

Brief Curriculum Vitae of members with list of publications (2015-20)

Parongama Sen

Present position : Professor, Physics Department

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Academic Qualifications

Ph.D., Saha Institute of Nuclear Physics, Calcutta 1993

M.Sc. (Physics), University of Calcutta, 1986 (exam held in 1987)

B.Sc. (Physics), Presidency College, Calcutta, 1984

Employments

Lecturer, College of Applied Sciences, University of Delhi, 1992-94

Research Associate, Jawaharlal Nehru University, New Delhi, 1994-95

Research Associate, Saha Institute of Nuclear Physics, 1995-96

Post Doctoral Fellow, University of Cologne, 1996-97

Lecturer, Surendranath College, Calcutta, 1997-2000

Lecturer, University of Calcutta, 2000-2005

Reader, University of Calcutta, 2005-2008

Associate Professor, University of Calcutta 2008-2011

Professor, University of Calcutta 2011- till date

Research Interests

Statistical physics: phase transitions and critical phenomena in magnetic systems, networks, quantum systems, percolation etc. Dynamical phenomena in complex physical and social systems

Awarded APS-IUSSTF Professorship, 2012-13

IMSc Associate (2011-2013)

Regular Associate Abdus Salam ICTP (2004-2010)

Research Publications (2015-20, in reverse order)

1. "A + A \rightarrow \emptyset reaction for particles with a dynamic bias to move away from their nearest neighbour in one dimension" by Roy, Reshmi; Sen, Parongama Article reference: JPhysA-113796.R2 (2020).
2. Long route to consensus: Two stage coarsening in binary choice voting model, S. Mukherjee, Soumyojyoti Biswas and P. Sen, Phys. Rev. E **102**, 012316 (2020).
3. Persistent quantum walks: Dynamic phases and diverging timescales, S. Mukhopadhyay and P. Sen, Phys. Rev. Research **2** 023002 (2020)
4. Tagged particle dynamics in one dimensional A + A \rightarrow kA models with the particles biased to diffuse towards their nearest neighbour, R. Roy, P. Ray and P. Sen, J. Phys. A: Math. Theor. **53** 155002 (2020).
5. Active-absorbing phase transition and small world behaviour in Ising model on finite addition type networks in two dimensions, P. Mullick and P. Sen, Journal of Complex Networks **8**, cnz046 (2020).
6. Scaling and crossover behaviour in a truncated long range quantum walk, P. Sen, Physica A **545**, 123529 (2020).
7. Effect of bias in a reaction diffusion system in two dimensions, P. Mullick and P. Sen, Phys. Rev. E **99** 052123 (2019).
8. Unusual scaling in a discrete quantum walk with random long range steps, P. Sen, Physica A **514**, 266 (2019).
9. Effect of localized loading on failure threshold of fiber bundles, Soumyajyoti Biswas and P. Sen, Physica A **509**, 1087 (2018).
10. Virtual walks in spin space: A study in a family of two-parameter models, P. Mullick and P. Sen, Phys. Rev. E **97**, 052122 (2018).
11. Critical noise can make the minority candidate win: The U.S. presidential election cases, S. Biswas and P. Sen, Rev. E **96**, 032303. (2017).
12. Zero temperature coarsening in Ising model with asymmetric second neighbor interaction in two dimensions, P. Mullick and P. Sen, Phys. Rev. E **95**, 052150 (2017).
13. Interplay of interfacial noise and curvature-driven dynamics in two dimensions, P. Roy and P. Sen, Phys Rev E **95**, 020101(R) (2017).
14. An empirical analysis of the Ebola outbreak in West Africa, A. Khaleque and P. Sen, Scientific Reports **7**, Article number: 42594 (2017).
15. Minority spin dynamics in the non-homogeneous Ising model: Diverging timescales and exponents, P. Mullick and P. Sen, Physical Review E **93**, 052113 (2016).
16. Annual Journal citation indices: a comparative study, A. Khaleque, A. Chatterjee and P. Sen, Journal of Scientometric Research **5**, 25 (2016).

