Simon F. Ross

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Date of Birth: 29th May 1971

Education

- 1993–1996: Ph.D., DAMTP, University of Cambridge.
  Thesis title: *Black Hole Pair Creation*
  Supervisor: Stephen Hawking
  Awards: St. John's College Benefactor's Scholarship (1995–1996); J.T. Knight Essay Prize [group 2] (1995); NSERC 1967 Scholarship (1992–1996); Commonwealth Scholarship (1992–1995).
- 1992–1993: Certificate of Advanced Study in Mathematics, University of Cambridge.
  Awards: Mayhew Prize (1993); Horne Scholarship (1993).
- 1988–1992: B.Sc., Joint Honours, Physics and Mathematics, University of Waterloo.
  Awards: Faculty of Science Alumni Gold Medal (1992); Canada Scholarship (1988–1992).

Employment

- From 1st Oct. 2005: Reader, Dept. of Mathematical Sciences, University of Durham.
- Oct. 2001–Sept. 2006: EPSRC Advanced Research Fellow.
- Oct. 1999–Sept. 2005: Lecturer, Dept. of Mathematical Sciences, Durham.
  $\star$ Vice-Chancellor's award for excellence in research by young members of staff (Faculty of Science), 2004.
- Sept. 1996–Sept. 1999: Postdoctoral Researcher, Dept. of Physics, University of California, Santa Barbara.
- Summer 1991 & Summer 1992: NSERC Summer Research Assistantships, Dept. of Physics, University of Waterloo.

Research Impact

- I was invited to participate in four major workshops on black holes in string theory and black holes in higher dimensions over the last year, including spending three months in Santa Barbara participating in a KITP programme "Scanning new horizons: GR beyond 4 dimensions".
- I was invited to give four lectures on Black Hole Thermodynamics at the "Frontiers of Mathematical Physics" summer school at the U. of British Columbia in August 2004, indicating that I am recognised as one of the leading world experts in this area.

- My paper "Notes on spacetime thermodynamics and the observer-dependence of entropy", with Don Marolf and Djordje Minic, was featured in the Physicswatch section of CERN Courier in November 2003.
- I organised, with four colleagues, a four-week workshop on "Time and String Theory" at the Aspen Centre for Physics in summer 2003. This is one of the premier meeting places for theoretical physicists; organising a workshop there is a significant indication of international esteem.
- Four of my papers have over 50 citations in the SLAC SPIRES database, with one of them having more than 200 citations, and the average number of citations per paper is 24.

Publications

Preprints

1. *Winding tachyons in BTZ*, M. Rangamani and S. F. Ross, arXiv:0706.0663 [hep-th].
2. *Reversing renormalization-group flows with AdS/CFT*, D. Marolf and S. F. Ross , arXiv:0705.4642 [hep-th].
3. *Geometry of non-supersymmetric three-charge bound states*, E. G. Gimon, T. S. Levi and S. F. Ross, arXiv:0705.1238 [hep-th].
4. *Black hole thermodynamics* (Lectures given at the PIMS Strings summer school), S. F. Ross, hep-th/0502195.

Articles in Refereed Journals:

1. *Boundary conditions and new dualities: Vector fields in AdS/CFT*, D. Marolf and S. F. Ross, J. High Energy Phys. **0611:085 (2006), hep-th/0606113.**
2. *Non-supersymmetric asymptotically $AdS_5 \times S^5$ smooth geometries*, **S. F. Ross, J. High Energy Phys. 0601:130 (2006), hep-th/0511090.**
3. *Winding tachyons in asymptotically supersymmetric black strings*, **S. F. Ross, J. High Energy Phys. 0510:112 (2005), hep-th/0509066.**
4. *Non-supersymmetric smooth geometries and D1-D5-P bound states*, **V. Jejjala, O. Madden, S. F. Ross and G. Titchener, Phys. Rev. D 71:124030 (2005), hep-th/0504181.**
5. *Causally pathalogical spacetimes are physically relevant*, **V. E. Hubeny, M. Rangamani and S. F. Ross, Int. J. Mod. Phys. D14, 2227-2232 (2005), gr-qc/0504013.**
6. *Causal Structure and Holography*, **V. E. Hubeny, M. Rangamani and S. F. Ross, J. High Energy Phys. 0507:037 (2005), hep-th/0504034.**

