

Curriculum Vitae

D.R. Heath-Brown

David Rodney Heath-Brown ('Roger')

Born: October 12th, 1952

Married, Two daughters.

Degrees

B.A. University of Cambridge, 1973

M.A. University of Cambridge, 1977

Ph.D. University of Cambridge, 1979

Prizes and Distinctions

Smith's Essay Prize, University of Cambridge, 1976

Research Fellowship, Trinity College, Cambridge, 1977

Hardy-Ramanujan Society Prize, 1978

Hardy-Ramanujan Society Prize, 1980

Junior Berwick Prize, London Mathematical Society, 1981

Fellow of the Royal Society, 1993

Senior Berwick Prize, London Mathematical Society, 1996

Corresponding Member, Akademie der Wissenschaften zu Göttingen, Math.-Phys. Klasse, 1999

Emeritus Fellow, Magdalen College, Oxford, 1999

Honorary Fellow of the Hardy-Ramanujan Society, 2004

Pólya prize, London Mathematical Society, 2009

Employment

Fellow and Tutor in Pure Mathematics, Magdalen College, Oxford (from October 1979 to December 1998)

Reader, *ad hominem* (from April 1990 to December 1998).

Professorial Fellow, Worcester College, Oxford (from January 1999)

Professor of Pure Mathematics, Oxford University (from January 1999)

Featured Reviews in Mathematical Reviews

A mean value estimate for real character sums, *Acta Arithmetica*, 72 (1995), 235-275.

Primes represented by $x^3 + 2y^3$, *Acta Math*, 186 (2001), 1-84.

Some Plenary Talks and Invited Lecture Series

ICM 1982 (Warsaw) 45 minute lecture

CIME Summer School, Analytic Number Theory, Cetraro, July, 2002

School on Random Matrix Approaches in Number Theory, Cambridge, March 2004

CNTA VIII, Toronto, June 2004

Gauss-Dirichlet Conference, Göttingen, June 2005

Journées Arithmétiques XXIV, Marseilles, July 2005

Equidistribution in the theory of numbers, Advanced Study Institute, Montréal, July 2005

Introductory Workshop in Rational and Integral Points on Higher-Dimensional Varieties, Berkeley, January 2006

CNTA X, Waterloo, July 2008

ICM 2010 (Hyderabad) 45 minute lecture

Research Students

C. Ringrose,
C. Pinner,
S. Dyke,
C.-R. Guo,
D. Shiu,
A. Peck,
F. Geiringer,
T. Rhodewald,
J. Haugland,
T. Browning,
R. Long,
G. Marasingha,
L. Pierce,
F-S. Leung,
N. Niedermowwe,
W. Schlackow,
T. Trudgian,
J. Zahid,
J. Bredberg.

Publications

1. Arithmetical functions and inversion formulae, *J. London Math. Soc.* (2), 9 (1974), 54-56. (With C.J.A. Evelyn.)
2. On the density of zeros of the Dedekind Zeta-function, *Acta Arith.*, 33 (1977), 169-181.
3. The mean value theorem for the Riemann Zeta-function, *Mathematika*, 25 (1978), 177-184.
4. The twelfth power moment of the Riemann Zeta-function, *Quart. J. Math. Oxford Ser. (2)*, 29 (1978), 443-462.
5. Almost primes in arithmetic progressions and short intervals, *Math. Proc. Camb. Phil. Soc.*, 83 (1978), 357-375.
6. Hybrid bounds for Dirichlet L -functions, *Invent. Math.*, 47 (1978), 149-170.
7. The differences between consecutive primes, *J. London Math. Soc.* (2), 18 (1978), 7-13.
8. The distribution of Kummer sums at prime arguments, *J. Reine angew. Math.*, 310 (1979), 111-130. (With S.J. Patterson.)
9. On the difference between consecutive primes, *Invent. Math.*, 55 (1979), 49-69. (With H. Iwaniec.)
10. The fourth power moment of the Riemann Zeta-function, *Proc. London Math. Soc.* (3), 38 (1979), 385-422.
11. On the difference between consecutive primes, *Bull. Amer. Math. Soc.*, 1 (1979), 758-760. (With H. Iwaniec.)
12. On a paper of Baker and Schinzel, *Acta Arith.*, 35 (1979), 203-207.
13. The density of zeros of Dirichlet's L -functions, *Can. J. Math.*, 31 (1979), 231-240.
14. Simple zeros of the Riemann Zeta-function on the critical line, *Bull. London Math. Soc.*, 11 (1979), 17-18.
15. The differences between consecutive primes, II, *J. London Math. Soc.* (2), 19 (1979), 207-220.
16. A large values estimate for Dirichlet polynomials, *J. London Math. Soc.* (2), 20 (1979), 8-18.
17. The differences between consecutive primes, III, *J. London Math. Soc.* (2), 20 (1979), 177-178.