17. Condensation transition in a conserved generalized interacting zero range process, A. Khaleque and P. Sen, Physical Review E **93**, 042102 (2016).
18. Continuous utility factor in segregation models, Parna Roy and P. Sen, Phys. Rev. E **93**, 022310 (2016).
19. Frozen states and active-absorbing phase transitions of the Ising model on networks. A. Khaleque and P. Sen, Journal of Complex Networks **4**, 330-341 (2016).
20. Maximizing the strength of fiber bundles under uniform loading, Soumyajyoti Biswas and P. Sen, Phys. Rev. Lett. **115**, 155501 (2015).
21. $A + A \rightarrow \emptyset$ model with a bias towards nearest neighbor P Sen and P Ray, Physical Review E **92**, 012109 (2015).
22. Exit probability in generalised kinetic Ising model, P. Roy and P. Sen, J. Stat. Phys. **159**, 893 (2015).
23. Effect of randomness in logistic maps, A. Khaleque and P. Sen, Int. J. Mod. Phys. C **26**, 1550086 (2015).

List of Publications of Parongama Sen

A. Published book

1. *Sociophysics: An Introduction*, P. Sen and B. K. Chakrabarti (Oxford University Press, Oxford) 2013.
2. *Quantum Ising Phases and Transitions in Transverse Ising models*, Lecture Notes in Physics **M41**, B. K. Chakrabarti, A. Dutta and P. Sen (Springer-Verlag) 1996.

B. Papers in refereed journals.

1. $A + A \rightarrow \emptyset$ reaction for particles with a dynamic bias to move away from their nearest neighbour in one dimension” by Roy, Reshmi; Sen, Parongama Article reference: JPhysA-113796.R2 (2020).
2. Long route to consensus: Two stage coarsening in binary choice voting model, S. Mukherjee, Soumyojyoti Biswas and P. Sen, Phys. Rev. E **102**, 012316 (2020).
3. Persistent quantum walks: Dynamic phases and diverging timescales, S. Mukhopadhyay and P. Sen, Phys. Rev. Research **2** 023002 (2020).
4. Tagged particle dynamics in one dimensional $A + A \rightarrow kA$ models with the particles biased to diffuse towards their nearest neighbour, R. Roy, P. Ray and P. Sen, J. Phys. A: Math. Theor. **53** 155002 (2020).
5. Active-absorbing phase transition and small world behaviour in Ising model on finite addition type networks in two dimensions, P. Mullick and P. Sen, Journal of Complex Networks **8**, cnz046 (2020).
6. Scaling and crossover behaviour in a truncated long range quantum walk, P. Sen, Physica A **545**, 123529 (2020).
7. Effect of bias in a reaction diffusion system in two dimensions, P. Mullick and P. Sen, Phys. Rev. E **99**, 052123 (2019).
8. Unusual scaling in a discrete quantum walk with random long range steps, P. Sen, Physica A **514**, 266 (2019).
9. Effect of localized loading on failure threshold of fiber bundles, Soumyajyoti Biswas and P. Sen, Physica A **509**, 1087 (2018)

10. Virtual walks in spin space: A study in a family of two-parameter models, P. Mullick and P. Sen, Phys. Rev. E **97**, 052122 (2018).
11. Critical noise can make the minority candidate win: The U.S. presidential election cases, S. Biswas and P. Sen, Rev. E **96**, 032303. (2017).
12. Zero temperature coarsening in Ising model with asymmetric second neighbor interaction in two dimensions, P. Mullick and P. Sen, Phys. Rev. E **95**, 052150 (2017).
13. Interplay of interfacial noise and curvature-driven dynamics in two dimensions, P. Roy and P. Sen, Phys Rev E **95**, 020101(R) (2017).
14. An empirical analysis of the Ebola outbreak in West Africa, A. Khaleque and P. Sen, Scientific Reports **7**, Article number: 42594 (2017).
15. Minority spin dynamics in the non-homogeneous Ising model: Diverging timescales and exponents, P. Mullick and P. Sen, Physical Review E, **93** 052113 (2016).
16. Annual Journal citation indices: a comparative study, A. Khaleque, A. Chatterjee and P. Sen, Journal of Scientometric Research **5** 25 (2016).
17. Condensation transition in a conserved generalized interacting zero range process, A. Khaleque and P. Sen, Physical Review E **93** 042102 (2016).
18. Continuous utility factor in segregation models, Parna Roy and P. Sen, Phys. Rev. E **93** 022310 (2016).
19. Frozen states and active-absorbing phase transitions of the Ising model on networks. A. Khaleque and P. Sen, Journal of Complex networks (doi: 10.1093/comnet/cnv024; 2015). first published online October 6, 2015. Journal publication: **4** (3): 330-341 (2016)
20. Maximizing the strength of fiber bundles under uniform loading, Soumyajyoti Biswas and P. Sen, Phys. Rev. Lett. **115**, 155501 (2015).
21. $A + A \rightarrow \emptyset$ model with a bias towards nearest neighbor P Sen and P Ray, Physical Review E **92**, 012109 (2015).
22. Exit probability in generalised kinetic Ising model, P. Roy and P. Sen, J. Stat. Phys. **159**, 893 (2015).
23. Effect of randomness in logistic maps, A. Khaleque and P. Sen, Int. J. Mod. Phys. C **26**, 1550086 (2015).
24. Universal features of exit probability in opinion dynamics models with domain size dependent dynamics, P. Roy, S. Biswas and P. Sen, J. Phys. A **47** 495001 (2014).

