

## CURRICULUM VITAE

(Last updated on July 11, 2013)

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**3. Date of Birth: January 7, 1965**

**4. Nationality: Indian**

**5. Academic qualification:**

- B. Sc.(Physics)- University of Kalyani-1986
- M. Sc.(Physics)- University of Kalyani-1988
- PhD - Saha Institute of Nuclear Physics(Calcutta University)-1996
- **Specialisation in M.Sc.:** Solid State Physics.
- **National Scholarship:** Obtained National Scholarship (on the result of B.Sc. (Hons.) Exam) financed by the Ministry of Human Resource Developments, Government of India, in 1986.
- **CSIR-UGC-NET:** Obtained Junior Research Fellowship (JRF) (elligibility for College/University teaching position in India) of CSIR-UGC-NET in 1990.
- **Ph.D thesis:** Work done at Saha Institute of Nuclear Physics, Calcutta, India. Thesis title: *Responses of Ising and other dynamical systems to time varying perturbations*. Degree awarded by the University of Calcutta in 1996.
- **Present position:** Reader, Department of Physics, Presidency University, 86/1 College Street, Calcutta-700 073, WB, India.

- **Teaching experiences:**

Undergraduate (B. Sc.) teaching experiences in Classical Mechanics, Physical Optics, Acoustics, Thermodynamics, Statistical Mechanics, Quantum Mechanics, Electromagnetic theory and few experimental techniques (including Computer programming in FORTRAN) at Krishnanagar Government College (July 1999-June 2006), Krishnanagar and Presidency University (July 2006-Continuing), Calcutta.

Post-graduate (M. Sc.) teaching experience in Quantum Mechanics, Statistical Mechanics, Solid State Physics (Advanced papers) and Numerical mathematical analysis (with computer programming in FORTRAN) at Presidency University (July 2006- Continuing), Calcutta.

- **Invited talks:**

(i) Department of Physics, Jadavpur University, *Ferromagnetic phase transition and Statistical Mechanics*, a series of three lectures delivered (on 14th and 15th December, 2012), as a Resource Person, in the Refresher course (3.12.2012-22.12.2012) organised by UGC Academic Staff college, Jadavpur University, Calcutta, India.

(ii) Department of Physics, Jadavpur University, *Computer Simulation in Physics and Chemistry*, on 23rd July, 2012, as a Resource Person, organised by UGC Academic Staff College, Jadavpur University in a Special Summer School "Principles and applications in basic sciences" (9.7.2012-28.7.2012).

(iii) Department of Physics, Calcutta University, *Multiple dynamic phase transitions in uniaxially anisotropic Heisenberg ferromagnet driven by polarised magnetic field* on 19th August, 2010

(Ref:<http://sites.google.com/site/statphyscu/muktish-acharyya>).

(iv) *Dynamic transition and Hysteresis*, RWTH-Aachen, Germany in February 1998

(v) *Responses of Ising ferromagnet to time varying magnetic field*, Stuttgart University, on 20.10.1997

(Ref:<http://www.icp.uni-stuttgart.de/Jahresberichte/98/node64.html>).

(vi) *Ising model in oscillating field: Hysteretic response*, IIT - Kanpur, in March 1997.

(vii) *Dielectric breakdown and other Catastrophes: Prediction possibilities*, University of Poona, in February 1995 as a speaker of Theoretical Physics Seminar Circuit Programme.

(viii) *Dynamical response of Ising system*, IISc Bangalore in January 1995, as a speaker of Theoretical Physics Seminar Circuit Programme.

- **Editorial Board Membership of Research Journals:**

1. Editorial Board member of *Frontiers in interdisciplinary Physics* ([www.frontiersin.org/interdisciplinary\\_Physics/editorialboard](http://www.frontiersin.org/interdisciplinary_Physics/editorialboard))
2. Editorial Board member of the journal *International Journal of Advanced studies in computers, science and engineering* (IAASSE) ISSN:2278-7917, website:[www.ijascse.org/editorial-board](http://www.ijascse.org/editorial-board)
3. Editorial Board member of the journal *Review of Applied Physics*, (Science and Engineering Publishing Company), ISSN 2327-1612, website:[www.seipub.org/RAP](http://www.seipub.org/RAP)
4. Editorial Board member of the journal *International Journal of Advancements in Research and Technology*,(SciResPub), ISSN 2278-7763, website:[www.ijoart.org/editorialTeam.shtml](http://www.ijoart.org/editorialTeam.shtml)
5. Editorial Board member of the journal *Scientific Research And Impact*, (Science Park Journals), ISSN:2315-5396, website:[scienceparkjournals.com/sri/board.htm](http://scienceparkjournals.com/sri/board.htm)

- **Reviewer of research papers (names of the Journals):**

1. Reviewed one Project of National Science Foundation, USA in 2000
2. Journal of Magnetism and Magnetic Materials (Elsevier)
3. Physics Letters A (Elsevier)
4. Physica A (Elsevier)
5. Physica B (Elsevier)
6. Modern Physics Letters B (World Scientific)
7. Phase Transitions (Taylor and Francis)

- **Seminars/Symposia attended:**

- (1) National Seminar through Video Conference entitled *The Institutional transformations towards world class universities* by Prof. Philip Altbach, organised by Planning Commission (Higher Education), Government of India on 7th November, 2012 at New-Delhi.
- (2) International workshop on *The e-infrastructures of India*, the first NKN (National Knowledge Network) annual workshop, Jointly organised by NIC and IIT Bombay, from 31.10.2012 to 2.11.2012, at IIT Bombay, India.
- (3) International Symposium on *Structure and Dynamics of Heterogeneous Systems* Duisburg University, Germany, February 24-26, 1999.
- (4) National Seminar on *Current Trends in Research at the Cross-Roads of Physics, Chemistry and Biology*, Scottish Church College, December 3, 2003
- (5) National Seminar on *Disaster and Its management: Perspective and Future approaches*, Krishnanagar Government College, April 16-17, 2004.

