Daniel Butter

Curriculum Vitae

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Personal Information

Place of Birth: Pittsburgh, PA, USA **Citizenship**: United States
Family status: Married, one daughter (age 5)
Languages: English (native), Spanish (intermediate), German (elementary), Dutch (elementary)

Academic Positions

Jan. 2017 -	**Research associate**	Mitchell Institute, Texas A&M
Oct. 2016 - Dec. 2016	**Visiting scholar**	Mitchell Institute, Texas A&M
Oct. 2012 - Sep. 2016	**Postdoctoral researcher**	Nikhef Theory Group, Amsterdam
	Marie Curie Fellow	Mar. 2014 - Mar. 2016
Sep. 2010 - Aug. 2012	**Research associate**	School of Physics, University of Western Australia

Education

May 2010 Ph.D. Physics, UC Berkeley
Advisor: Mary K. Gaillard
Thesis: "On conformal superspace and the one-loop effective action in supergravity"

June 2002 A.B. Chemistry and Physics (*summa cum laude*), Harvard University

Honors, Awards, & Fellowships

2014 - 2016 Marie Curie Fellowship (FP7-MC-IIF), €183,000, grant no. 627976
The last piece of the puzzle: Off-shell hypermultiplets in string theory and complex geometry

2011 Research Development Award, University of Western Australia, $11,900
Extended supergravity in particle physics and string theory

2010 Friedman Prize in Applied Mathematics, UC Berkeley
2004 Outstanding Graduate Student Instructor Award, UC Berkeley
2002 Phi Beta Kappa, Harvard University

Teaching experience

Utrecht University and University of Amsterdam

Co-lecturer	*Field Theory in Particle Physics* with B. de Wit and E. Laenen	Spring 2014
Teaching assistant	*Field Theory in Particle Physics*	Spring 2013

University of California, Berkeley

Teaching assistant	Honors Intro. Mechanics	Fall 2009
	Honors Intro. Electrodynamics	Spring 2009
	Intro. Electrodynamics	Spring 2007, Fall 2006, Spring 2004, Spring 2003, Fall 2003
	Quantum Mechanics (II)	Spring 2006
	Quantum Mechanics (I)	Fall 2005, Fall 2004
	Electromagnetism & Optics	Spring 2005
	Intro. Mechanics	Fall 2002

Graduate mentoring

2020-	Artem Bolshov	Ph.D student, Texas A&M University, Advisor: Katrin Becker Guidance on research.
2017	Sunny Guha	Ph.D student, Texas A&M University, Advisor: Katrin and Melanie Becker Co-authored one publication.
2012 - 2016	Franz Ciceri	Ph.D, Utrecht University, Mar. 2017, Advisor: Bernard de Wit Provided guidance. Co-authored one publication, another in process. Currently postdoc at Max Planck Institute, Potsdam
2012 - 2016	Valentin Reys	Ph.D, Utrecht University, Mar. 2016, Advisors: B. de Wit and S. Murthy Provided guidance. Postdoc at Milano-Bicocca. Current postdoc at KU Leuven.
2012 - 2014	Ivano Lodato	Ph.D, Utrecht University, Sept. 2014, Advisor: Bernard de Wit Worked extensively together. Co-authored four publications (two as student). Postdoc at Fudan University, Shanghai.
2011 - 2012	Joseph Novak	Ph.D, University of Western Australia, Jan 2013, Advisor: Sergei Kuzenko Worked extensively together. Co-authored 8 publications (two as student). Postdoc at Max Planck Institute, Humboldt Fellowship. Now working for Western Australian Treasury Corporation.

Conference and Workshops attended (talks in bold)

- Geometry and Duality, Potsdam, December 2-6, 2019
- Strings 2019, Brussels, July 9-13, 2019
- Pre-Strings, Leuven, July 2-5, 2019
- Simons Center's Workshop: Geometrical Aspects of Supersymmetry, Stony Brook, Oct. 22-26, 2018
- 23rd European String Workshop, "Strings, Geometry and Black Holes", King's College London, April 9-13, 2018
- Simons Collaboration on Special Holonomy in Geometry, Analysis and Physics First Annual Meeting, New York, Sept. 14-15, 2017
- Workshop on Special Holonomy, Simons Center, NY, Sept. 11, 2017
  Eleven-Dimensional Supergravity in 4D, N=1 Superspace, Invited talk.
- "Supergravity: what next?", GGI, Florence, Sept. 2016
  Conformal supergravity actions in four and six dimensions
- Amsterdam String Workshop, Amsterdam, July 2015.
- The String Theory Universe, KU Leuven, Sept. 2015
  All rigid $N=2$ supersymmetric backgrounds
- SUSY 2015, Lake Tahoe, Aug. 2015
  All rigid $N=2$ supersymmetric backgrounds
- Simons Summer Workshop, Stony Brook, August 2015.
- Eurostrings 2015, Cambridge UK, March 2015.
- Black Objects Beyond Supersymmetry, Utrecht, Sept 2014.
- SUSY 2014, Manchester, July 2014
  Covariant techniques in projective and harmonic superspace

