Curriculum Vitae

Prof. Dr. Alexander K. Hartmann

born 20 July 1968 in Heidelberg (Germany)
nationality: German
family status: married, two children

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Education and Qualifications

1987-1993	Study of Computer Science at University of Hagen (Germany) Diplom examination (≡ Master's Degree) July 1993
1987-1994	Study of Physics at University of Duisburg (Germany) Diplom examination (≡ Master's Degree) with distinction March 1994
Spring 1996	Research project at Edinburgh Parallel Computing Center (Scotland, UK)
1994-1998	Graduate studies in Computational Physics at University of Heidelberg (Germany) PhD in Physics in May 1998
2004	Habilitation in Physics

Professional Activities

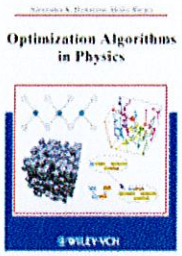
1992–1994	Tutor for theoretical computer science, data structures and PASCAL at University of Hagen (Study Center Krefeld)
1994–1996	European-Community project "Computational Modeling of Diffusion in amorphous Media" at the Computational Physics Group (Prof. D.W. Heermann), University of Heidelberg
1996–1998	Part-time work at IBM scientific-center Heidelberg, project: optimization of a car-rental service

1996–1998	Tutor for theoretical physics and computer science, University of Heidelberg
1998-2000	Post-doc position at the Institut für Theoretische Physik, University of Göttingen (group of Prof. A. Zippelius)
01-07/2001	Visiting post-doc at the Department of Physics, University of California Santa Cruz (group of Prof. A.P. Young)
08/01-02/02	Visiting post-doc at the Département de Physique of the Ecole Normale Supérieure, Paris (group of Dr. W. Krauth)
03/02-12/02	Post-doc position at the Institut für Theoretische Physik, University of Göttingen (group of Prof. A. Zippelius)
01/03 - 3/07	Head of the research group "Complex Ground States of Disordered Systems" at the Institut für Theoretische Physik, University of Göttingen
since 4/2007	W2 Professorship "Computational Theoretical Physics" at University of Oldenburg

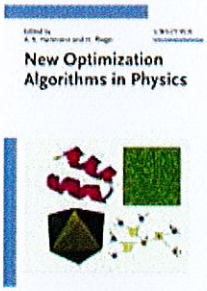
Oldenburg, June 22, 2015

Publications (H-index (Web of Science): 26)

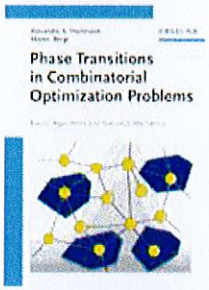
Books

1. 

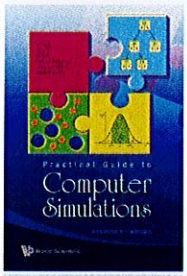
A.K. Hartmann and H. Rieger
Optimization Algorithms in Physics
Wiley-VCH (2001)

2. 

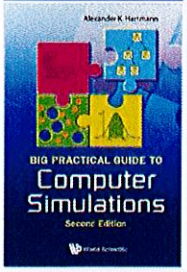
A.K. Hartmann and H. Rieger (eds.)
New Optimization Algorithms in Physics
Wiley-VCH (2004)

3. 

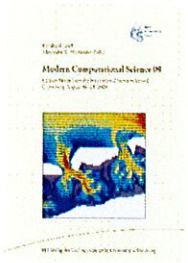
A.K. Hartmann and M. Weigt
Phase Transitions in Combinatorial Optimization Problems
Wiley-VCH (2005)

4. 

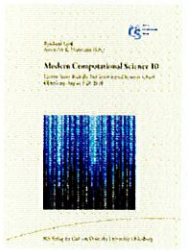
A.K. Hartmann
Practical Guide to Computer Simulations
World Scientific (2009)



(2nd strongly extended edition)
A.K. Hartmann
Big Practical Guide to Computer Simulations
World Scientific (2015)

5. 

R. Leidel and A.K. Hartmann (eds.)
Modern Computational Science 09: lecture notes from the international summer school (Oldenburg August 16–28, 2009)
BIS-Verlag Oldenburg (2009)

6. 

R. Leidel and A.K. Hartmann (eds.)
Modern Computational Science 10: lecture notes from the international summer school (Oldenburg August 9–20, 2010)
BIS-Verlag Oldenburg (2010)

7. 

