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**Citizenship:** U.S.A. and Ireland (EU)

## Education:

Ph.D., Physics, UCLA (11 June 2010). M.S., Physics, UCLA (2007). B.S., Physics, Caltech (2005).

## Research Interests:

Theoretical physics (currently quantum field theories and applications)

## Publications:

1. J. Broedel and J. J. M. Carrasco, "Virtuous Trees at Five and Six Points for Yang-Mills and Gravity," [arXiv:1107.4802](https://arxiv.org/abs/1107.4802) [hep-th].
2. J. J. M. Carrasco and H. Johansson, "Five-Point Amplitudes in N=4 Super-Yang-Mills Theory and N=8 Supergravity," Submitted to: Phys. Rev. D. [arXiv:1106.4711](https://arxiv.org/abs/1106.4711) [hep-th].
3. J. J. M. Carrasco and H. Johansson, "Generic multiloop methods and application to N=4 super-Yang-Mills," Submitted to: J.Phys.A. [arXiv:1103.3298](https://arxiv.org/abs/1103.3298) [hep-th].
4. Z. Bern, J. J. Carrasco, L. J. Dixon, H. Johansson, R. Roiban, "Amplitudes and Ultraviolet Behavior of N = 8 Supergravity," [arXiv:1103.1848](https://arxiv.org/abs/1103.1848) [hep-th].
5. Z. Bern, J. J. Carrasco, T. Dennen, Y.-t. Huang, H. Ita, "Generalized Unitarity and Six-Dimensional Helicity," Phys. Rev. **D83**, 085022 (2011). [arXiv:1010.0494](https://arxiv.org/abs/1010.0494) [hep-th].
6. Z. Bern, J. J. M. Carrasco, L. J. Dixon, H. Johansson, R. Roiban, "The Complete Four-Loop Four-Point Amplitude in N=4 Super-Yang-Mills Theory," Phys. Rev. **D82**, 125040 (2010). [arXiv:1008.3327](https://arxiv.org/abs/1008.3327) [hep-th].
7. Z. Bern, J. J. M. Carrasco, H. Johansson, "The Structure of Multiloop Amplitudes in Gauge and Gravity Theories," Nucl. Phys. Proc. Suppl. **205-206**, 54-60 (2010). [arXiv:1007.4297](https://arxiv.org/abs/1007.4297) [hep-th].
8. Z. Bern, J. J. M. Carrasco and H. Johansson, "Perturbative Quantum Gravity from Gauge Theory," accepted to Phys. Rev. Lett. (06/10), [arXiv:1004.0476](https://arxiv.org/abs/1004.0476) [hep-th].
9. Z. Bern, J. J. M. Carrasco, L. J. Dixon, H. Johansson and R. Roiban, "The Ultraviolet Behavior of  $\mathcal{N} = 8$  Supergravity at Four Loops," Phys. Rev. Lett. **103**<sup>(P)</sup> 081301, (2009). [arXiv:0905.2326](https://arxiv.org/abs/0905.2326) [hep-th].
10. Z. Bern, J. J. M. Carrasco and H. Johansson, "Progress on Ultraviolet Finiteness of Supergravity," to appear in the Proceedings of the 46th International School of Subnuclear Physics, [arXiv:0902.3765](https://arxiv.org/abs/0902.3765) [hep-th].
11. Z. Bern, J. J. M. Carrasco, H. Ita, H. Johansson and R. Roiban, "On the Structure of Supersymmetric Sums in Multi-Loop Unitarity Cuts," Phys. Rev. D **80** 065029 (2009) [arXiv:0903.5348](https://arxiv.org/abs/0903.5348) [hep-th].
12. Z. Bern, J. J. M. Carrasco, L. J. Dixon, H. Johansson, and R. Roiban, "Manifest Ultraviolet Behavior for the Three-Loop Four-Point Amplitude", Phys. Rev. D **78** 105019, (2008). [arXiv:0808.4112](https://arxiv.org/abs/0808.4112) [hep-th].

13. Z. Bern, J. J. M. Carrasco, H. Johansson, “New Relations for Gauge-Theory Amplitudes”, Phys. Rev. D **78** 085011, (2008). [arXiv:0805.3993](#) [hep-ph, hep-th].
14. Z. Bern, J. J. Carrasco, D. Forde, H. Ita and H. Johansson, “Unexpected Cancellations in Gravity Theories”, Phys. Rev. D **77** 025010, (2007). [arXiv:0707.1035](#) [hep-th].
15. Z. Bern, J. J. M. Carrasco, H. Johansson and D. A. Kosower, “Maximally Supersymmetric Planar Yang-Mills Amplitudes at Five Loops”, Phys. Rev. D **76** 125020, (2007). [arXiv:0705.1864](#) [hep-th].
16. Z. Bern, J. J. Carrasco, L. J. Dixon, H. Johansson, D. A. Kosower and R. Roiban, “Three-Loop Superfiniteness of N=8 Supergravity”, Phys. Rev. Lett. **98**<sup>(+)</sup> 161303, (2007). [[hep-th/0702112](#)].
17. J. J. Carrasco, D. Fain, K. Lang, L. Zhukov. [Clustering of bipartite advertiser-keyword graph](#), *The ICDM 2003 Third IEEE International Conference on Data Mining, Workshop on Clustering Large Data Sets*, Melbourne, Florida, 2003.
18. M. S. Yun, N. Z. Scoville, J. J. Carrasco, and R. D. Blandford. “Resolution and Kinematics of Molecular Gas Surrounding the Cloverleaf Quasar at  $z=2.6$  Using the Gravitational Lens,” *ApJ*, 479 : L9-L13, 1997 April 10., [[astro-ph/9702031](#)]

