 2008.
  - The Summer Science Program, New Mexico Tech, Socorro, NM, June 20, 2008.
  - “VIPP Korean Teachers Workshop,” Michigan State University, Aug. 9, 2007.
  - “Grandparents University,” Michigan State University, June 27, 2007.
- “Physics at the Energy Frontier: the Quest to Uncover the Origin of Mass”
  - After Hours Conversation, Institute for Advanced Study, Oct. 19, 2009
- “Tritium, Chocolate, and Ping-Pong Balls: Building Atoms”
  - “Physics for Kids Barbecue,” Aspen Center for Physics, Aug. 6, 2008.
- “Atoms, Nuclei, and Quarks”
  - Spartan Science Day, MSU Lyman Briggs College, April 11, 2008.
  - Spartan Science Day, MSU Lyman Briggs School of Science, April 20, 2007.
  - Spartan Science Day, MSU Lyman Briggs School of Science, Mar. 30, 2006.
- “The Expanding Universe”
  - “Physics for Kids Barbecue,” Aspen Center for Physics, July 27, 2005.