

JACOB LEWIS BOURJAILY

bourjaily(at)psu.edu

<http://www-personal.umich.edu/~jbourj/>

Academic Positions:

Penn State University , University Park, Pennsylvania, USA. Associate Professor of Physics	2020–
Harvard University , Cambridge, Massachusetts, USA. Visiting Professor	2019
Niels Bohr Institute , University of Copenhagen, Copenhagen Ø, Denmark. Affiliated Professor of Physics	2020–
Associate Professor of Physics (fixed term)	2019–2020
Assistant Professor of Physics (fixed term)	2014–2019
Harvard University , Cambridge, Massachusetts, USA. Junior Fellow, Harvard Society of Fellows	2011–2014

Education:

Princeton University , Princeton, New Jersey, USA. Ph.D. in Theoretical Physics	2008–2011
M.A. in Physics	2006–2008
Cambridge University , Trinity College, Cambridge, UK. M.A.St. (Master of Advanced Studies) in Mathematics	2005–2006
University of Michigan , Ann Arbor, Michigan, USA. B.S. with Highest Honors in Physics and Mathematics	2002–2005

Research Funding, Grants and Fellowships:

Royal Society (UK) University Research Fellowship (declined): £782,205 (≈\$955,600)	2019
Ernest Rutherford Fellowship, STFC (declined): £503,405.60 (≈\$670,000)	2019
ERC Starting Grant : €1,499,695 (≈\$1,759,000)	2018
Villum Foundation Young Investigator Research Grant : 7,390,515 DKK (≈\$1,035,000)	2017
Danish Council for Independent Research MOBILEX Grant : 2,000,187 DKK (≈\$335,000)	2014
Harvard University Milton Grant : \$40,000	2012

Academic Honors and Other Awards:

Simons Visiting Scientist , Galileo Galilei Institute	2018
Young Investigators Award , Villum Foundation	2017
Marshall Scholarship , Marshall Aid Commemoration Commission, UK	2005–2006
National Science Foundation Graduate Research Fellowship	2005–2009
Casey Award for Public Outreach , Public Museum of Grand Rapids	2014
Prize for Outstanding Teaching , Princeton University Physics Department	2010–2011
Margaret Hunt Scholarship , U of M College of Literature Science & the Arts <i>covering all tuition and living expenses during my undergraduate education</i>	2003–2005
Writ and Mary Cornwell Scholarship , University of Michigan Department of Physics	2005
Outstanding Achievement in Mathematics Award , U of M Department of Mathematics	2005
Barry M. Goldwater Scholarship	2004
Best Student , Erice International School of Subnuclear Physics	2004
Best Presentation of a Theoretical Subject , Erice International School of Subnuclear Physics	2004
Otto Graf Scholarship , University of Michigan Honors Program	2004
Frank C. Mock Fellowship , University of Michigan Department of Physics	2004
Arthur B. Singleton Distinguished Class Prize , U of M College of Engineering <i>awarded to the most outstanding first year student at the College of Engineering</i>	2003
Kikuchi Memorial Scholar , U of M Dept. of Nuclear Engineering and Radiological Sciences <i>awarded to the most outstanding second [sic] year student of nuclear engineering</i>	2003
Continuous Merit Scholar , U of M Dept. of Nuclear Engineering and Radiological Sciences	2003
Roger B. Chaffee Astronaut Memorial Scholar	2002

Research Publications: (total papers: 54; *h*-index: 29; total citations: 2,750+)