(P) selected for a Viewpoint in Physics: [Vanquishing Infinity](#), *Physics* 2, 70 (2009), by Hermann Nicolai

(+) PRL cover article, discussed in *Nature Physics*: [Supergravity: Finite after all?](#), *Nature Physics* 3, 448 - 450 (2007), by Kellogg Stelle

## Recent Invited Talks:

1. “Gluons for (almost) nothing, gluons for free”, [String Theory Seminar](#), UCB, Berkeley , June 2011
2. String Theory Seminar, UBC, Vancouver, 2011
3. “Perturbative Quantum Gravity as a Double Copy of Gauge Theory”, [SITP Seminar](#), Stanford Institute for Theoretical Physics, Stanford, Sep 2010
4. “A duality between color and kinematics yielding perturbative quantum gravity from gauge theory”, [Amplitudes 2010](#), QMU, May 2010.
5. “Quantum Gravity from Gauge Theory”, [Integrability in Scattering Amplitudes, Part I](#), IAS & Perimeter Institute for Theoretical Physics, Apr 2010.
6. “Perturbative Cancellations in Gravity Theories”, [Asymptotic Safety - 30 Years Later](#), Perimeter Institute for Theoretical Physics, Nov 2009.
7. “Relations between gravity and gauge theory amplitudes and their multiloop application”, [SITP Seminar](#), Stanford Institute for Theoretical Physics, Stanford, Oct 2009.
8. “ $\mathcal{N} = 8$  Supergravity at Four Loops (or how to be an Action Hero while eschewing Lagrangians.)”, [Supergravity versus Superstring Theory in the Ultraviolet](#), Institute for Gravitation and the Cosmos, Penn. State, Aug 2009.
9. “ $\mathcal{N} = 8$  Supergravity at Four Loops”, [Hidden Structures in Field Theory Amplitudes 2009](#), Neils Bohr International Academy, Aug 2009.
10. “Learning about  $\mathcal{N} = 4$  sYM  $\implies$  Learning about QCD?”, [Wonders of Gauge theory and Supergravity](#), IHP & IPHT/Saclay, 2008.
11. “Cancellations in Gravity Theories”, [Institute for Gravitation and the Cosmos Inaugural Conference](#), Penn. State, Aug 2007.

## Patents:

1. Disambiguation of Search Queries (US Patent No. 7 225 184)
2. System and method for rapid completion of data processing tasks distributed on a network (US Patent No. 6 775 831)

## Recent Honors/Awards:

1. Julian S. Schwinger Named Diploma, Erice International School of Subnuclear Physics (2011),
2. Best Theoretical Physics Prize, Erice International School of Subnuclear Physics (2011).
3. Guy Weyl Physics Alumni Graduate Fellowship (2007-2010).
4. John S. Bell Named Diploma, Erice International School of Subnuclear Physics (2008),
5. Best [open] Question Prize <sup>1</sup>, Erice International School of Subnuclear Physics (2008).

## Employment:

1. Postdoctoral Research Fellow at the Stanford Institute for Theoretical Physics, Stanford University, September 2010 - *current*.
2. Guy Weyl Physics Alumni Graduate Fellow, UCLA (9/07-6/10),
3. Research and Teaching Assistant, UCLA (9/05-9/07).
4. Summer Undergraduate Research Fellow, Caltech (6/04-9/04)
5. Research Scientist & Founding Member of Overture Research/Yahoo! Labs (3/02-9/04)<sup>2</sup>
6. Engineer, Overture Services/Goto.com (3/98-3/02)
7. Developer, Jobtrak Corporation (2/97-9/97)
8. Summer Undergraduate Research Fellow, Caltech (6/96-9/96)
9. Summer Undergraduate Research Fellow, Caltech (6/95-9/95)
10. Summer Undergraduate Research Fellow, Caltech (6/94-9/94)
11. Intern, North Carolina Supercomputing Center (6/93-9/93)

## Service:

Referee/reviewer for JHEP, Journal Physics A, and Nuclear Physics B.

## References:

1. Professor Zvi Bern, Department of Physics, UCLA
2. Professor Lance J. Dixon, SLAC, Stanford
3. Professor Radu Roiban, Department of Physics, Penn State

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<sup>1</sup>re: economy of physical descriptions, c.f. the amount of information encoded in real numbers.

<sup>2</sup>Part-time after 1/04 while attending Caltech.