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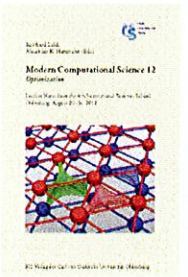
Modern Computational Science 11: lecture notes from the international summer school (Oldenburg August 15–26, 2011)
BIS-Verlag Oldenburg (2011)

8. 

R. Leidel and A.K. Hartmann (eds.)
Modern Computational Science 12: lecture notes from the international summer school (Oldenburg August 20–31, 2012)
BIS-Verlag Oldenburg (2012)

Theses

9. A.K. Hartmann
Simulation fehlertoleranter Systeme mittels Importance Sampling
Diplomarbeit Informatik, Fernuniversität Hagen, 1993

10. A.K. Hartmann
Exakte Berechnung von Grundzuständen verdünnter Antiferromagnete
Diplomarbeit Physik, Gesamthochschule Duisburg, 1994

11. A.K. Hartmann
Grundzustände ungeordneter Ising-Systeme
Doktorarbeit Physik, Heidelberg 1998

12. A.K. Hartmann
    Random-field systems, spin glasses and vertex covers: on the relation of statistical physics and combinatorial optimization
    Habiliation Physik, Göttingen 2004

Refereed Publications

13. A.K. Hartmann and K.D. Usadel
    Exact determination of all ground states of random field systems in polynomial time
    Physica A **214**, 141 (1995)

14. A.K. Hartmann
    Cluster–exact approximation of spin glass ground states
    Physica A **224**, 480 (1996)

15. A.K. Hartmann
    Evidence for nontrivial ground state structure of 3d $\pm J$ spin glasses
    Europhysics Letters **40** (4), 429 (1997)

16. A.K. Hartmann
    Ground state structure of diluted antiferromagnets and random field systems
    Physica A **248**, 1–20 (1998)

17. A.K. Hartmann and D.W. Heermann
    Description of noble gas diffusion in a polymer matrix by a hopping model
    J. Chem. Phys. **108**, 9550 (1998)

18. A.K. Hartmann
    Are ground states of 3d $\pm J$ spin glasses ultrametric ?
    Europhys. Lett **44**, 249 (1998)

19. A.K. Hartmann
    Scaling of stiffness energy for 3d $\pm J$ spin glasses
    Phys. Rev. E **59**, 84 (1999)

20. A.K. Hartmann and U. Nowak
    Universality in three dimensional random field systems
    Eur. Phys. J. B **7**, 105 (1999)

21. A.K. Hartmann
    Ground-state behavior of the 3d $\pm J$ random-bond Ising model
    Phys. Rev. B **59**, 3617 (1999)

22. A.K. Hartmann
    Ground-state landscape of 2d $\pm J$ Ising spin glasses
    Eur. Phys. J. B **8**, 619 (1999)

23. A.K. Hartmann
Reply to comment on "Evidence for nontrivial ground-state structure of 3d $\pm J$ spin glasses"
Europhys. Lett. **45**, 747 (1999)

24. A.K. Hartmann
Calculation of ground states of four-dimensional $\pm J$ Ising spin glasses
Phys. Rev. E **60**, 5135 (1999)

25. A.K. Hartmann
Analysis of the statistical behavior of genetic cluster-exact approximation
Physica A **275**, 1 (1999)

26. A.K. Hartmann
A new method for analyzing ground-state landscapes: ballistic search
J. Phys. A **33**, 657 (2000)

27. A.K. Hartmann
How to evaluate ground-state landscapes of spin glasses thermodynamical correctly
Eur. Phys. J. B **13**, 539 (2000)

28. M. Weigt and A.K. Hartmann
The number of guards needs a museum - an easy-hard transition in vertex covering of random graphs
Phys. Rev. Lett. **84**, 6118 (2000)

29. A.K. Hartmann
Ground-state clusters of two, three and four-dimensional $\pm J$ Ising spin glasses
Phys. Rev. E **63**, 016106 (2001)

30. A.K. Hartmann and I.A. Campbell
Ordered phase in the two-dimensional randomly coupled ferromagnet
Phys. Rev. B **63**, 094423 (2001)

31. A.K. Hartmann
Comment on "Glassy Transition in a Disordered Model for the RNA Secondary Structure"
Phys. Rev. Lett. **86** 1382, (2001)

32. M. Weigt and A.K. Hartmann
The typical-case complexity of a vertex-covering algorithm on finite-connectivity random graphs
Phys. Rev. Lett. **86**, 1658 (2001)