18. Zero density estimates for the Riemann Zeta-function and Dirichlet L -functions, *J. London Math. Soc. (2)*, 20 (1979), 221-232.
19. Hybrid Bounds for Dirichlet L -functions, II, *Quart. J. Math. Oxford Ser. (2)*, 31 (1980), 157-167.
20. Differences between consecutive primes, *Sémin. Théor. Nombres, Bordeaux, 1979-80*, Exposé No. 14, 7pp (1980).
21. An asymptotic series for the mean value of Dirichlet L -functions, *Comment. Math. Helvetici*, 56 (1981), 148-161.
22. Representation of an integer as a prime plus a product of two small factors, *Math. Proc. Camb. Phil. Soc.*, 89 (1981), 29-33.
23. The fourth power mean of Dirichlet's L -functions, *Analysis*, 1 (1981), 25-32.
24. Three primes and an almost prime in arithmetic progression, *J. London Math. Soc. (2)*, 23 (1981), 396-414.
25. Mean value theorems for the Riemann Zeta-function, *Théorie des Nombres, Sémin. Delange-Pisot-Poitou, Paris, 1979-80*, *Prog. Math.*, 12 (1981), 123-134.
26. Fractional moments of the Riemann Zeta-function, *J. London Math. Soc. (2)*, 24 (1981), 65-78.
27. Almost primes in short intervals, *Recent progress in analytic number theory*, (Academic Press, London, 1981), 69-101. (With H. Halberstam and H.-E. Richert.)
28. Mean values of the Zeta-function and divisor problems, *Recent progress in analytic number theory*, (Academic Press, London, 1981), 115-119.
29. Hybrid bounds for L -functions: a q -analogue of van der Corput's method and a t -analogue of Burgess's method, *Recent progress in analytic number theory*, (Academic Press, London, 1981), 121-126.
30. A parity problem from sieve theory, *Mathematika*, 29 (1982), 1-6.
31. Gaps between primes, and the pair correlation of zeros of the zeta-function, *Acta Arith.*, 41 (1982), 85-99.
32. Sieve identities and gaps between primes, *Astérisque*, 94 (1982), 61-65.
33. Primes in 'almost all' short intervals, *J. London Math. Soc. (2)*, 26 (1982), 385-396.
34. Prime numbers in short intervals and a generalized Vaughan identity, *Can. J. Math.*, 34 (1982), 1365-1377.