25. Agent based models for wealth distribution with preference in interaction, S. Goswami and P. Sen, *Physica A* **415**, 514 (DOI: 10.1016/j.physa.2014.08.018) (2014).
26. Damage spreading transition in an opinion dynamics model, A. Khaleque and P. Sen, *Physica* **413**, 599, (DOI: 10.1016/j.physa.2014.07.021) (2014).
27. Exit probability in inflow dynamics: Nonuniversality induced by range, asymmetry, and fluctuation. P. Roy, S. Biswas and P. Sen. *Phys. Rev. E* **89**, R030103 (2014).
28. Opinion dynamics model with weighted influence: Exit probability and dynamics, S. Biswas, S. Sinha and P. Sen, *Phys. Rev. E* **88**, 022152 (2013).
29. Susceptible-Infected-Recovered model on Euclidean network, A Khaleque and P. Sen, *Journal of Physics A* **46**, 095007 (2013).
30. Quantum random walk: Effect of quenching, S. Goswami and P. Sen, *Phys. Rev. A* **86**, 022314 (2012).
31. Nonconservative kinetic exchange model of opinion dynamics with randomness and bounded confidence, P. Sen, *Phys. Rev. E* **86**, 016115 (2012).
32. Disorder induced phase transition in kinetic models of opinion dynamics, S. Biswas, A. Chatterjee, P. Sen, *Physica A* **391**, P 3257-3265 (2012).
33. Effect of the nature of randomness on quenching dynamics of the Ising model on complex networks, S. Biswas and P. Sen, *Phys. Rev E* **84**, 066107 (2011).
34. Antipersistent dynamics in kinetic models of wealth exchange, S. Goswami, A. Chatterjee and P. Sen, *Phys. Rev. E* **84**, 051118 (2011).
35. Novel ballistic to diffusive crossover in the dynamics of a one dimensional Ising model with variable range of interaction, S. Biswas and P. Sen, *J. Phys. A* **44**, 145003 (2011).
36. Complex Networks: effect of subtle changes in nature of randomness, S. Goswami, S. Biswas and P. Sen, *Physica A* **390**, 972 (2011).
37. Phase transitions in a two parameter model of opinion dynamics with random kinetic exchanges, P. Sen, *Phys. Rev. E* **83**, 16108 (2011).
38. Agent dynamics in kinetic models of wealth exchange, A. Chatterjee and P. Sen, *Phys. Rev. E* **82**, 056117 (2010).
39. Noise driven dynamic phase transition in a one-dimensional Ising-like model, P. Sen, *Phys. Rev E* **81**, 032103 (2010)
40. Quantum Persistence: A Random Walk Scenario , S. Goswami, P. Sen and A. Das, *Phys. Rev. E* **81**, 021121 (2010).