- J. Bourjaily, C. Langer, and K. Patatoukos, *Locally Finite Observables in sYM*, [[arXiv:2102.02821](#)].
- J. Bourjaily, N. Kalyanapuram, C. Langer, and K. Patatoukos, *Prescriptive Unitarity with Elliptic Leading Singularities*, [[arXiv:2102.02210](#)].
- J. Bourjaily, N. Kalyanapuram, C. Langer, K. Patatoukos, and M. Spradlin, *An Elliptic Yangian-Invariant, ‘Leading Singularity’*, [[arXiv:2012.14438](#)].
- J. Bourjaily, E. Herrmann, C. Langer, and J. Trnka, *Building Bases of Loop Integrands*, JHEP **11** (2020) 116, [[arXiv:2007.13905](#)].
- J. Bourjaily, H. Holmfridur Hannesdottir, A. J. McLeod, M. Schwartz, and C. Vergu, *Sequential Discontinuities of Feynman Integrals and the Monodromy Group*, JHEP (in press), [[arXiv:2007.13747](#)].
- J. Bourjaily, E. Gardi, A. J. McLeod, and C. Vergu, *All-Mass n -gons in n Dimensions*, JHEP, **08** (2020) 029, [[arXiv:1912.11067](#)].
- J. Bourjaily, M. Volk, and M. von Hippel, *Conformally Regulated Direct Integration of the Two-Loop Heptagon Remainder*, JHEP **02** (2020) 095, [[arXiv:1912.05690](#)].
- J. Bourjaily, E. Herrmann, C. Langer, A. J. McLeod, and J. Trnka, *All-Multiplicity Non-Planar MHV Amplitudes in sYM at Two Loops*, Phys.Rev.Lett. **124** (2020) 11, [[arXiv:1911.09106](#)].
- J. Bourjaily, A. J. McLeod, C. Vergu, M. Volk, M. von Hippel, and M. Wilhelm, *Rooting Out Letters: Octagonal Symbol Alphabets and Algebraic Number Theory*, JHEP **2002** (2020) 025, [[arXiv:1910.14224](#)].
- J. Bourjaily, A. J. McLeod, C. Vergu, M. Volk, M. von Hippel, and M. Wilhelm, *Embedding Feynman Integral (Calabi-Yau) Geometry in Weighted Projective Space*, JHEP **2001** (2020) 078, [[arXiv:1910.01534](#)].
- J. Bourjaily, E. Herrmann, C. Langer, A. J. McLeod, and J. Trnka, *Prescriptive Unitarity for Non-Planar Six Particle Amplitudes at Two Loops*, JHEP **012** (2019) 073, [[arXiv:1909.09131](#)].
- J. Bourjaily, F. Dulat, and E. Panzer, *Manifestly Dual-Conformal Loop Integration*, Nucl.Phys. **B 942** (2019) 251, [[arXiv:1901.02887](#)].
- J. Bourjaily, E. Herrmann, and J. Trnka, *Amplitudes at Infinity*, Phys.Rev. **D99** 66006 (2019), [[arXiv:1812.11185](#)].
- J. Bourjaily, A. J. McLeod, M. von Hippel, and M. Wilhelm, *A (Bounded) Bestiary of Feynman Integral Calabi-Yau Geometries*, Phys.Rev.Lett. **122** (2019) 031601, [[arXiv:1810.07689](#)].
- J. Bourjaily, A. J. McLeod, M. von Hippel, and M. Wilhelm, *Rationalizing Loop Integration*, JHEP **1808** (2018) 184, [[arXiv:1805.10281](#)].
- J. Bourjaily, Y-H. He, A. J. McLeod, M. von Hippel, and M. Wilhelm, *Traintracks Through Calabi-Yaus: Amplitudes Beyond Elliptic Polylogarithms*, Phys.Rev.Lett. **121** (2018) 071603, [[arXiv:1805.09326](#)].
- J. Bourjaily, A. J. McLeod, M. Spradlin, M. von Hippel, and M. Wilhelm, *Elliptic Double-Box Integrals*, Phys.Rev.Lett. **120** (2018) 121603, [[arXiv:1712.02785](#)].
- J. Bourjaily, E. Herrmann, and J. Trnka, *Prescriptive Unitarity*, JHEP **1705** (2017) 1, [[arXiv:1704.05460](#)].
- J. Bourjaily, S. Haco, S. Hawking, and M. Perry, *The Conformal BMS Group*, JHEP **1711** (2017) 12, [[arXiv:1701.08110](#)].
- C. Baadsgaard, N. E. J. Bjerrum-Bohr, J. Bourjaily, and P. H. Damgaard, *String-Like Dual Models for Scalar Theories*, JHEP **1612** (2016) 019, [[arXiv:1610.04228](#)].
- J. Bourjaily, P. Heslop, V-V. Tran, *Amplitudes and Correlators to Ten Loops Using Simple, Graphical Bootstraps*, JHEP **1611** (2016) 125, [[arXiv:1609.00007](#)].
- N. E. J. Bjerrum-Bohr, J. Bourjaily, P. H. Damgaard, and B. Feng, *Manifesting Color-Kinematics Duality in the Scattering Equation Formalism*, JHEP **1609** (2016) 094, [[arXiv:1608.00006](#)].
- J. Bourjaily, S. Franco, D. Galloni, and C. Wen, *Stratifying On-Shell Cluster Varieties: the Geometry of Non-Planar On-Shell Diagrams*, JHEP **1610** (2016) 003, [[arXiv:1607.01781](#)].
- N. E. J. Bjerrum-Bohr, J. Bourjaily, P. H. Damgaard, and B. Feng, *Analytic Representations of Yang-Mills Amplitudes*, Nucl.Phys. **B 913** (2016) 964, [[arXiv:1605.06501](#)].
- J. Bourjaily, P. Heslop, V-V. Tran, *Perturbation Theory at Eight Loops: Novel Structures and the Breakdown of Manifest Conformality*, Phys.Rev.Lett. **116** (2016) 191602, [[arXiv:1512.07912](#)].
- C. Baadsgaard, N. E. J. Bjerrum-Bohr, J. Bourjaily, S. Caron-Huot, P. H. Damgaard, and B. Feng, *New Representations of the Perturbative S-Matrix*, Phys.Rev.Lett. **116** (2016) 061601, [[arXiv:1509.02169](#)].