35. The Riemann Zeta-function, *Journées Arithmétiques 1980*, (Cambridge University Press, Cambridge, 1982), 83-91.
36. The least square-free number in an arithmetic progression, *J. Reine angew. Math.*, 332 (1982), 204-220.
37. The Pjateckiĭ-Šapiro prime number theorem, *J. Number Theory*, 16 (1983), 242-266.
38. Prime twins and Siegel zeros, *Proc. London Math. Soc. (3)*, 47 (1983), 193-224.
39. Cubic forms in ten variables, *Proc. London Math. Soc. (3)*, 47 (1983), 225-257.
40. Finding primes by sieve methods, *Proc. Internat. Cong. Math., Warsaw*, (1983), 487-492.
41. Three primes and an almost prime in arithmetic progression, *Coll. Math. Soc. János Bolyai, 34, Topics in classical number theory*, (Elsevier North Holland, Amsterdam, 1984), 709-715.
42. The square sieve and consecutive square-free numbers, *Math. Ann.*, 266 (1984), 251-259.
43. A note on the differences between consecutive primes, *Math. Ann.*, 266 (1984), 317-320. (With D.A. Goldston.)
44. The divisor function at consecutive integers, *Mathematika*, 31 (1984), 141-149.
45. Diophantine approximation with square-free numbers, *Math. Zeit.*, 187 (1984), 335-344.
46. Cubic forms in 10 variables, *Number theory, Noordwijkerhout 1983, Lecture Notes in Math., 1068*, (Springer, Berlin, 1984), 104-108.
47. Fermat's two squares theorem, *Invariant*, 11 (1984), 3-5.
48. The ternary Goldbach problem, *Rev. Math. Iberoamericana*, 1 (1985), 45-59.
49. On the distribution of gaps between zeros of the Zeta-function, *Quart. J. Math. Oxford Ser. (2)*, 36 (1985), 43-51. (With J.B. Conrey, A. Ghosh, D. Goldston and S.M. Gonek.)
50. Fermat's last theorem for "almost all" exponents, *Bull. London Math. Soc.*, 17 (1985), 15-16.
51. The first case of Fermat's last theorem, *Invent. Math.*, 79 (1985), 409-416. (With L.M. Adleman.)

52. Asymptotic mean square of the product of the Riemann zeta-function and a Dirichlet polynomial, *J. Reine angew. Math.*, 357 (1985), 161-181. (With R. Balasubramanian and J.B. Conrey.)
53. A multiple exponential sum to modulus p^2 , *Canad. Math. Bull.*, 28 (1985), 394-396.
54. The first case of Fermat's last theorem, *Math. Intellegencer*, 7 (1985), 40-47, 55.
55. Small solutions of quadratic congruences, *Glasgow Math. J.*, 27 (1985), 87-93.
56. Artin's conjecture for primitive roots, *Quart. J. Math. Oxford Ser. (2)*, 37 (1986), 27-38.
57. The divisor function $d_3(n)$ in arithmetic progressions, *Acta Arith.*, 47 (1986), 31-56.
58. *The theory of the Riemann Zeta-function, 2nd Edition*, (Clarendon Press, Oxford, 1986). (First edition by E.C. Titchmarsh.)
59. Integer sets containing no arithmetic progressions, *J. London Math. Soc. (2)*, 35 (1987), 385-394.
60. Consecutive almost-primes, *J. Indian Math. Soc.*, 52 (1987), 39-49.
61. Differences between consecutive primes, *Jahresber. Deutsch. Math.-Verein.*, 90 (1988), 71-89.
62. The growth rate of the Dedekind zeta-function on the critical line, *Acta Arith.*, 49 (1988), 323-329.
63. The fractional part of αn^k , *Mathematika*, 35 (1988), 28-37.
64. Weyl's inequality, Hua's inequality and Waring's problem, *J. London Math. Soc. (2)*, 38 (1988), 216-230.
65. The number of primes in a short interval, *J. Reine angew. Math.*, 389 (1988), 22-63.
66. Van der Corput bounds for the Dedekind Zeta-function, *Groupe de travail en théorie analytique et élémentaire des nombres, 1986-87*, (Publ. Math. Orsay, 1988), 44-46.
67. Weyl's inequality, Waring's problem and Diophantine approximation, *Number theory and related topics*, (Tata Inst. Fund. Res., Bombay, 1988), 41-45.
68. Ternary quadratic forms and sums of three square-full numbers, *Séminaire de Théorie des nombres, Paris 1986-87, Prog. Math.*, 75 (1989), 137-163.