7. *Smeared D0 charge and the Gubser-Mitra conjecture*, **S. F. Ross and T. Wiseman, Class. Quant. Grav. 22, 2933-2946 (2005), hep-th/0503152.**

8. *Time-dependent spacetimes in AdS/CFT: Bubble and black hole*, **S. F. Ross and G. Titchener, J. High Energy Phys. 0502:021 (2005), hep-th/0411128.**

9. *On uniqueness of charged Kerr-AdS black holes in five dimensions*, **O. Madden and S. F. Ross, Class. Quant. Grav. 22, 515-524 (2005), hep-th/0409188.**

10. *Smeared branes and the Gubser-Mitra conjecture*, **P. Bostock and S. F. Ross, Phys. Rev. D 70:064014 (2004), hep-th/0405026.**

11. *Quotients of $AdS_{p+1} \times S^q$: causally well-behaved spaces and black holes*, **J. Figueroa-O'Farrill, O. Madden, S. F. Ross and J. Simon, Phys. Rev. D 69:124026 (2004), hep-th/0402094.**

12. *On Gauss-Bonnet black hole entropy*, **T. Clunan, S. F. Ross and D. J. Smith, Class. Quant. Grav. 21, 3447-3458 (2004), gr-qc/0402044.**

13. *Quotients of anti-de Sitter space*, **O. Madden and S. F. Ross, Phys. Rev. D 70:026002 (2004), hep-th/0401205.**

14. *Enhancon solutions: Pushing supergravity to its limits*, **A. Dimitriadis, A. W. Peet, G. Potvin, and S. F. Ross, Phys. Rev. D 70:046001 (2004), hep-th/0311271.**

15. *Notes on spacetime thermodynamics and the observer-dependence of entropy*, **D. Marolf, D. Minic and S. F. Ross, Phys. Rev. D 69:064006 (2004), hep-th/0310022.**

16. *Causal inheritance in plane wave quotients*, **V. E. Hubeny, M. Rangamani and S. F. Ross, Phys. Rev. D 69:024007 (2004), hep-th/0307257.**

17. *Properties of non-extremal enhancons*, **A. Dimitriadis and S. F. Ross, Phys. Rev. D 69:026002 (2004), hep-th/0307216.**

18. *Holography beyond the horizon and cosmic censorship*, **T. S. Levi and S. F. Ross, Phys. Rev. D 68:044005 (2003), hep-th/0304150.**

19. *Plane waves and spacelike infinity*, **D. Marolf and S. F. Ross, Class. Quant. Grav. 20, 4119-4133 (2003), hep-th/0303044.**

20. *A new recipe for causal completions*, **D. Marolf and S. F. Ross, Class. Quant. Grav. 20, 4085–4118 (2003), gr-qc/0303025.**

21. *Plane waves: to infinity and beyond*, **D. Marolf and S. F. Ross, Class. Quant. Grav. 19, 6289–6302 (2002), hep-th/0208197.**

22. *Stability of the nonextremal enhancon solution I: perturbation equations*, **A. Dimitriadis and S. F. Ross,**
Phys. Rev. D 66:106003 (2002), hep-th/0207183.

23. *The dual of nothing*, **V. Balasubramanian and S. F. Ross,**
Phys. Rev. D 66:086002 (2002), hep-th/0205290.

24. *Stringy negative tension branes and the second law of thermodynamics*, **D. Marolf and S. F. Ross,**
J. High Energy Phys. 0204:008 (2002), hep-th/0202091.

25. *Stability and the negative mode for Schwarzschild in a finite cavity*, **J. P. Gregory and S. F. Ross,**
Phys. Rev. D 64:124006 (2001), hep-th/0106220.

26. *The enhancon and the consistency of excision*, **C. V. Johnson, R. C. Myers, A. W. Peet and S. F. Ross,**
Phys. Rev. D 64:106001 (2001), hep-th/0105077.

27. *Looking for event horizons using UV/IR relations*, **J. P. Gregory and S. F. Ross,**
Phys. Rev. D 63:104023 (2001), hep-th/0012135.