33. A.K. Hartmann and M. Weigt
Statistical mechanics perspective on the phase transition in vertex covering of finite-connectivity random graphs
Theor. Comp. Science **265**, 199 (2001)

34. G. Hed, A.K. Hartmann, D. Stauffer and E. Domany
Spin Domains Generate Hierarchical Ground States
Phys. Rev. Lett. **86**, 3148 (2001)

35. K. Broderix, T. Aspelmeier, A. K. Hartmann and A. Zippelius
The dynamics of gelation
Phys. Rev. E **64**, 021404 (2001)

36. M. Weigt and A.K. Hartmann,
Minimal vertex covers on finite-connectivity random graphs - a hard-sphere lattice-gas picture
Phys. Rev. E 63, 056127 (2001)

37. G. Hed, A.K. Hartmann and E. Domany
Correct extrapolation of overlap distribution in spin glasses
Europhys. Lett. **55**, 112 (2001)

38. A.K. Hartmann and A.P. Young
Lower Critical Dimension of Ising Spin Glasses
Phys. Rev. B **64**, 180404 (2001)

39. A.K. Hartmann and A.P. Young
Specific-Heat Exponent of Random-Field Systems via Ground-State Calculations
Phys. Rev. B **64**, 214419 (2001)

40. A.K. Hartmann
Ferromagnetic-spin glass transition in four-dimensional random-bond Ising model
Phys. Rev. B **64**, 224430 (2001)

41. A.K. Hartmann
Sampling rare events: statistics of local sequence alignments
Phys. Rev. E **65**, 056102 (2002)

42. W. Barthel, A.K. Hartmann, M. Leone, F. Ricci-Tersenghi, M. Weigt, and R. Zecchina
Generating hard and solvable satisfiability problems: A statistical mechanics approach
Phys. Rev. Lett. **88**, 188701 (2002)

43. A.K. Hartmann
Critical exponents of four-dimensional random-field Ising systems
Phys. Rev. B **65**, 174427 (2002)

44. A.K. Hartmann, R. Kree, U. Geyer, and M. Koelbel
Long-Time Effects of Surface Relaxation in a Simulation Model of Sputter Erosion
Phys. Rev. B **65**, 193403 (2002)

45. A.K. Hartmann and A.P. Young
Large-Scale, Low-Energy Excitations in the Two-Dimensional Ising Spin Glass
Phys. Rev. B **66**, 094419 (2002)

46. A.K. Hartmann, A.J. Bray, A.C. Carter, M.A. Moore, and A.P. Young
The stiffness exponent of two-dimensional Ising spin glasses for non-periodic boundary conditions using aspect-ratio scaling
Phys. Rev. B **66**, 224401 (2002)

47. A.K. Hartmann and F. Ricci-Tersenghi
Equilibrium sampling of complex landscapes at low temperatures: the three-dimensional $\pm J$ Ising spin glass
Phys. Rev. B **66**, 224419 (2002)

48. A. Rosso, A.K. Hartmann, and W. Krauth
Depinning of elastic manifolds
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49. J.J. Moreno, H.G. Katzgraber, A.K. Hartmann
Finding Low-Temperature States with Parallel Tempering, Simulated Annealing and Simple Monte Carlo
Int. J. Mod. Phys. C **14**, 285 (2003)

50. M. Weigt and A.K. Hartmann
Glassy behavior induced by geometrical frustration in a hard-core lattice gas model
Europhys. Lett. **62**, 533 (2003)

51. A.K. Hartmann and M.A. Moore
Corrections to Scaling are Large for Droplets in Two-Dimensional Spin Glasses
Phys. Rev. Lett. **90**, 127201 (2003)

52. W. Barthel, A.K. Hartmann, and M. Weigt
Solving satisfiability problems by fluctuations: The dynamics of stochastic local search algorithms
Phys. Rev. E **67**, 066104 (2003)

53. A.K. Hartmann
No spin-glass transition in the "mobile-bond" model
Phys. Rev. B **67**, 214404 (2003)

54. F. Liers, M. Palassini, A.K. Hartmann, and M. Jünger
Ground State of the Bethe Lattice Spin Glass and Running Time of an Exact Optimization Algorithm
Phys. Rev. B **68**, 094406 (2003)