69. Sums of three square-full numbers, *Coll. Math. Soc. János Bolyai*, 51, *Number Theory*, (Elsevier North Holland, Amsterdam, 1990), 163-171.
70. Exponential sums with a difference, *Proc. London Math. Soc.* (3), 61 (1990), 227-250. (With M.N. Huxley.)
71. Siegel zeros and the least prime in an arithmetic progression, *Quart. J. Math. Oxford Ser.* (2), 41 (1990), 405-418.
72. The differences between consecutive primes, IV, *A tribute to Paul Erdős*, (Cambridge University Press, 1990), 277-287.
73. Square-full numbers in short intervals, *Math. Proc. Camb. Phil. Soc.*, 110 (1991), 1-3.
74. Searching for solutions of $x^3 + y^3 + z^3 = k$, *Sémin. Théorie des Nombres, Paris, 1989-90, Prog. Math.*, 12 (1991), 71-75.
75. Small solutions of quadratic congruences, II, *Mathematika*, 38 (1991), 264-284.
76. The number of Abelian groups of order at most x , *Astérisque*, 198-199-200 (1991), 153-163.
77. Zero-free regions for Dirichlet L -functions, and the least prime in an arithmetic progression, *Proc. London Math. Soc.* (3), 64 (1992), 265-338.
78. The distribution and moments of the error term in the Dirichlet divisor problem, *Acta Arith.*, 60 (1992), 389-414.
79. Calabi-Yau threefolds with $\rho > 13$, *Math. Ann.*, 294 (1992), 49-57. (With P.M.H. Wilson.)
80. The density of zeros of forms for which weak approximation fails, *Math. Comp.*, 59 (1992), 613-623.
81. Zero-free regions of $\zeta(s)$ and $L(s, \chi)$, *Proceedings of the Amalfi conference on analytic number theory*, (University of Salerno, 1992), 195-200.
82. The size of Selmer groups for the congruent number problem, *Invent. Math.*, 111 (1993), 171-195.
83. Zeros of the Riemann Zeta-function on the critical line, *Math. Zeit.*, 212 (1993), 193-199.
84. The Dirichlet divisor problem, *Advances in number theory*, (Clarendon Press, Oxford, 1993), 31-35.
85. Fractional moments of the Riemann Zeta-function, II *Quart. J. Math. Oxford Ser.* (2), 44 (1993), 185-197.

86. On solving the Diophantine equation $x^3+y^3+z^3 = k$ on a vector computer, *Math. Comp.*, 61 (1993), 235-244. (With W.M. Lioen and H.J.J. te Riele).
87. The density of rational points on non-singular hypersurfaces, *Proc. Indian Acad. Sci. (Math. Sci.)*, 104 (1994), 13-29.
88. Odd perfect numbers, *Math. Proc. Camb. Phil. Soc.*, 115 (1994), 191-196.
89. The size of Selmer groups for the congruent number problem, II, *Invent. Math.*, 118 (1994), 331-370.
90. Sign changes of $E(T)$, $\Delta(x)$ and $P(x)$, *J. Number Theory*, 49 (1994), 73-83. (With K. M. Tsang.)
91. A mean value estimate for real character sums, *Acta Arithmetica*, 72 (1995), 235-275.
92. The largest prime factor of the integers in an interval, *Science in China, Ser. A*, 39 (1996), 449-476.
93. An estimate for Heilbronn's exponential sum, *Analytic number theory: Proceedings of a conference in honor of Heini Halberstam*, (Birkhäuser, Boston, 1996), 451-463.
94. A new form of the circle method, and its application to quadratic forms, *J. reine angew. Math.*, 481 (1996), 149-206.
95. Almost-prime k -tuples, *Mathematika*, 44 (1997), 245-266.
96. The density of rational points on cubic surfaces, *Acta Arith.*, 89 (1997), 17-30.
97. The circle method and diagonal cubic forms, *Phil. Trans. Roy. Soc. London*, A 356 (1998), 673-699.
98. The largest prime factor of the integers in an interval, II, *J. Reine angew. Math.*, 498 (1998), 35-59. (With C.-H. Jia).
99. Counting rational points on cubic surfaces, *Astérisque*, 251 (1998), 13-29.
100. The density of rational points on the cubic surface $X_0^3 = X_1X_2X_3$, *Math. Proc. Camb. Phil. Soc.*, 125 (1999), 385-395. (With B.Z. Moroz.)
101. Lattice points in the sphere, *Number theory in progress*, (Walter de Gruyter, Berlin, 1999), 883-892.
102. The solubility of diagonal cubic diophantine equations, *Proc. London Math. Soc. (3)*, 79 (1999), 241-259.
103. A note on the paper 'Consecutive almost-primes', *J. Indian Math. Soc. (N.S.)*, 66 (1999), 203-205.