28. *Supersymmetric conical defects: towards a string theoretic description of black hole formation*, **V. Balasubramanian, J. de Boer, E. Keski-Vakkuri, and S. F. Ross,**
Phys. Rev. D 64:064011 (2001), hep-th/0011217.

29. *On geodesic propagators and black hole holography*, **J. Louko, D. Marolf and S. F. Ross,**
Phys. Rev. D 62:044041 (2000), hep-th/0002111.

30. *D3-brane shells to black branes on the Coulomb branch*, **S. B. Giddings and S. F. Ross,**
Phys. Rev. D 61:024036 (2000), hep-th/9907204.

31. *Holographic particle detection*, **V. Balasubramanian and S. F. Ross,**
Phys. Rev. D 61:044007 (2000) hep-th/9906226.

32. *Microcanonical phases of string theory on $AdS_m \times S^n$*, **A. W. Peet and S. F. Ross,**
J. High Energy Phys. 9812:020 (1998), hep-th/9810200.

33. *Possible resolution of black hole singularities from large N gauge theory*, **G. T. Horowitz and S. F. Ross,**
J. High Energy Phys. 9804:015 (1998), hep-th/9803085.

34. *Singularities in wavy strings*, **S. F. Ross,**
J. High Energy Phys. 9808:003 (1998), hep-th/9710158.

35. *Properties of naked black holes*, **G. T. Horowitz and S. F. Ross,**
Phys. Rev. D 57, 1098–1107 (1998), hep-th/9709050.

36. *Loss of quantum coherence through scattering off virtual black holes*, **S. W. Hawking and S. F. Ross,**
Phys. Rev. D 56, 6403–6415 (1997), hep-th/9705147.

37. *Naked black holes*, **G. T. Horowitz and S. F. Ross,**
Phys. Rev. D 56, 2180–2187 (1997), hep-th/9704058.

38. *Pair creation rate for $U(1)^2$ black holes*, **S. F. Ross,**
Phys. Rev. D 52, 7089–7097 (1995), gr-qc/9509010.

39. *Pair production of black holes on cosmic strings*, **S. W. Hawking and S. F. Ross,**
Phys. Rev. Lett. 75, 3382–3385 (1995), gr-qc/9506020.

40. *Duality between electric and magnetic black holes*, **S. W. Hawking and S. F. Ross,**
Phys. Rev. D 52, 5865–5876 (1995), hep-th/9504019.

41. *Cosmological production of charged black hole pairs*, **R. B. Mann and S. F. Ross,**
Phys. Rev. D 52, 2254–2265 (1995), gr-qc/9504015.

42. *Entropy, area, and black hole pairs*, **S. W. Hawking, G. T. Horowitz and S. F. Ross,**
Phys. Rev. D 51, 4302–4314 (1995), gr-qc/9409013.

43. *Pair production of black holes in a $U(1) \otimes U(1)$ theory*, **S. F. Ross,**
Phys. Rev. D 49, 6599–6605 (1994), hep-th/9401131.

44. *Properties of asymptotically flat two-dimensional black holes*, **R. B. Mann, M. S. Morris and S. F. Ross,**
Class. Quant. Grav. 10, 1477–1494 (1993), hep-th/9202068.

45. *The $D \to 2$ limit of General Relativity*, **R. B. Mann and S. F. Ross,**
Class. Quant. Grav. 10, 345–351 (1993), gr-qc/9208004.

46. *Gravitationally collapsing dust in $2+1$ dimensions*, **R. B. Mann and S. F. Ross,**
Phys. Rev. D 47, 3319–3322 (1993), hep-th/9208036.

47. *Gravitation & cosmology in $(1+1)$-dimensional dilaton gravity*, **R. B. Mann and S. F. Ross,**
Phys. Rev. D 47, 3312–3318 (1993), hep-th/9206022.

48. *Matching conditions and gravitational collapse in two-dimensional gravity*, **R. B. Mann and S. F. Ross,**
Class. Quant. Grav. 9, 2335–2350 (1992), hep-th/9205098.

49. *Chaos in a chain of six particles with fixed ends (a $4+2$ chain)*, **S. Ross, J. Grindlay and B. I. Henry,**
Phys. Rev. A 44, 4876–4884 (1991).