- C. Baadsgaard, N. E. J. Bjerrum-Bohr, J. Bourjaily, P. H. Damgaard, and B. Feng, *Integration Rules for Loop Scattering Equations*, JHEP **1511** (2015) 080, [[arXiv:1508.03627](#)].
- C. Baadsgaard, N. E. J. Bjerrum-Bohr, J. Bourjaily, and P. H. Damgaard, *Scattering Equations and Feynman Diagrams*, JHEP **1509** (2015) 136, [[arXiv:1507.00997](#)].
- C. Baadsgaard, N. E. J. Bjerrum-Bohr, J. Bourjaily, and P. H. Damgaard, *Integration Rules for Scattering Equations*, JHEP **1509** (2015) 129, [[arXiv:1506.06137](#)].
- J. Bourjaily and J. Trnka, *Local Integrand Representations of All Two-Loop Amplitudes in Planar SYM*, JHEP **1508** (2015) 119, [[arXiv:1505.05886](#)].
- N. Arkani-Hamed, J. Bourjaily, F. Cachazo, A. Postnikov, and J. Trnka, *On-Shell Structures of MHV Amplitudes Beyond the Planar Limit*, JHEP **1506** (2015) 179, [[arXiv:1412.8475](#)].
- N. Arkani-Hamed, J. Bourjaily, F. Cachazo, and J. Trnka, *On the Singularity Structure of Maximally Supersymmetric Scattering Amplitudes*, Phys.Rev.Lett. **113** (2014) 261603, [[arXiv:1410.0354](#)].
- J. Bourjaily, S. Caron-Huot, and J. Trnka, *Dual-Conformal Regularization of Infrared Loop Divergences and the Chiral Box Expansion*, JHEP **1501** (2015) 001, [[arXiv:1303.4734](#)].
- J. Bourjaily, *Positroids, Plabic Graphs, and Scattering Amplitudes* in MATHEMATICA, [[arXiv:1212.6974](#)].
- N. Arkani-Hamed, J. Bourjaily, F. Cachazo, A. Goncharov, A. Postnikov, and J. Trnka, *Scattering Amplitudes and the Positive Grassmannian*, [[arXiv:1212.5605](#)].
- J. Bourjaily, A. Dire, A. Shaikh, M. Spradlin, and A. Volovich, *The Soft-Collinear Bootstrap: $\mathcal{N}=4$ Yang-Mills Amplitudes at Six and Seven Loops*, JHEP **1203** (2012) 032, [[arXiv:1112.6432](#)].
- N. Arkani-Hamed, J. Bourjaily, F. Cachazo, A. Hodges, and J. Trnka, *A Note on Polytopes for Scattering Amplitudes*, JHEP **1204** (2012) 081, [[arXiv:1012.6030](#)].
- N. Arkani-Hamed, J. Bourjaily, F. Cachazo, and J. Trnka, *Local Integrals for Planar Scattering Amplitudes*, JHEP **1206** (2012) 125, [[arXiv:1012.6032](#)].
- J. Bourjaily, *Efficient Tree Amplitudes in $\mathcal{N}=4$: Automatic BCFW Recursion* in MATHEMATICA, [[arXiv:1011.2447](#)].
- N. Arkani-Hamed, J. Bourjaily, F. Cachazo, S. Caron-Huot, and J. Trnka, *The All-Loop Integrand for Scattering Amplitudes in $\mathcal{N}=4$ SYM*, JHEP **1101** (2011) 041, [[arXiv:1008.2958](#)].
- J. Bourjaily, J. Trnka, A. Volovich, and C. Wen, *The Grassmannian and the Twistor String: Connecting All Trees in $\mathcal{N}=4$ SYM*, JHEP **1101** (2011) 038, [[arXiv:1006.1899](#)].
- N. Arkani-Hamed, J. Bourjaily, F. Cachazo, and J. Trnka, *Unification of Residues and Grassmannian Dualities*, JHEP **1101** (2011) 049, [[arXiv:0912.4912](#)].
- N. Arkani-Hamed, J. Bourjaily, F. Cachazo, and J. Trnka, *Local Spacetime Physics from the Grassmannian*, JHEP **1101** (2011) 108, [[arXiv:0912.3249](#)].
- J. Bourjaily, *Effective Field Theories for Local Models in F-Theory and M-Theory*, [[arXiv:0905.0142](#)].
- J. Bourjaily, *Local Models in F-Theory and M-Theory with Three Generations*, [[arXiv:0901.3785](#)].
- J. Bourjaily and S. Espahbodi, *Geometrically Engineerable Chiral Matter in M-Theory*, [[arXiv:0804.1132](#)].
- J. Bourjaily, *Unfolding Geometric Unification in M-Theory*, [[arXiv:0706.3364](#)].
- J. Bourjaily, *Geometrically Engineering the Standard Model: Locally Unfolding Three Families out of E_8* , Phys.Rev. **D76** (2007) 045004, [[arXiv:0704.0445](#)].
- J. Bourjaily, *Multiple Unfoldings of Orbifold Singularities: Engineering Geometric Analogies to Unification*, Phys.Rev. **D79** (2009) 046005, [[arXiv:0704.0444](#)].
- J. Bourjaily, G. Kane, P. Kumar, and T. Wang, *Outside the mSUGRA Box*, [[hep-ph/0504170](#)].
- J. Bourjaily and G. Kane, *What is the Cosmological Significance of a Discovery of Wimps at Colliders or in Direct Experiments?*, [[hep-ph/0501262](#)].
- J. Bourjaily, *Determining the Actual Local Density of Dark Matter Particles*, Eur.Phys.J. C Direct (2005), [[astro-ph/0410470](#)].
- J. Bourjaily, *Weighing the Dark Matter Halo*, “IDM 2004: The 5th International Workshop on the Identification of Dark Matter,” eds. N. Spooner *et al.*, [[astro-ph/0411409](#)].