41. Model of binary opinion dynamics: coarsening and effect of disorder, Soham Biswas and P. Sen, Phys. Rev. E **80**, 027101 (2009) (also selected for the September 1, 2009 issue of Virtual Journal of Biological Physics Research).
42. Zero-temperature dynamics in the two-dimensional axial next-nearest-neighbor Ising model, Soham Biswas, Anjan Kumar Chandra, and Parongama Sen, Phys. Rev. E **78**, 041119 (2008).
43. Effect of a static phase transition on searching dynamics, K. Basu Hajra and P. Sen, J. Stat. Mech. P06015 (2007).
44. A novel approach to study realistic navigations on networks, P. Sen, J. Stat. Mech. P04007 (2007).
45. Dynamics of unvisited sites in presence of mutually repulsive random walkers, P. K. Das, S. Dasgupta and P. Sen, J. Phys. A: Math. Theor. **40** (2007), 6013-6022.
46. Modelling temporal and spatial features of collaboration network, Anjan Kumar Chandra, Kamalika Basu Hajra, Pratap Kumar Das, Parongama Sen, Int. J. Mod. Phys. C **18**, 1157 (2007).
47. Phase transitions in an Ising model on a Euclidean network, A. Chatterjee and P. Sen, Phys. Rev E **74**, 036109 (2006).
48. Modelling Aging Characteristics in Citation Networks, K. Basu Hajra and P. Sen, Physica A, **368**, 575 (2006).
49. Zero temperature dynamics of Ising model on a densely connected small world network P. K. Das and P. Sen, Eur. Phys. J. B, **47** 306 (2005).
50. Aging in citation networks, K. Basu Hajra and P. Sen, Physica A **346**, (2005) 44.
51. Persistence and dynamics in ANNNI chain, P. Sen and S. Dasgupta, J. Phys. A **37**, 11949-11956 (2004).
52. Phase transitions in an aging network, K. Basu Hajra and P. Sen, Phys. Rev. E **70** 056103 (2004).
53. Probability distribution of persistent spins in a Ising chain, P. K. Das and P. Sen, J. Phys A **37** 7179 (2004).
54. Accelerated growth in outgoing links in evolving networks: deterministic vs. stochastic picture, P. Sen, Physical Rev. E **69** 046107 (2004).
55. Scale-free network on a vertical plane, S. S. Manna, G. Mukherjee and P. Sen, Physical Review E **69** 017102 (2004).
56. Clustering properties of a generalised critical Euclidean network, P. Sen and S. S. Manna, Phys. Rev. E **68** 026104 (2003).

57. Small-world properties of the Indian railway network, P. Sen S. Dasgupta, A. Chatterjee, P. A. Sreeram, G. Mukherjee, S. S. Manna Phys. Rev. E **67** 036106 (2003).
58. Persistence in an antiferromagnetic Ising system with conserved magnetisation, Moumita Saharay and P. Sen, Physica A **318** 243 (2003).
59. Modulated Scale-free Network in the Euclidean Space, S. S. Manna and P. Sen, Phys. Rev. E **66** 066114 (2002).
60. Phase transitions in a network with range dependent connection probability, P. Sen, K. Banerjee and T. Biswas, Phys. Rev. E **66** 037102 (2002).
61. Is there a true model-D critical dynamics? P. Sen and S. M. Bhattacharjee J. Phys. A **35**, L141 (2002).
62. Short-time scaling in the critical dynamics of an antiferromagnetic Ising system with conserved magnetization, P. Sen and S. Dasgupta, J. Phys. A **35** , 2755 (2002).
63. Nature of largest size distribution at the percolation threshold, P. Sen J. Phys. A **34** 8487 (2001).
64. Small-world phenomena and the statistics of linear polymers, P. Sen and B. K. Chakrabarti, J. Phys. A **34** 7749 (2001).
65. Quantum fluctuation induced spatial stochastic resonance at zero temperature, P. Sen, Phys. Rev. E **63** R040101 (2001).
66. Quantum Phase Transitions in the Ising model in a spatially modulated field, P. Sen, Phys. Rev. E **63** 016112 (2001).
67. On the universality of distribution of ranked cluster masses at critical percolation, P. Sen, J. Phys. A **32** 7673 (1999).
68. Comparative distribution of spanning cluster masses in different dimensions, P. Sen, Int. J. Mod. Phys. C **10** 747 (1999).
69. Non-local conservation in the coupling field: effect on critical dynamics, P. Sen, J. Phys. A **32** 1623 (1999).
70. Dynamics of Antiferromagnetic Ising Model with fixed Magnetisation, P. Sen, S. Dasgupta and D. Stauffer, Eur. Phys. J. B **1** 107 (1998).
71. Universal mass ratios in non-unique spanning clusters in percolation, P. Sen and A. Aharony, Int J. Mod. Phys. C **8** 1169 (1997).
72. Metastability in Monte Carlo Simulation of 2D Ising films and Fe Monolayer strips, P. Sen, D. Stauffer and U. Gradmann, Physica A **245** 361 (1997).
73. Cluster-cluster correlations in random percolation, P. Sen, Physica A **242** 8 (1997).