Conference Proceedings:

1. *Black hole pair creation*, S. F. Ross, in "The Future of Theoretical Physics", ed. by G. W. Gibbons, E. P. S. Shellard, and S. J. Rankin (Cambridge University Press, Cambridge 2003)

2. *Entropy, information and black hole pair creation*, S. F. Ross, in "Proceedings of the Third Alexander Friedmann International Seminar on Gravitation and Cosmology", ed. by Yu. N. Gnedin, A. A. Grib, and V. M. Mostepanenko (Friedmann Laboratory Publishing, St. Petersburg, 1996).

Research Activity

Current Grants

- I am involved in recruiting candidates to apply for postdoctoral and advanced fellowships to be held in the group here; I was responsible for two postdoctoral fellowship applications in 2005.
- Helped to prepare application for PPARC studentships, September 2005. We received funding for four four-year studentships per year.
- Co-investigator on PPARC rolling grant applications: our most recent project, 'Fields, Strings and Cosmology; Fundamental issues in particle physics', received a grant of £824,613 for a period of five years beginning in October 2005. This represents a remarkable 68 % increase in annual funding compared to our previous grant (£393,105 over four years).
- EPSRC Advanced Fellowship grant of £206,086 to study 'Causality, Locality and Singularities in New Approaches to String Theory', for a period of five years beginning October 2001.

Past Grants

- PPARC rolling grant, £393,105 for the project "Strongly coupled phenomena in fundamental physics", 2003–2007 (superseded by renewal above in 2005).
- PPARC conference grant, £4,115, 2004.
- EPSRC conference grant, £4,305, 2004.
- IOP conference grant, £1,200, 2004.
- PPARC rolling grant, £264,910 for the project "Strongly coupled phenomena in fundamental physics", 2001–2005 (superseded by renewal above in 2003).
- EPSRC grant of £62,837 for the project 'Dualities Between Field Theories and Gravity', 2000–2002.
- Two grants of £700 each from the PPARC Theory Committee travel fund to support attendance at the strings workshops in Aspen, CO, in August 2000 and August 2001.

Research Supervision

- Current Ph.D. students:
  Julian Le Witt, expected completion date September 2009.
  Gina Titchener, expected completion date September 2006.

- Past Ph.D. students:
  Owen Madden, 2002–2005.
  Paul Bostock (co-supervised with Ruth Gregory) 2000–2004.
  Apostolos Dimitriadis, 2000–2003.
  James Gregory, 1999–2002

- Past Postdoc: Dominic Brecher, 2000–2002.

Academic Service

- Referee for Physical Review Letters, Physical Review D, JHEP, Classical and Quantum Gravity, Physics Letters A, Physics Letters B. Referee for PPARC fellowship & grant applications. Member of the EPSRC College.
- Member of the Institute of Physics and of the London Mathematical Society.
- Member of the Scientific Organising Committee for the *Annual Theory Meeting* 2004, 2005, 2006.
- Co-Organiser of *Post-Strings 2004*, a conference held in Durham 5th–10th July 2004.
- Co-Organizer of *Time and String Theory*, a workshop in the Aspen Center for Physics summer programme, 10th August–7th September 2003.
- Co-Organiser of *Pre-Strings 2002*, a conference held in Durham 11th–13th July 2002.
- Member of the Scientific Steering Committee for *The Future of Theoretical Physics and Cosmology*, a conference in celebration of Stephen Hawking's 60th birthday, 7th–10th January 2002.
- Session chair for *Eighth Canadian Conference on General Relativity and Relativistic Astrophysics*, McGill, 10th–12th June 1999.
- Organised *15th Pacific Coast Gravity Meeting* in Santa Barbara, 26th–27th February 1999.

Invited Presentations

- Invited talk in *Neils Bohr Summer Institute*, NBI, Copenhagen, August 2006.
- Invited talk in *Workshop on Black holes, black rings & topological strings*, Arnold Sommerfeld Center, Munich, April 2006.