104. Exponential decay in the frequency of analytic ranks of automorphic L -functions, *Duke Math. J.*, 102 (2000), 475-484. (With P. Michel.)
105. New bounds for Gauss sums derived from k -th powers, and for Heilbronn's exponential sum, *Quart. J. Math.*, 51 (2000), 221-235. (With S. Konyagin.)
106. Arithmetic applications of Kloosterman sums, *Nieuw Arch. Wiskd.* (5), 1 (2000), 380-384.
107. Kummer's conjecture for cubic Gauss sums, *Israel J. Math.*, 120 (2000), 97-124.
108. The largest prime factor of $X^3 + 2$, *Proc. London Math. Soc.* (3), 82 (2001), 554-596.
109. Primes represented by $x^3 + 2y^3$, *Acta Math.*, 186 (2001), 1-84.
110. The distribution of αp modulo one, *Proc. London Math. Soc.* (3), 84 (2002), 79-104. (With C.-H. Jia.)
111. Primes represented by binary cubic forms, *Proc. London Math. Soc.* (3), 84 (2002), 257-288. (With B.Z. Moroz.)
112. The density of rational points on curves and surfaces, *Annals of Math.*, 155 (2002), 553-595.
113. Heilbronn's exponential sum and transcendence theory, *The panorama of number theory, or the view from Baker's garden*, ed. G. Wüstholz, (Cambridge University Press, Cambridge, 2002), 353-356.
114. Integers represented as a sum of primes and powers of two, *Asian J. Math.*, 6 (2002), 535-566. (With J.-C. Puchta.)
115. Rational solutions of certain equations involving norms, *Acta Math.*, 189 (2002), 161-177. (With A. Skorobogatov.)
116. Lagrange's four squares theorem with one prime variable and three almost prime variables, *J. reine Angew. Math.*, 558 (2003), 159-224. (With D. Tolev.)
117. Linear relations amongst sums of two squares, *Number theory and algebraic geometry*, eds M. Reid and A. Skorobogatov, LMS Lecture Note Series, 303, (Cambridge University Press, Cambridge, 2003), 133-176.
118. Lectures on Sieves, *Bonn. Math. Schr.*, 360 (2003), 50pp.
119. The density of rational points on Cayley's cubic surface, *Bonn. Math. Schr.*, 360 (2003), 33pp.
120. On the representation of primes by cubic polynomials in two variables, *Proc. London math. Soc.* (3), 88 (2004), 289-312. (With B.Z. Moroz.)