Books:

- N. Arkani-Hamed, J. Bourjaily, F. Cachazo, A. Goncharov, A. Postnikov, and J. Trnka, *Grassmannian Geometry of Scattering Amplitudes*, Cambridge University Press, 2016.

Invited Contributions and Reviews:

- J. Bourjaily and H. Thomas, *What is the Amplituhedron?*, Notices, American Mathematical Society, **60**, 2018.

Reviews of Research in the Popular Press:

- A. Ananthaswamy, “The Geometry of Space-Time”, (Cover Story,) *New Scientist*, **3136**, 29 July 2017.
 N. Wolchover, “A Jewel at the Heart of Quantum Physics,” *Quanta Magazine*, 2013.
 E. Reich, “Rethinking Particle Dynamics,” *Nature*, **502**, 2013, 19.
 R. Highfield, “Physics Won’t be the Same Again,” *The Telegraph*, 8 October 2013.
 A. Hodges, “Particle Physics: Theory with a Twistor,” *Nature Physics* **9**, 2013, 205-206.
 N. Turok, “Particle Physics: Beyond Feynman’s Diagrams,” *Nature* **469**, 2011, 165-166.

Invited Colloquia, Seminars, Conferences, Workshops, Schools, and Public Lectures:

2020

- Dec. **Conference Organizer**, *QCD Meets Gravity VI*, Northwestern University, Evanston, IL.
 Nov. **Public Lecture**, *Maron Memorial Lecture*, GR Amateur Astronomical Association, Grand Rapids, MI.
Public Lecture, Public Museum of Grand Rapids, Grand Rapids, MI.
 Sept. **Conference Organizer**, *Elliptics and Beyond, 2020*, Zoom.
 July **Invited Lecture**, *Recent Developments in S-Matrix Theory*, ICTS, TIFR, Bangalore, India.
 Mar. **Invited Seminar**, Institute for Gravitation and Cosmology, Penn State University, PA.
Invited Lecture, *Cluster Algebras Workshop*, Higgs Centre, University of Edinburgh, Edinburgh, UK.
 Feb. **Invited Lecturer**, 2nd SageX Training School, Humboldt-Universität, Berlin, Germany.

2019

- Nov. **Invited Speaker**, Joint MIT-Harvard-MSR *Combinatorics Seminar*, Harvard Mathematics, Cambridge, MA.
Invited Seminar, University of New Hampshire, Durham, NH.
Invited Seminar, Theoretical Physics Group, Brown University, Providence, RI.
 Oct. **Invited Seminar**, High Energy Theory Group, McGill University, Montréal, Canada.
 July **Workshop Organizer**, *Amplitudes and the Conformal Bootstrap*, Aspen Center for Physics, Aspen, CO.
 June **Invited Speaker**, *Amplitudes 2019*, Trinity College, Dublin, Ireland.
Invited Seminar, Theoretical Physics Seminar, Nikhef, Amsterdam, Netherlands.
 May **Invited Lecturer**, *PhD School on Amplitudes, Cosmology, and Positive Geometry*, Lecce, Italy.
Colloquium, Department of Applied Mathematics and Theoretical Physics, Cambridge University, UK.
Invited Lecture, *Simons Symposium: Amplitudes Meets Cosmology*, Elmau, Germany.
Invited Seminar, CERN Theory Division, Genève, Switzerland.
 Apr. **Colloquium**, Niels Bohr International Academy, Københavns University, Copenhagen, Denmark.
Colloquium, Higgs Centre for Theoretical Physics, University of Edinburgh, Edinburgh, UK.
 Mar. **Invited Lecture**, *Frontiers of Theoretical Physics*, The Graduate Center, CUNY, New York, NY.
Local Organizer, Simons Meeting: *Amplitudes in String and Field Theory*, NBIA, Copenhagen, Denmark.
Invited Seminar, *Special Theoretical Physics Seminar*, Yale University, New Haven, CT.
 Feb. **Colloquium**, Physics Department, Penn State University, State College, PA.
Local Organizer, Simons Meeting: *Hadronic Strings & Large-N Theory*, NBIA, Copenhagen, Denmark.
 Jan. **Invited Seminar**, Theory Group Seminar, Max-Planck-Institut für Physik, München, Germany.
Invited Seminar, String Theory Seminar, DESY & University of Hamburg, Hamburg, Germany.