55. A.K. Hartmann and M. Weigt
Statistical mechanics of the vertex-cover problem
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56. A.K. Hartmann and M. Moore
Generating droplets in two-dimensional Ising spin glasses by using matching algorithms
Phys. Rev. B **69**, 104409 (2004)

57. S. Alder, S. Trebst, A.K. Hartmann, and M. Troyer
Dynamics of the Wang-Landau algorithm and complexity of rare events for the three-dimensional bimodal Ising spin glass
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58. J. Houdayer and A.K. Hartmann
Low-temperature behavior of two-dimensional Gaussian Ising spin glasses
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59. I.A. Campbell, A.K. Hartmann, and H.G. Katzgraber
Energy size effects of two-dimensional Ising spin glasses, Phys. Rev. B **70**, 054429 (2004)

60. A. Engel, R. Monasson, and A.K. Hartmann
On large deviation properties of Erdos-Renyi random graphs
J. Stat. Phys. **117**, 387 (2004)

61. C. Amoruso and A.K. Hartmann
Domain-Wall Energies and Magnetization of the Two-Dimensional Random-Bond Ising Model
Phys. Rev. B **70**, 134425 (2004)

62. W. Barthel and A.K. Hartmann
Clustering analysis of the ground-state structure of the vertex-cover problem
Phys. Rev. E **70**, 066120 (2004)

63. A.K. Hartmann
Calculation of partition functions by measuring component distributions
Phys. Rev. Lett. **94**, 050601 (2005)

64. M. Feix, A.K. Hartmann, R. Kree, J. Munoz-Garcia, and R. Cuerno
Influence of Collision Cascade Statistics on Pattern Formation of Ion-Sputtered Surfaces
Phys. Rev. B **71**, 125407 (2005)

65. B. Burghardt and A.K. Hartmann
Dependence of RNA secondary structure on the energy model
Phys. Rev. E **71**, 021913 (2005)

66. E.O. Yewande, A.K. Hartmann and R. Kree
Propagation of Ripples in Monte Carlo Models of Sputter Induced Surface Morphology
Phys. Rev. B **71**, 195405 (2005)

67. A.K. Hartmann, W. Barthel, and M. Weigt
Phase transition and finite-size scaling in the vertex-cover problem
Comp. Phys. Comm. **169**, 234 (2005)

68. S. Boettcher and A.K. Hartmann
Reduction of Two-Dimensional Dilute Ising Spin Glasses
Phys. Rev. B **72**, 014429 (2005)

69. H.G. Katzgraber, M. Körner, F. Liers, M. Jünger, and A.K. Hartmann
Energy fluctuations in spin glasses
Phys. Rev. B **72**, 094421 (2005)

70. M. Körner, H.G. Katzgraber, and A.K. Hartmann
Probing tails of energy distributions using importance-sampling in the disorder with a guiding function
J. Stat. Mech. P 04001 (2006).

71. E.O. Yewande, R. Kree, and A.K. Hartmann
Morphological regions and oblique incidence dot formation in a model of surface sputtering
Phys. Rev. B **73**, 115434 (2006).

72. C. Amoruso, A.K. Hartmann, and M.A. Moore
Determining Energy Barriers by Iterated Optimization The Two-Dimensional Ising Spin Glass
Phys. Rev. B **73**, 184405 (2006).

73. C. Amoruso, A.K. Hartmann, M.B. Hastings, and M.A. Moore
Conformal Invariance and SLE in Two-Dimensional Ising Spin Glasses
Phys. Rev. Lett. **97**, 267202 (2006)

74. B. Burghardt and A.K. Hartmann
RNA secondary structure design
Phys. Rev. E **75** 021920 (2007)

75. E.O. Yewande, R. Kree, and A.K. Hartmann
Numerical analysis of the quantum dots on off-normal incidence ion sputtered surfaces
Phys. Rev. B **75**, 155325 (2007)

76. R. Fisch and A.K. Hartmann,
Ground-State and Domain-Wall Energies in the Spin-Glass Region of the 2D +-J Random-Bond Ising Model
Phys. Rev. B **75**, 174415 (2007)

77. M. Jungsbluth, B. Burghardt and A.K. Hartmann
Fingerprinting networks: Correlations of local and global network properties
Physica A **381**, 444 (2007)

78. S. Wolfsheimer, B. Burghardt, and A.K. Hartmann
Local Sequence Alignments Statistics: Deviations from Gumbel Statistics in the Rare-Event Tail
Algorithms for Molecular Biology **2**, 9 (2007)