- Simons Summer Workshop, Stony Brook, July-August 2014.
- String Phenomenology 2014, ICTP Trieste, July 2014.
- Strings 2014, Princeton, June 2014.
- Physics@FOM, Veldhoven, Jan 2014.
- 19th European Workshop on String Theory, Bern, Sept. 2013
  The N=2 Gauss-Bonnet and other higher derivative terms from conformal supergravity
- Integrability in Gauge and String Theory, Utrecht, August 2013.
- SQS 2013 (Dubna), Jul 2013
  The N=2 Gauss-Bonnet invariant from conformal supergravity
- Topics in Holography, Supersymmetry and Higher Derivatives, Mitchell Institute, Texas, April 2013.
- Strings 2012, Munich, July 2012.
- XVII European Workshop on String Theory, Padua, September 2011
  On higher derivative couplings in 4D N=2 supergravity
- Strings 2011, Uppsala, July 2011.

Seminars

- "E_7 ExFT in superspace" Exceptional Geometry Seminar Series, July 24, 2020. (Zoom)
- "M-thoery in $N = \frac{1}{8}$ superspace", BTPC, Brown University, April 17, 2020. (Zoom)
- "Aspects of maximal supergravity", SUNY Oneonta, Feb. 10, 2020.
- "11D supergravity in 4D superspace", String Seminar, Albert Einstein Institute, Potsdam, Apr. 16, 2018.
- "Eleven-Dimensional Supergravity in 4D, N=1 Superspace", String Duality Seminar, Harvard University, Nov. 16, 2017.
- "All rigid $N = 2$ supersymmetric backgrounds and actions", Theory Seminar, Perimeter Institute, Waterloo, Sept. 2015.
- "All rigid $N = 2$ supersymmetric backgrounds", Theory Seminar, Mitchell Institute, Texas A&M, Sept. 2015.
- "All rigid $N = 2$ supersymmetric backgrounds", String Seminar, UC Berkeley, Sept. 2015.
- "Off-shell hypermultiplets in conformal supergravity", String Seminar, Albert Einstein Institute, Potsdam, Feb. 2015.
- "Hypermultiplets and conformal supergravity in projective/harmonic superspace", String Seminar, Groningen, Nov. 2014.
- "Complex geometry and conformal supergravity in projective/harmonic superspace", String Seminar, ITF Utrecht, Sept. 2014.
- "The N=2 Gauss-Bonnet invariant in and out of superspace," Mitchell Institute, Texas A&M, April 2013.
- "Supersymmetry, complex geometry and Hamiltonian mechanics," Nikhef, January 2013.
- "Geometric aspects of N=2 nonlinear sigma models in AdS4", Johns Hopkins, November 2011.
- "Conformal techniques in superspace" String Seminar, ITF Utrecht, July 2011.
- "Conformal $N = 1$ superspace in four dimensions," UWA Seminar, Perth, Sept 2010
- "Superspace Pauli-Villars regularization of super Yang-Mills" 4D Seminar, LBNL, March 2008.
- "Classically conformal N=1, D=4 superspace" String Theory Seminar, UC Berkeley, Apr 2007.

Professional activities

- Organizer TAMU HET seminars (2016-)
- Referee for JHEP, Physics Letters B
- Thesis committees: Ivano Lodato, Utrecht University, Sept. 2014
  Stefanos Katmadas, Utrecht University, July 2011
- Participated in Nikhef Open Day, Oct. 2014
- Organized Nikhef journal club (2012-2013)

Professional References

Prof Bernard de Wit
Nikhef Theory Group
Science Park 105, 1098 XG Amsterdam, The Netherlands,
and Institute for Theoretical Physics, Utrecht University
Leuvenlaan 4, 3584 CE Utrecht, The Netherlands
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Prof Sergei Kuzenko
School of Physics, The University of Western Australia
M013, 35 Stirling Highway, Crawley WA 6009, Australia
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Prof Eric Laenen
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Science Park 105, 1098 XG Amsterdam, The Netherlands
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Prof Martin Roček
C.N. Yang Institute for Theoretical Physics, Stony Brook University
Stony Brook, NY 11794, USA
Email: martin.rocek@stonybrook.edu
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Prof Ergin Sezgin
Mitchell Institute for Fundamental Physics and Astronomy
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Publications

Journal publications

[J38] K. Becker and D. Butter, *4D $N=1$ Kaluza-Klein superspace*, JHEP **2009**, 091 (2020) 2003.01790.