2018

- Invited Seminar**, QMAP, Physics Department, University of California, Davis, CA.
 Dec. **Colloquium**, High Energy Physics Group, Zhejiang Institute of Modern Physics, Hangzhou, China.
Invited Seminar, High Energy Physics Group, Zhejiang Institute of Modern Physics, Hangzhou, China.
 Nov. **Simons Visiting Scientist**, *Amplitudes in the LHC Era*, Galileo Galilei Institute, Arcetri, Florence, Italy.
 Oct. **Invited Speaker**, *Theoretical Tools for Precision Physics*, Galileo Galilei Institute, Arcetri, Florence, Italy.
Invited Seminar, Physics Department, Oxford University, Oxford, UK.
Invited Seminar, Mathematical Institute, Oxford University, Oxford, UK.
 Sept. **Invited Speaker**, *Cooks Branch/Mitchell Meeting*, Brinsop Court, Hereford, UK.
Invited Speaker, *Elliptic Integrals in Mathematics and Physics*, Ascona, Switzerland.
 Aug. **Invited Speaker**, *Integrability in Gauge and String Theory 2018*, Niels Bohr Institute, Copenhagen, Denmark.
Local Organizer, *Current Themes in High Energy Physics and Cosmology*, NBIA, Copenhagen, Denmark.
 June **Invited Speaker**, *Amplitudes 2018*, SLAC, Stanford University, Menlo Park, CA.
Invited Lecturer, *Amplitudes Summer School 2018*, University of California, Davis, CA.
Invited Lecturer, *Structures in Local Quantum Field Theory School*, Les Houches, France.
 May **Invited Seminar**, *Quantum Field and String Seminar*, Humboldt-Universität, Berlin, Germany.
Invited Speaker, *N-Talk*, Niels Bohr International Academy, Københavns University, Copenhagen, Denmark.
 Apr. **Invited Seminar**, *String Duality Seminar*, Harvard Physics Department, Cambridge MA.

- Invited Seminar**, *Geometry and Physics*, Department of Mathematics, Boston University, Boston, MA.
Invited Speaker, *Simons Collaboration Meeting*, CMSA, Harvard Mathematics Department, Cambridge, MA.
- Mar. **Invited Speaker**, *Workshop on Holography and Gauge Theories*, Southampton University, Southampton, UK.
Colloquium, IPhT CEA, Saclay, Paris, France.
Invited Seminar, Mathematical Institute, Oxford University, Oxford, UK.
- Feb. **Invited Seminar**, *Rencontres Théoriciennes*, Institut Henri Poincaré, Paris, France.
Mini-Course, *Cluster Varieties*, Niels Bohr Institute, Københavns University, Copenhagen, Denmark.
- Jan. **Invited Seminar**, Niels Bohr Institute, Københavns University, Copenhagen, Denmark.
- 2017**
- Dec. **Invited Speaker**, *UK Theory Christmas Meeting*, IPPP, Durham University, Durham, UK.
Invited Speaker, *QCD Meets Gravity*, University of California, Los Angeles, CA.
- Nov. **Invited Seminar**, Physics Department, Uppsala University, Uppsala, Sweden.
- Oct. **Invited Seminar**, Department of Mathematics, Københavns University, Copenhagen, Denmark.
- Sept. **International Workshop**, *Mathematics and Physics of Scattering Amplitudes*, MIAPP, München, Germany.
- Aug. **Local Organizer**, *Current Themes in Physics and Cosmology*, Niels Bohr Institute, Copenhagen, Denmark.
Invited Seminar, *Particle and Nuclear Theory Seminar*, Charles University, Prague, Czech Republic.
- Apr. **Invited Seminar**, *Scattering Amplitudes Workshop*, KITP, University of California, Santa Barbara, CA.
Invited Lecture, *Scattering Amplitudes Conference*, KITP, University of California, Santa Barbara, CA.
- Mar. **Invited Seminar**, Physics Department, ETH, Zürich, Switzerland.
Colloquium, Physics Department, Trinity College, Dublin, Ireland.
Invited Seminar, High Energy Physics Theory, McGill University, Montréal, Canada.
- Feb. **Invited Seminar**, High Energy Physics Group, University of California, Los Angeles, CA.
Invited Lecture, *Mainz Workshop on Amplitudes*, MITP, Mainz, Germany.
- Jan. **Invited Seminar**, CEA Saclay, Paris, France.
Invited Seminar, *Seminar Fundamentale Wechselwirkungen*, Freiburg University, Freiburg, Germany.
- 2016**
- International Conference**, *New Horizons in Twistor Theory*, Oxford University, Oxford, UK.
- Dec. **Invited Speaker**, *QMAP (Inaugural) Conference*, University of California, Davis, CA.
Invited Speaker, *QCD Meets Gravity Conference*, University of California, Los Angeles, CA.
Invited Seminar, Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal.
- Nov. **Invited Seminar**, Physics Department, University of California, Los Angeles, CA.
- Oct. **Invited Seminar**, Mathematics Department, University of California, Davis, CA.
Invited Lecture, *Amplitudes in Asia 2016*, Beijing, China.
- Sept. **Invited Lecture**, *Mitchell Meeting on Theoretical Physics*, Brinsop Court, Hereford, England.
Invited Lecture, *New Formulations of Amplitudes*, Ludwig-Maximilians-Universität, München, Germany.
- Aug. **Local Organizer**, *Current Themes in Physics and Cosmology*, Niels Bohr Institute, Copenhagen, Denmark.
- July **Invited Lecture**, *Amplitudes 2016*, NORDITA, Stockholm, Sweden.
- June **International Workshop**, *Aspects of Amplitudes*, NORDITA, Stockholm, Sweden.
Invited Lectures, *California Amplitudes Meeting*, University of California, Davis, CA.
- May **Invited Lecture Series**, *Cracow School of Theoretical Physics*, Zakopane, Poland.
- Mar. **Invited Seminar**, Physics Department, University of California, Los Angeles, CA.
International Conference, *MHV@30*, Fermilab, Batavia, IL.
- Feb. **Invited Seminar**, Mathematics Department, University of California, Davis, CA.
Invited Seminar, Physics Department, Brown University, Providence, RI.
- 2015**
- Invited Seminar**, Physics Department, University of California, Davis, CA.
- Dec. **Invited Seminar**, Ludwig-Maximilians-Universität, München, Germany.
- Nov. **Invited Lecture**, *Amplitudes in Asia 2015*, National Center for Theoretical Sciences, Taipei, Taiwan.
- Oct. **Public Lecture**, *Great Lakes Planetarium Association Annual Conference*, Grand Rapids, MI.
- Aug. **Local Organizer**, *Current Themes in Physics and Cosmology*, Niels Bohr Institute, Copenhagen, Denmark.
Invited Lecture, *Positive Grassmannians Workshop*, CRM, University of Montréal, Canada.
- July **Invited Lecture**, Aspen Center for Physics, Aspen, CO.
Public Lecture, Aspen Science Center and the Aspen Center for Physics, Aspen, CO.
- June **Invited Lecture**, *Strings 2015*, Tata Institute of Fundamental Research, Bangalore, India.
Invited Lectures, Humboldt-Universität, Berlin, Germany.
- May **Invited Seminar**, Joint Belgium High Energy Seminar, University of Leuven, Leuven, Belgium.