121. The average analytic rank of elliptic curves, *Duke Math. J.*, 122 (2004), 591-623.
122. Equal sums of three powers, *Invent. Math.*, 157 (2004), 553-573. (With T.D. Browning.)
123. Rational points and analytic number theory, *Arithmetic of higher-dimensional algebraic varieties (Palo Alto, CA, 2002)*, eds B. Poonen and Yu. Tschinkel, (Progr. Math., 226, Birkhäuser Boston, Boston, MA, 2004), 37-42.
124. On the average value of divisor sums in arithmetic progressions, *Int. Math. Res. Not.*, (2005), no. 1, 1-25. (With W.D. Banks and I.E. Shparlinski.)
125. Prime number theory and the Riemann Zeta-function, *Recent perspectives in random matrix theory and number theory*, eds F. Mezzadri and N.C. Snaith, (LMS Lecture Notes, 332, Cambridge University Press, Cambridge, 2005), 1-30.
126. Counting rational points on hypersurfaces, *J. reine Angew. Math.*, 584 (2005), 83-115. (With T.D. Browning.)
127. Plane curves in boxes and equal sums of two powers, *Math. Zeit.*, 251 (2005), 233-247. (With T.D. Browning.)
128. Permutation groups, simple groups and sieve methods, *Israel J. Math.*, 148 (2005), 347-375. (With C.E. Praeger and A. Shalev.)
129. The density of rational points on non-singular hypersurfaces, I, *Bull. London Math. Soc.*, 38 (2006), 401-410. (With T.D. Browning.)
130. Counting rational points on algebraic varieties, *Duke Math. J.*, 132 (2006), 545-578. (With T.D. Browning and P. Salberger.)
131. The density of rational points on non-singular hypersurfaces, II, *Proc. London Math. Soc.* (3), 93 (2006), 273-303. (With T.D. Browning.)
132. Counting rational points on algebraic varieties, *Analytic Number Theory, Cetraro, Italy, 2002*, eds A. Perelli and C. Viola, (Lecture Notes in Mathematics, 1891, Springer, Berlin, 2006), 51-95.
133. The distribution of rational points on algebraic varieties, *Equidistribution in number theory, An introduction*, eds A. Granville and Z. Rudnick, (NATO Science Series, Series II, Mathematics, Physics and Chemistry, Vol. 237, Springer, 2007), 139-168.
134. A note on the 2-part of Sha for the congruent number curves, *Ranks of elliptic curves and random matrix theory*, eds J.B. Conrey, D.W. Farmer, F. Mezzadri and N.C. Snaith, (LMS Lecture Notes, 341, Cambridge University Press, Cambridge, 2007), 341-344.

135. Simultaneous equal sums of three powers, *Diophantine geometry proceedings*, ed U. Zannier, (CRM Series, 4, Scuola Normale Superiore Pisa, 2007), 93-100. (With T.D. Browning).
136. Cubic forms in 14 variables, *Invent. Math.*, 170 (2007), 199-230.
137. Quadratic class numbers divisible by 3, *Funct. Approx. Comment. Math.*, 37 (2007), 203-211.
138. Carmichael numbers with three prime factors, *Hardy–Ramanujan J.*, 30 (2007), 6-12.
139. Density of non-residues in Burgess-type intervals and applications, *Bull. London Math. Soc.*, 40 (2008), 88-96. (With W.D. Banks, M.Z. Garaev and I.E. Shparlinski).
140. Imaginary quadratic fields with class group exponent 5, *Forum Math*, 20 (2008), 275-283.
141. Integral points on cubic hypersurfaces, *Analytic number theory, Essays in honour of Klaus Roth*, (Cambridge University Press, Cambridge, 2009), 75-90. (With T.D. Browning).
142. Convexity bounds for L -functions, *Acta Arith*, 136 (2009), 391-395.
143. Sums and differences of three k -th-powers, *J. Number Theory*, 129 (2009), 1579-1594.
144. Rational points on quartic hypersurfaces, *J. Reine angew. Math.*, 629 (2009), 37-88. (With T.D. Browning).
145. Zeros of forms in many variables, *Colloquio de Giorgi 2007 and 2008*, 2 (2009), 17-26.
146. A note on the fourth moment of Dirichlet L -functions, *Acta Arith.*, 141 (2010), 335-344. (With H.M. Bui).
147. Zeros of p -adic forms, *Proc. London Math. Soc. (3)*, 100 (2010), 560-584.
148. Pair Correlation for Fractional Parts of αn^2 , *Math. Proc. Camb. Phil. Soc.*, 148 (2010), 385-407.
149. Zeros of systems of p -adic Quadratic Forms, *Compositio Math.*, 146 (2010), 271-287.