[J37] K. Becker, M. Becker, D. Butter, W. D. Linch and S. Randall, *Five-dimensional Supergravity in N = 1/2 Superspace*, JHEP **2003**, 098 (2020) 1909.09208.

[J36] D. Butter, F. Ciceri and B. Sahoo, *N=4 conformal supergravity: the complete actions*, JHEP **2001**, 029 (2020) [1910.11874].

[J35] D. Butter, H. Samtleben and E. Sezgin, *$E_{7(7)}$ Exceptional Field Theory in Superspace*, JHEP **1901**, 087 (2019) [1811.00038].

[J34] D. Butter, J. Novak, M. Ozkan, Y. Pang and G. Tartaglino-Mazzucchelli, *Curvature squared invariants in six-dimensional $\mathcal{N} = (1,0)$ supergravity*, JHEP **1904**, 013 (2019) [1808.00459].

[J33] K. Becker, M. Becker, D. Butter and W. D. Linch, *$N = 1$ supercurrents of eleven-dimensional supergravity*, JHEP **1805**, 128 (2018) [1803.00050].

[J32] D. Butter, S. Hegde, I. Lodato and B. Sahoo, *$N = 2$ dilaton Weyl multiplet in 4D supergravity*, JHEP **1803**, 154 (2018) [1712.05365].

[J31] K. Becker, M. Becker, D. Butter, S. Guha, W. D. Linch III, and D. Robbins, *Eleven-dimensional supergravity in 4D, $N=1$ superspace*, JHEP **1711**, 199 (2017) [1709.07024].

[J30] D. Butter, J. Novak and G. Tartaglino-Mazzucchelli, *The component structure of conformal supergravity invariants in six dimensions*, JHEP **1705**, 133 (2017) [1701.08163].

[J29] D. Butter, F. Ciceri, B. de Wit and B. Sahoo, *All N=4 Conformal Supergravities*, Phys. Rev. Lett. **118**, 081602 (2017) [1609.09083].

[J28] D. Butter, S. M. Kuzenko, J. Novak and S. Theisen, *Invariants for minimal conformal supergravity in six dimensions*, JHEP **1612**, 072 (2016) [1606.02921].

[J27] D. Butter, *On conformal supergravity and harmonic superspace*, JHEP **1603**, 107 (2016) [1508.07718].

[J26] D. Butter, G. Inverso and I. Lodato, *Rigid 4D $\mathcal{N} = 2$ supersymmetric backgrounds and actions*, JHEP **1509**, 088 (2015) [1505.03500].

[J25] D. Butter, S. M. Kuzenko, J. Novak and G. Tartaglino-Mazzucchelli, *Conformal supergravity in five dimensions: New approach and applications*, JHEP **1502**, 111 (2015) [1410.8682].

[J24] D. Butter and M. K. Gaillard, *The anomaly structure of regularized supergravity*, Phys. Rev. D **91**, 025015 (2015) [1410.6192].

[J23] D. Butter, *Projective multiplets and hyperkähler cones in conformal supergravity*, JHEP **1506**, 161 (2015) [1410.3604].

[J22] D. Butter, *A new approach to curved projective superspace*, Phys. Rev. D **92**, 085004 (2015) [1406.6235].

[J21] D. Butter, B. de Wit and I. Lodato, *Non-renormalization theorems and N=2 supersymmetric backgrounds*, JHEP **1403**, 131 (2014) [1401.6591].

[J20] D. Butter, B. de Wit, S. M. Kuzenko, and I. Lodato, *New higher-derivative invariants in N=2 supergravity and the Gauss-Bonnet term*, JHEP **1312**, 062 (2013) [1307.6546].

[J19] D. Butter and S. M. Kuzenko, *Nonlocal action for the super-Weyl anomalies: A new representation*, JHEP **1309**, 067 (2013) [1307.1290].

[J18] D. Butter, S. M. Kuzenko, J. Novak and G. Tartaglino-Mazzucchelli, *Conformal supergravity in three dimensions: Off-shell actions*, JHEP **1310**, 073 (2013) [1306.1205].