- Invited Seminar**, CERN Theory Division, Genève, Switzerland.
- Apr. **Public Lecture**, Grand Rapids Amateur Astronomical Association, Grand Rapids, MI.
Colloquium, *NBIA-Oxford Theory Colloquium*, NBIA, Copenhagen, Denmark.
Invited Seminar, California Institute of Technology, Pasadena, CA.
- Mar. **Public Lecture**, Kendall College of Art and Design, Ferris State University, Grand Rapids, MI.
Invited Seminar, Niels Bohr International Academy, University of Copenhagen, Copenhagen, Denmark.
Invited Seminar, *Schrödinger Institute Workshop*, Vienna, Austria.
Invited Lecture Series, *Schrödinger Institute Master Class*, Vienna, Austria.
- Feb. **Invited Seminar**, INFN University of Rome, Tor Vergata, Italy.
- Jan. **Invited Lecture Series**, *Nordic Winter School on Cosmology and Particle Physics*, Lillehammer, Norway.
- 2014**
- Dec. **Invited Lectures**, *Grassmannian Geometry of Scattering Amplitudes*, Caltech, Pasadena, CA.
- Nov. **Invited Lecture**, *IAS Focused Program on Scattering Amplitudes*, HKUST, Hong Kong, China.
Public Lecture, *News from the Niels Bohr International Academy*, NBIA, Copenhagen, Denmark.
- Sept. **International Workshop**, *New Geometric Structures in Scattering Amplitudes*, Oxford, England.
Invited Seminar, CP³ Origins, University of Southern Denmark, Odense, Denmark.
- Aug. **Invited Lecture**, *Current Themes in Physics and Cosmology*, Niels Bohr Institute, Copenhagen, Denmark.
- July **Plenary Lecture**, *SUSY 2014*, Manchester University, Manchester, England.
- May **Invited Lecture**, *Rep. Theory, Integrable Systems & Quantum Fields*, Northwestern University, Evanston, IL.
- Apr. **Invited Seminar**, Niels Bohr International Academy, Copenhagen, Denmark.
- Mar. **Invited Seminar**, *AMS Sectional Meeting*, University of Tennessee, Knoxville, TN.
Invited Seminars, Physics and Mathematics Departments, University of Texas, Austin, TX.
Plenary Lecture, *IEEE Aerospace Conference*, Yellowstone, MT.
- Feb. **Colloquium**, Triangle Nuclear Theory, Duke University, Durham, NC.
Invited Lecture, *Workshop on Amplitudes*, California Institute of Technology, Pasadena, CA.
- Jan. **Invited Seminar**, Physics Department, University of California, Berkeley, CA.
Combinatorics Seminar, Mathematics Department, University of California, Berkeley, CA.
- 2013**
- Invited Seminar**, SLAC, Stanford University, Menlo Park, CA.
- Dec. **Invited Seminar**, Physics Department, Brown University, Providence, RI.
- Nov. **Invited Seminar**, California Institute of Technology, Pasadena, CA.
Invited Lecture Series, *SPOCK Symposium*, Thomas More College, Crestview Hills, KY.
Invited Seminar, University of Cincinnati, Cincinnati, OH.
Invited Seminar, University of Michigan, Ann Arbor, MI.
- Oct. **Invited Lecture**, *Physics and Mathematics of Scattering Amplitudes*, Simons Center, Stony Brook, NY.
- July **Invited Lecture**, Aspen Center for Physics, Aspen, CO.
Invited Lecture, *Amplitudes, Strings and Branes*, CERN, Genève, Switzerland.
Invited Lecture Series, *London Mathematical Society Summer School*, Durham, England.
Invited Lecture, *London Mathematical Society Symposium*, Durham, England.
- May **Invited Lecture Series**, Weizmann Institute, Rehovot, Israel.
- Apr. **Invited Seminar**, Harvard University, Cambridge, MA.
Invited Seminar, Massachusetts Institute of Technology, Cambridge, MA.
Keynote Speaker, Roger B. Chaffee Astronaut Memorial Scholarship, Grand Rapids, MI.
Public Lecture, Grand Rapids Amateur Astronomical Association, Grand Rapids, MI.
- Mar. **Invited Lecture**, *Cook's Branch Workshop*, Montgomery, TX.
Invited Seminar, University of New Hampshire, Durham, NH.
Invited Seminar, Carnegie Mellon University, Pittsburgh, PA.
- Feb. **Invited Seminar**, Syracuse University, Syracuse, NY.
- 2012**
- Nov. **Invited Seminar**, Harvard University, Cambridge, MA.
- Oct. **Invited Seminar**, Boston University, Boston, MA.
- Sept. **Invited Seminar**, Tata Institute of Fundamental Research, Bangalore, India.
- Aug. **Invited Lecture**, *Geometry of Scattering Amplitudes Workshop*, Banff, Alberta, Canada.
Invited Lecture, *International Congress on Mathematical Physics*, Aalborg, Denmark.
- Apr. **Invited Seminar**, Harvard University, Cambridge, MA.