79. O. Melchert and A.K. Hartmann
Fractal dimension of domain walls in two-dimensional Ising spin glasses
Phys. Rev. B **76**, 174411 (2007)

80. S. Panknin, A.K. Hartmann, and Tim Salditt
X-Ray Propagation in Tapered Waveguides: Simulation and Optimization
Optics Commun. **281** , 2779 (2008)

81. O. Melchert, and A.K. Hartmann
Negative-weight percolation
New J. Phys. **10**, 043039 (2008)

82. A.K. Hartmann
Droplets in the two-dimensional +-J Ising spin glass
Phys. Rev. B **77**, 144418 (2008)

83. M. Zumsande, M.J. Alava, and A. K. Hartmann
First excitations in two- and three-dimensional random-field Ising systems
J. Stat. Mech. P02012 (2008)

84. S. Wolfsheimer, A. Mann, B. Burghardt, and A.K. Hartmann
RNA Secondary Structures: Complex Statics and Glassy Dynamics
J. Stat. Mech. P03005 (2008)

85. K. Janzen, A.K. Hartmann, and A. Engel
Replica theory for Levy spin glasses
J. Stat. Mech. P04006 (2008)

86. O. Melchert and A.K. Hartmann
Ground states of 2d +-J Ising spin glasses via stationary Fokker-Planck sampling
J. Stat. Mech. P10019 (2008)

87. H.G. Katzgraber, I.A. Campbell, and A.K. Hartmann
Extended scaling for ferromagnetic Ising models with zero-temperature transitions
Phys. Rev. B **78** 184409 (2008)

88. H.G. Katzgraber and A.K. Hartmann
Ultrametricity and clustering of states in spin glasses: A one-dimensional view
Phys. Rev. Lett. **102**, 037207 (2009)

89. R. Kree, T. Yasseri, and A.K. Hartmann
Surfactant Sputtering: Theory of a new method of surface nanostructuring by ion beams
Nucl. Instr. Meth. B **267**, 1403 (2009)

90. R. Kree, T. Yasseri, and A.K. Hartmann
The influence of beam divergence on ion-beam induced surface patterns
Nucl. Instr. Meth. B **267**, 1407 (2009)

91. A.K. Hartmann, R. Kree and T. Yasseri
Simulating discrete models of pattern formation by ion-beam sputtering
J. Phys.: Cond. Mat. **21**, 224015 (2009)

92. L. Apolo, O. Melchert and A.K. Hartmann
Phase transitions in diluted negative-weight percolation models
Phys. Rev. E **79**, 031103 (2009)

93. O. Melchert, and A.K. Hartmann
Scaling behavior of domain walls at the T=0 ferromagnet to spin-glass transition
Phys. Rev. B **79**, 184402 (2009)

94. M. Zumsande and A.K. Hartmann
Low-energy excitations in the three-dimensional random-field Ising model
Eur. Phys. J B **72**, 619-627 (2009)

95. S. Wolfsheimer, O. Melchert and A.K. Hartmann
Finite-temperature local protein sequence alignment: percolation and free-energy distribution
Phys. Rev. E **80**, 061913 (2009)

96. O. Melchert, L. Apolo, and A.K. Hartmann
The upper critical dimension of the negative-weight percolation problem
Phys. Rev. E **81**, 051108 (2010)

97. S. Wolfsheimer and A.K. Hartmann
Minimum (Free-) Energy Distribution of RNA Secondary Structures: Entropic and Thermodynamic Properties of Large Deviations
Phys. Rev E **82**, 021902 (2010)

98. A. Mann and A.K. Hartmann
Numerical Solution-Space Analysis of Satisfiability Problems
Phys. Rev. E **82**, 056702 (2010)

99. S. Wolfsheimer, Inke Herms, A.K. Hartmann, and S. Rahmann
Accurate Statistics for Local Sequence Alignment with Position-Dependent Scoring by Rare-Event Sampling
BMC Bioinformatics 2011 **12**:47 (2011)

100. B. Ahrens and A.K. Hartmann
Critical behavior of the Random-Field Ising model at and beyond the Upper Critical Dimension
Phys. Rev. B **83**, 014205 (2011)

101. O. Melchert and A.K. Hartmann
Configurational statistics of densely and fully packed loops in the negative-weight percolation model
Europ. Phys. J. B **80**, 155–165 (2011)

102. O. Melchert and A.K. Hartmann
A dedicated algorithm for calculating ground states for the triangular random bond Ising model
Computer Physics Communications **182**, 1828–1832 (2011)

103. S. Boettcher and A.K. Hartmann
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Phys. Rev. E **84**, 011108 (2011)

104. A.K. Hartmann
Ground states of two-dimensional Ising spin glasses: fast algorithms, recent developments and a ferromagnet-spin glass mixture
J. Stat. Phys. **144**, 519–540 (2011)

105. A.K. Hartmann
Large-deviation properties of largest component for random graphs
Eur. Phys. J. B **84**, 627–634 (2011).