- Two seminars in programme on *Scanning new horizons*, KIRP, Santa Barbara, February & March 2006.
- String theory seminar, Caltech, February 2006.
- High energy theory seminar, Berkeley, January 2006.
- High energy theory seminar, Munich, December 2005.
- Theory seminar, Barcelona, November 2005.
- High energy theory seminar, Oxford, November 2005.
- Invited talk in *20th Nordic Strings meeting*, Helsinki, October 2005.
- High energy theory seminar, Nottingham, October 2005.
- String theory seminar, Helsinki Institute of Physics, June 2005.
- Invited talk in *Workshop on Gravitational Aspects of String Theory*, Fields Institute, Toronto, May 2005.
- Joint Theory Seminar, Israel, March 2005.
- High Energy Theory Seminar, Southampton University, February 2005.
- String Theory Seminar, Imperial College, February 2005.
- Mathematical Physics seminar, University of York, November 2004.
- Lectures at *Frontiers of Mathematical Physics summer school on Strings, Gravity and Cosmology*, University of British Columbia, Vancouver, August 2004.
- Queen Mary String Theory Seminar, London, March 2004.
- Informal Seminar at Lawrence Berkeley Laboratories, Berkeley, CA, March 2004.
- Stanford String Seminar, Palo Alto, CA, March 2004.
- UCSB String/Gravity Seminar, Santa Barbara, CA, February 2004.
- High Energy Theory Seminar, National Tsing Hua University, Taiwan, January 2004.
- Departmental Seminar, Physics Department, Queen Mary, University of London, December 2003.
- High Energy Theory Seminar, Niels Bohr Institute, Copenhagen, November 2003.
- Edinburgh Mathematical Physics Seminar, U. of Edinburgh, October 2003.
- Invited talk in *Gravitation: A Decennial Perspective* conference, Penn State, June 2003.
- Invited talk in *Black Holes IV: Theory and Mathematical Aspects* conference, Honey Harbor, Ont., May 2003.

- Perimeter Institute Superstrings Seminar, Waterloo, May 2003.
- Queen Mary String Theory Seminar, London, May 2003.
- CMS Joint HEP/GR Seminar, Cambridge, April 2003.
- Rencontres Theoriciennes de Paris, Insitut Henri Poincare, March 2003.
- Université libre de Bruxelles High Energy Theory Seminar, March 2003.
- University of Pennsylvania High Energy Theory Seminar, February 2003.
- Harvard University Informal Strings Seminar, February 2003.
- University of Nottingham Quantum Gravity Seminar, November 2002.
- King's College London Theoretical Physics Seminar, October 2002.
- University of Pennsylvania High Energy Theory Seminar, April 2002.
- Review talk in *Euro-GDR General Meeting*, Durham, April 2002.
- University of Newcastle Relativity Seminar, March 2002.
- Invited talk in *M-Theory, Gravity and Geometry* conference, Isaac Newton Institute, Cambridge, February 2002.
- Invited talk in *The Future of Theoretical Physics and Cosmology* conference, CMS, Cambridge, January 2002.
- King's College London Theoretical Physics Seminar, October 2001.
- University of Toronto High Energy Physics Seminar, September 2001.
- Series of talks in *Strings, Fields and Gravity* workshop at the Pacific Institute for Mathematical Sciences, Simon Fraser University, July 2001.
- Invited talk in *String theory* workshop at the Helsinki Institute for Physics, July 2001.
- Dublin QFT Seminar, Trinity College Dublin, April 2001.
- Edinburgh Mathematical Physics Seminar, Heriott-Watt, March 2001.
- Queen Mary String Theory Seminar, London, February 2001.
- Imperial College Theoretical Physics Seminar, London, March 2000.
- University of Nottingham Quantum Gravity Seminar, November 1999.
- King's College London Theoretical Physics Seminar, November 1999.
- Harvard University String Theory Seminar, September 1999.
- Syracuse University High Energy Theory Seminar, September 1999.

- Invited talk in *Black Holes II: Theory and Mathematical Aspects* conference, Val Morin, Que., June 1999.
- Caltech Theory Seminar, February 1998.
- Invited talk in *Black Holes: Theory and Mathematical Aspects* conference, Banff Centre, June 1997.
- Invited talk in *CIAR Meeting on Gravity and Cosmology*, Banff Centre, February 1997.
- Southampton University Relativity Seminar, February 1996.
- Queen Mary Relativity Seminar, London, November 1995.
- Invited talk in *Third Alexander Friedmann International Seminar on Gravitation and Cosmology*, St. Petersburg, July 1995.
- Newcastle University Relativity Seminar, June 1995.