TEDx Talk, *TEDxUofM Conference*, Ann Arbor, MI.

Mar. **Invited Lecture**, *Amplitudes 2012*, DESY, Hamburg, Germany.

Feb. **Invited Seminar**, Brandeis University, Waltham, MA.

Jan. **Invited Seminar**, Cornell University, Ithaca, NY.

2011

Nov. **International Conference**, *Amplitudes 2011*, University of Michigan, Ann Arbor, MI.

Oct. **Public Lecture**, Grand Rapids Amateur Astronomical Association, Grand Rapids, MI.

Aug. **Invited Lecture Series**, *MATHEMATICA Summer School on Theoretical Physics*, Waterloo, Canada.

June **Invited Seminars**, Institute for the Physics and Mathematics of the Universe, Tokyo, Japan.

Jan. **Invited Seminar**, University of North Carolina, Chapel Hill, NC.

2010

Nov. **Invited Seminar**, Massachusetts Institute of Technology, Cambridge, MA.

Oct. **Invited Seminar**, Institute for Advanced Study, Princeton, NJ.

Invited Seminar, University of Texas, Austin, TX.

Sept. **Invited Lecture**, *Integrability in Scattering Amplitudes*, Perimeter Institute, Waterloo, Canada.

Invited Seminar, Johns Hopkins University, Baltimore, MD.

June **Summer School**, *Cargèse Summer School on Theoretical Physics 2010*, Corsica, France.

May **International Conference**, *Amplitudes 2010*, London, England.

Feb. **Invited Seminar**, Brown University, Providence, RI.

2009

Nov. **Invited Seminar**, The Ohio State University, Columbus, OH.

June **International Conference**, *Strings 2009*, Rome, Italy.

Invited Lecture, *String Phenomenology 2009*, Warsaw, Poland.

Mar. **Invited Lecture**, *Cook's Branch Workshop*, Montgomery, TX.

Feb. **Invited Seminar**, Harvard University, Cambridge, MA.

Jan. **Winter School**, *Winter School in Theoretical Physics*, Institute for Advanced Studies, Jerusalem, Israel.

2008

Oct. **Invited Lecture**, *Stringy Reflections on The LHC*, Clay Mathematics Institute, Cambridge, MA.

Aug. **International Conference**, *Strings 2008*, CERN, Genève, Switzerland.

Invited Lecture, *String Phenomenology 2008*, CERN Theory Institute, Genève, Switzerland.

July **Invited Lecture**, *Simons Workshop in Mathematics and Physics 2008*, Stony Brook, NY.

June **Summer School**, *Cargèse Summer School on Theoretical Physics 2008*, Corsica, France.

May **Invited Seminar**, The Ohio State University, Columbus, OH.