106. B. Ahrens and A. K. Hartmann
Critical behavior of the Random-Field Ising Magnet with long range correlated disorder
Phys. Rev. B **84**, 144202 (2011)

107. O. Melchert, A.K. Hartmann, and M. Mezard
Mean-field behavior of the negative-weight percolation model on random regular graphs
Phys. Rev. E **84**, 041106 (2011)

108. H. Klein-Hennig and A.K. Hartmann
Bias in generation of random graphs
Phys. Rev. E **85**, 026101 (2012)

109. S. Wolfsheimer, A.K. Hartmann, R. Rabus, and G. Nuel
Computing posterior probabilities for score based alignments using ppALIGN
Stat. Appl. Gen. Mol. Biol. **11**, issue 4, article 1 (2012)

110. B. Ahrens and A.K. Hartmann
Excitations in high-dimensional random-field Ising magnets
Phys. Rev. B **85**, 224421 (2012)

111. A.K. Hartmann
Intuitive understanding of T=0 behavior of 2d spin glasses via renormalization-group analysis (News and perspectives)
J. Stat. Mech. Theory and Experiment, N07001 (2012)

112. M. Manssen, M. Weigel, and A.K. Hartmann
Random number generators for massively parallel simulations on GPU
Eur. Phys. J. Special Topics **210**, 53-71 (2012)

113. T. Dewenter and A.K. Hartman
Phase transition for cutting-plane approach to vertex-cover problem
Phys. Rev. E **86**, 041128 (2012)

114. H.G. Katzgraber, T.Jörg, F. Krzakala, and A.K. Hartmann
Ultrametric probe of the spin-glass state in a field
Phys. Ref. B **86**, 184405 (2012)

115. C. Hinz, K. Gebhardt, A.K. Hartmann, L. Sigman, and G. Gerlach
Influence of kinship and MHC class II genotype on visual traits in zebrafish larvae (Danio rerio)
Plos One **17**, e51182 (2012)

116. G. Claussen, L. Apolo, O. Melchert, and A.K. Hartmann
Analysis of the loop length distribution for the negative-weight percolation problem in dimensions d=2 through 6
Phys. Ref. E **86**, 056708 (2012)

117. O. Melchert and A. K. Hartmann
Information theoretic approach to ground-state phase transitions for two and three-dimensional frustrated spin systems
Phys. Ref. E **87**, 022107 (2013)

118. C.Norrenbrock, O. Melchert, and A.K. Hartmann
Is negative-weight percolation compatible with SLE?
Phys. Rev. E **87** , 032142 (2013)

119. O. Melchert and A.K. Hartmann
Typical and large-deviation properties of minimum-energy paths on disordered hierarchical lattices
Eur. Phys. J. B **86**, 323 (2013)

120. V. Hänke, M. Rupp, A.K. Hartmann, and G. Schneider
Pharmacophore Alignment Search Tool (PhAST): Significance Assessment of Chemical Similarity
Molecular Informatics 32, 625-646 (2013)

121. A.K. Hartmann, S. Majumdar, A. Rosso
Sampling fractional Brownian motion in presence of absorption: a Markov Chain method
Phys. Rev. E **88**, 022119 (2013)

122. H. Ehmann, H. Hartwich, C. Salzig, N. Hartmann, M. Clement-Ziza, K. Ushakov, K. B. Avraham, O. R. P. Bininda-Emonds, A. K. Hartmann, P. Lange, E. Friauf, and H. G. Nothwang
Time-dependent gene expression analysis of the developing superiot olivary complex
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Are the diluted antiferromagnet in a field and the random-field Ising model in the same universality class?
Phys. Rev. B **88**, 174408 (2013)

124. T. L. Mitran, O. Melchert, and A.K. Hartmann
Biased and greedy random walks on two-dimensional lattices with quenched randomness: the "greedy" ant within a disordered environment
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