Teaching

- Lecturing:
  - 2005–2006: MSc course on General Relativity (16 lectures, 16 students).
  - 2004–2005: MSc course on General Relativity (16 lectures, 15 students).
  - 2003–2004: MSc course on General Relativity (16 lectures, 14 students).
  - 2002–2003: MSc course on General Relativity (16 lectures, 16 students). Tutorials for Single Maths B.
  - 2000–2001: 4H General Relativity (38 lectures, 11 students), MSc course on Cosmology (8 lectures, 12 students). Tutorials for various first and second year courses.
  - 1999–2000: 4H General Relativity (38 lectures, 14 students). Tutorials for various first and second year courses.
- Examining:
  - External examiner for Ph.D. exam of Hari Krishna Kunduri, University of Cambridge, August 2006
  - Internal examiner for Ph.D. exam of Jose Sanchez Loureda, April 2006
  - Internal examiner for Ph.D. exam of Gavin Probert, December 2005
  - Internal examiner for Ph.D. exam of Jessica Barrett, September 2004.
  - External examiner for Ph.D. exam of James Hockings at Southampton University, January 2003
- Supervising postgraduates:

  - Past students: Owen Madden, Ph.D., 2002–2005. Faizal Mir, M.Sc., 2004–2005. Anthony Ioannou, M.Sc., 2003–2004. Paul Bostock, Ph.D. (joint supervisor), 2000–2004. Apostolos Dimitriadis, Ph.D, 2000–2003, James Gregory, Ph.D, 1999–2002, John Morris, M.Sc., 2001–2002, Sanjeev Melwani, M.Sc., 1999–2000.
  - Current students:
    Julian le Witt, Ph.D., expected completion date September 2009.
    Gina Titchener, Ph.D., expected completion date September 2006.

- Supervising undergraduates:
  - Dominic Ketley: supervised for 3 weeks on a project as part of the PPARC IUSS, summer 2004.
  - Sophy Palmer: supervised for 3 weeks on a project as part of the PPARC IUSS, summer 2004.
  - Tim Clunan: co-supervised for 10 weeks on a summer research project funded by the Nuffield foundation, summer 2003.
  - Adam Brown: supervised for 3 weeks on a project as part of the PPARC IUSS, summer 2003.
  - Michael Donnellan: supervised for 3 weeks on a project as part of the PPARC IUSS, summer 2003.
  - Mark Eade, Goeff Lynch & Barry Mason: supervised for a 4H project on gravitational waves, 2000–2001.

Student Feedback

For the undergraduate General Relativity course, the questionnaire responses were satisfactory in both years. The students rated the course from 3 to 4 (out of 4) for interest, and ratings averaged around 3 for clarity, lectures, homework and marking. This is comparable to other 4H courses. Students commented that the lectures were "always clear and concise" and "very well organised", and "follows a logical structure". They also said they found me approachable and available to answer questions. In response to student comments, the explanation of tensors on manifolds was considerably expanded in the second year.

Questionnaire responses for the graduate Cosmology and General Relativity courses were very positive. In Cosmology, almost all students rated the course good overall and for interest. They felt it was well lectured, but some complained that it was too brief. In 2002–2003, students in the graduate General Relativity course rated the course either good or excellent overall and for interest. Several students commented favourably on the well-organised lectures and on my enthusiasm. Some students from physics backgrounds found the notation confusing; the explanation of mathematical aspects was expanded the following year. In 2003–2004, the course was rated from satisfactory to excellent, and three students rated it the most interesting topic in the first term of the MSc. In 2004–2005, the majority of the students rated the course excellent overall, and several commented in writing that it was an excellent, well-taught course. Four selected it as the most interesting subject in the first term of the MSc. In 2005–2006, the majority of the students rated the course good or excellent overall.

The feedback from students I have supervised has been uniformly positive; all the students were happy about the level and quality of attention they received. I have particularly enjoyed working with the undergraduates I have supervised, and they have commented favourably on my accessibility and enthusiasm for the subject.

Administration

- Secretary of the Management Board for the M.Sc. in Elementary Particle Theory 2000–present.
- Jointly organised a seminar series for the Centre for Particle Theory, Michaelmas 2000.
- Helped to re-organise the web pages of the Centre for Particle Theory 2000-2001.