[J17] D. Butter, S. M. Kuzenko, J. Novak and G. Tartaglino-Mazzucchelli, *Conformal supergravity in three dimensions: New off-shell formulation*, JHEP **1309**, 072 (2013) [1305.3132].

[J16] D. Butter, S. M. Kuzenko and G. Tartaglino-Mazzucchelli, *Nonlinear sigma models with AdS supersymmetry in three dimensions*, JHEP **1302** (2013) 121 [1210.5906].

[J15] D. Butter, *Relating harmonic and projective descriptions of N=2 nonlinear sigma models*, JHEP **1211** (2012) 120 [1206.3939].

[J14] D. Butter, S. M. Kuzenko and J. Novak, *The linear multiplet and ectoplasm*, JHEP **1209** (2012) 131 [1205.6981].

[J13] D. Butter, S. M. Kuzenko, U. Lindström and G. Tartaglino-Mazzucchelli, *Extended supersymmetric sigma models in AdS_4 from projective superspace*, JHEP **1205** (2012) 138 [1203.5001].

[J12] D. Butter and J. Novak, *Component reduction in N=2 supergravity: the vector, tensor, and vector-tensor multiplets*, JHEP **1205** (2012) 115 [1201.5431].

[J11] D. Butter and S. M. Kuzenko, *The structure of N=2 supersymmetric nonlinear sigma models in AdS_4*, JHEP **1111** (2011) 080 [1108.5290].

[J10] D. Butter and S. M. Kuzenko, *A dual formulation of supergravity-matter theories*, Nucl. Phys. B **854** (2012) 1 [1106.3038].

[J9] D. Butter and S. M. Kuzenko, *N=2 supersymmetric sigma-models in AdS*, Phys. Lett. B **703** (2011) 620 [1105.3111].

[J8] D. Butter and S. M. Kuzenko, *N=2 AdS supergravity and supercurrents*, JHEP **1107** (2011) 081 [1104.2153].

[J7] D. Butter, *N=2 conformal superspace in four dimensions*, JHEP **1110** (2011) 030 [1103.5914].

[J6] D. Butter and S. M. Kuzenko, *New higher-derivative couplings in 4D $N = 2$ supergravity*, JHEP **1103** (2011) 047 [1012.5153].

[J5] D. Butter and S. M. Kuzenko, *N=2 supergravity and supercurrents*, JHEP **1012** (2010) 080 [1011.0339].

[J4] D. Butter, *Background field formalism for chiral matter and gauge fields conformally coupled to supergravity*, Nucl. Phys. B **828** (2010) 233 [0909.4901].

[J3] D. Butter, *N=1 conformal superspace in four dimensions*, Annals Phys. **325** (2010) 1026 [0906.4399].

[J2] D. Butter and M. K. Gaillard, *Anomaly structure of supergravity and anomaly cancellation*, Phys. Lett. B **679** (2009) 519 [0906.3503].

[J1] D. Butter and M. K. Gaillard, *The axion mass in modular invariant supergravity*, Phys. Lett. B **612** (2005) 304 [hep-th/0502100].

Preprints

[P4] K. Becker, D. Butter, W. D. Linch, A. Sengupta, *Components of eleven-dimensional supergravity with four off-shell supersymmetries*, arXiv:2101.11671.

[P3] D. Butter, *Exploring the geometry of supersymmetric double field theory*, arXiv:2101.10328.

[P2] D. Butter, *Conserved supercurrents and Fayet-Iliopoulos terms in supergravity*, arXiv:1003.0249.

[P1] D. Butter, *One loop divergences and anomalies from chiral superfields in supergravity*, arXiv:0911.5426.

Conference proceedings

[C4] D. Butter, *The $\mathcal{N} = 2$ Gauss-Bonnet from conformal supergravity*, Phys. Part. Nucl. Lett. **11**, 941 (2014).

[C3] D. Butter, S. M. Kuzenko, J. Novak and G. Tartaglino-Mazzucchelli, *Off-shell actions for conformal supergravity in three dimensions*, Phys. Part. Nucl. Lett. **11**, 927 (2014).

[C2] D. Butter, S. M. Kuzenko, J. Novak and G. Tartaglino-Mazzucchelli, *New approach to $\mathcal{N}$-extended conformal supergravity in three dimensions*, Phys. Part. Nucl. Lett. **11**, 880 (2014).

[C1] D. Butter and S. M. Kuzenko, *Generating higher-derivative couplings in N=2 supergravity*, Fortsch. Phys. **60** (2012) 941 [1202.0336].