74. Application of the interface approach in quantum Ising models, P. Sen, *Phys. Rev. B* **55** (1997) 11367.
75. Probability distribution and sizes of spanning clusters, P. Sen, *Int. J. Mod. Phys. C*, **8** (1997) 229.
76. Statistics of red sites on elastic and full backbone, P. Sen, *Physica* **A238** 39 (1997).
77. Non-uniqueness of spanning clusters in two to five dimensions, P. Sen, *Int. J. Mod. Phys. C*, **7** (1996) 603.
78. Hysteresis in a quantum spin model, V. Banerjee, S. Dattagupta and P. Sen, *Phys. Rev. E*, **52** (1995) 1436.
79. Order disorder transitions in Ising systems in transverse field with second neighbour interaction, P. Sen, *Z. Phys. B* **98** (1995) 251.
80. Ground state properties of a one-dimensional frustrated XY model, P. Sen, *Physica* **A186** (1992) 306.
81. Frustrated transverse Ising models : a class of frustrated quantum systems, P. Sen and B. K. Chakrabarti, *Int. J. Mod. Phys. B* **6** (1992) 2439.
82. Numerical estimate of the phase diagram of finite ANNNI chains in transverse fields P. Sen, S. Chakrabarti, S. Dasgupta and B. K. Chakrabarti), *Z. Phys. B* **88** (1992) 33.
83. Extended memory loading capacity in a neural network model with delayed time interaction, P. Sen and B. K. Chakrabarti, *Phys. Lett. A* **162** (1992) 327.
84. Growth of correlation in the Hopfield model, P. Sen, *J. Stat. Phys.* **67** (1992) 413.
85. Critical properties of a one-dimensional frustrated quantum magnetic model, P. Sen and B. K. Chakrabarti, *Phys. Rev. B* **43** (1991) 13559.
86. Longest path in percolation on hierarchical lattice, P. Sen and P. Ray, *J. Stat. Phys.* **59** (1990) 1573.
87. Available phase space and robustness of a layered feed forward neural network, P. Sen and B. K. Chakrabarti, *Phys. Rev. A* **40** (1989) 4700.
88. Ising models with competing axial interactions in transverse fields, P. Sen and B. K. Chakrabarti, *Phys. Rev. B* **40** (1989) 760.
89. Travelling salesman problem on dilute lattices : visit to a fraction of cities, P. Sen and B. K. Chakrabarti, *J. Phys. Paris* **50** (1989) 255.

C. Papers in conference proceedings.

1. Spanning clusters in percolation, Proceedings of the Solid State P. Sen, Physics Symposium **41** 22 (1998).
2. Phase Transitions in Euclidean networks, P. Sen, Physica Scripta **T106** 55 (2003).
3. Directed Accelerated Growth: Application in Citation Network, P. Sen, Physica A **346** (2005) 139.
4. Euclidean networks and Dimensionality, P. Sen in Recent developments in Theoretical Physics, eds. S. Ghosh and G. Kar (Platinum Jubilee series of ISI, India) World Scientific (2010) p 375.
5. Realistic searches on stretched exponential networks, Pramana **71** 313 (2008).
6. Funnelling effect in networks, Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering **5** p. 1719 (Proceedings of Complex 2009, published by Springer, 2010)
7. Opinion dynamics model with domain size dependent dynamics: novel features and new universality class, Soham Biswas, Parongama Sen, Purusattam Ray, Journal of Physics : Conference Series, **297** 012003 (2011)

D. Articles/Chapters in Books.

1. P. Sen and P. K. Das, Dynamical frustration in ANNNI model and annealing, in *Quantum Annealing and Related Optimisation Methods* ed. A. Das and B. K. Chakrabarti, Springer Verlag 2005.
2. Complexities of social networks: a physicist's perspective, in *Econophysics and Sociophysics: Trends and perspectives* ed. B. K. Chakrabarti, A. Chakrabarti and A. Chatterjee, Wiley-VCH 2006

E. Papers submitted/under preparation

1. S Mukhopadhyay and P. Sen
Persistent quantum walks: dynamic phases and diverging timescales
arXiv:1909.12610

F. Edited Journal volumes

1. Physica A: Statistical Mechanics and its Applications, Volume 346, Issues 1-2, February 2005, Eds. Subhrangshu Sekhar Manna, Parongama Sen
2. Physica A: Statistical Mechanics and its Applications, Volume 384, Issue 1, October 2007, Eds. Parongama Sen, Pradeep Kumar Mohanty
3. Journal of Physics Conference Series. Vol 297, May 2011; coedited with J. K. Bhattacharjee, Bikas K. Chakrabarti and J. Inoue