Invited Seminar, Institute for Advanced Study, Princeton, NJ.

Apr. **Invited Lecture**, *String Vacuum Project Workshop*, University of Arizona, Tucson, AZ.

2007

Aug. **Invited Lecture**, *Simons Workshop in Mathematics and Physics 2007*, Stony Brook, NY.

Invited Seminar, Michigan Center for Theoretical Physics, University of Michigan, Ann Arbor, MI.

July **Summer School**, *Les Houches Summer School on Theoretical Physics 2007*, Les Houches, France.

June **International Conference**, *Strings 2007*, Madrid, Spain.

Apr. **Invited Lecture**, *Physics and Mathematics of G_2 Compactifications*, University of Michigan, Ann Arbor, MI.

Mar. **International Conference**, *Physics at the LHC*, Princeton University, Princeton, NJ.

2006

Oct. **International Conference**, *Axions at the IAS*, Institute for Advanced Study, Princeton, NJ.

Sept. **Invited Scientist**, *Erice International School for Subnuclear Physics 2006*, Erice, Sicily, Italy.

Apr. **International Conference**, *LHC Inverse Workshop*, University of Michigan, Ann Arbor, MI.

2005

Sept. **Invited Seminar**, Case Western Reserve, Cleveland, OH.

Aug. **Summer School**, *Les Houches Summer School on Theoretical Physics 2005*, Les Houches, France.

July **Summer School**, *Prospects in Theoretical Physics 2005*, Institute for Advanced Study, Princeton, NJ.

June **Summer School**, *Theoretical Advanced Study Institute (TASI) 2005*, Boulder, CO.

Feb. **Invited Seminar**, Kavli Institute for Cosmological Physics, University of Chicago, Chicago, IL.

2004

Nov. **Colloquium**, Michigan Center for Theoretical Physics, University of Michigan, Ann Arbor, MI.

Sept. **Invited Lecture**, *International Workshop on the Identification of Dark Matter* 2004, Edinburgh, Scotland.
Aug. **Summer School**, *International School of Subnuclear Physics* 2004, Erice, Sicily, Italy.
International Conference, *Strings at CERN*, CERN, Genève, Switzerland.
June **International Conference**, *Strings* 2004, Paris, France.

Teaching Experience:

Associate Professor, 2020 to present.

Penn State University, State College, PA.

Introduction to Quantum Mechanics, Fall 2020.

Subatomic Physics, Spring 2021.

Associate Instructor, Fall 2006 to Spring 2011.

Princeton University, Princeton, New Jersey.

Relativistic Quantum Field Theory II, Spring 2008 and 2010.

Advanced (Graduate) Quantum Mechanics II, Spring 2010.

Analytical Mechanics, Fall 2009.

General Physics Laboratories, Fall 2010 to Spring 2011.

awarded the Physics Department's Prize for Outstanding Teaching, 2010–2011

Future Physics, Fall 2006 to Spring 2011.

Invited Lecture Series, Mini-Courses, and PhD Schools

2nd SageX Training School, Humboldt-Universität, Berlin, Germany, February 2020.

International School on Amplitudes, Cosmology, and Positive Geometry, Lecce, Italy, May 2019.

Amplitudes Summer School, University of California, Davis, CA, June 2018.

Structures in Local Quantum Field Theories, Les Houches, France, June 2018.

Mini-Course on Cluster Varieties, Niels Bohr Institute, Copenhagen, Denmark, February 2018.

Cracow School for Theoretical Physics, Zakopane, Poland, May 2016.

Schrödinger Institute Master Class, Vienna, Austria, March 2015.

Nordic Winter School on Cosmology and Particle Physics, Lillehammer, Norway, January 2015.

SPOCK Symposium, Thomas More College, Crestview Hills, KY, November 2013.

London Mathematical Society Summer School, Durham, England, July 2013.

Mini-Course at the Weizmann Institute, Rehovot, Israel, May 2013.

MATHEMATICA Summer School on Theoretical Physics, Perimeter Institute, Waterloo, Canada, August 2011.

Erice International School for Subnuclear Physics, Erice, Sicily, Italy, September 2006.

Organic Chemistry Laboratory Teaching Assistant, April to August 2002.

Calvin College, Department of Chemistry and Biochemistry, Grand Rapids, Michigan.

Planetarium Lecturer, Producer, and Technician, December 1999 to April 2004.

Roger B. Chaffee Planetarium at the Public Museum of Grand Rapids, Michigan.

References:

Nima Arkani-Hamed

Institute for Advanced Study
Princeton, New Jersey, USA.

Freddy Cachazo

Perimeter Institute for Theoretical Physics
Waterloo, Ontario, Canada.

Poul Henrik Damgaard

Niels Bohr International Academy
Copenhagen Ø, Denmark.

Lance Dixon

Stanford Linear Accelerator Center
Menlo Park, California, USA.

Marcus Spradlin

Brown University
Providence, Rhode Island, USA.

Andrew Strominger

Harvard University
Cambridge, Massachusetts, USA.