## **6. Postdoctoral research experiences:**

(a) July 98-July 1999: Postdoctoral fellow, Department of Physics, Duisburg University, D-47048 Duisburg, Germany, financed by Graduiertenkolleg.

(b) July 97-June 98: Postdoctoral fellow, Institute for Theoretical Physics, University of Cologne, D-50923 Cologne, Germany, financed by Sonderforschungsbereich 341.

(c) July 96-April 97: Research Associate, Department of Physics, Indian Institute of Science, Bangalore-560012, India, financed by Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India.

## **7. Brief description of research work:**

I have worked on few problems of statistical and condensed-matter physics. A brief description of my research work is given below:

- I have carried out some studies of the dynamic hysteretic response and nonequilibrium phase transition in the kinetic Ising model in the presence of a time-dependent (sinusoidally oscillating) field [42, 40]. These studies have involved Monte Carlo simulations and the numerical solution of the dynamical differential (mean-field, etc.) equations of motion [13, 29]. The athermal dynamic transition [31] in the random-field Ising model (2D) was studied by Monte Carlo simulations. The frequency variation of coercive field was studied [29] by Monte Carlo simulation and by solving dynamical mean-field equation. These studies constitute the major part of my earlier research work; they have been summarised in a review [22] which is published in **Reviews of Modern Physics, 71, (1999) 847, (Impact factor=32.77 and having 220 citations, Ref:[http://www. google. com](http://www.google.com))**; and they include the following:
  - I have studied the nonequilibrium phase transition in and the temperature variations of AC susceptibilities, the 'relaxation' time and the 'specific-heat' [35, 33, 32] of the kinetic Ising model in the presence of a sinusoidally varying magnetic field.
  - I have investigated the behaviour of dynamic correlation function [26] near this transition and found an exact relation between the dynamic correlation function, the dynamic order parameter, and the hysteretic loss.
  - I have recently confirmed the existence of a tricritical point [24] by studying the temperature variations of the distribution of order parameter and the fourth-order cumulant.
  - I have elucidated the connection between this dynamic phase transition and the stochastic resonance in this system.
  - I have also studied this dynamic transition via dynamical symmetry breaking [27] in a randomly driven Ising ferromagnet.
  - I have investigated the dynamical response of kinetic Ising model to a pulsed magnetic field [34] and have proposed *finite-time* scaling in this context.
- I have carried out studies of both static [46] and dynamic properties [49] of granular materials (heaps of hard discs and spheres).

- I have studied [38] earthquake models (like the Burridge-Knopoff model) numerically and shown that, in these models, the *prediction* of imminent earthquakes is possible by measuring the response to periodic pulses.
- I have studied the dielectric breakdown problem [38] by solving Laplace's equation numerically on a lattice and have found a possible way of *predicting* the breakdown voltage prior to macroscopic breakdown. I have also studied cluster statistics [36] and growth phenomena here.
- I have studied [30] the temperature dependence of the specific heat of a model that shows the Integer Quantum Hall effect by the numerical *diagonalization* of a tight-binding Hamiltonian.
- I have studied metastability and nucleation phenomena [28] in Ising systems by Monte Carlo simulations that use the multi-spin coding technique and parallel processing (*Geometric parallelization* on a CRAY-T3E). The applicability of classical nucleation theory to the analysis of our simulation results of the low-frequency hysteretic loss is discussed.
- I have studied [25] the effects of different boundary conditions on the spanning probability at the percolation threshold for random site percolation.
- The response of classical vector spin model (ferromagnetic) to time varying (polarized) magnetic field is current interest of research [19, 18, 16, 15]. The nonequilibrium multicritical behavior was found [14] in anisotropic Heisenberg ferromagnet driven by polarized magnetic field. A review [15] has been written collecting very recent works on the dynamic transitions in vector spin models.
- Studying the dynamical responses of model ferromagnets to the spatio-temporal variations of fields.
- Studying the electronic properties[10, 7, 4] of solids in generalised d-dimensions.
- Studying the dynamical responses of metamagnets[6] to the time varying magnetic field.

## **8. List of Publications:**

Also available in [scholar.google.co.in](http://scholar.google.co.in)

1. M. Acharyya, **Random field Ising model swept by propagating magnetic field wave: Athermal nonequilibrium phase diagram**, *J. Magn. Magn. Mater.* **334** (2013) 11.
2. M. Acharyya, **Nonequilibrium phase transition in the kinetic Ising model: Absence of tricritical behaviour in presence of impurities**, *Acta Physica Polonica B*, **43** (2012) 2041.

3. A. B. Acharyya and M. Acharyya, **Bose - Einstein condensation in arbitrary dimensions**, *Acta Physica Polonica B*, **43** (2012) 1805
4. M. Acharyya, **Form invariant Sommerfeld electrical conductivity in generalised d - dimensions**, *Communications in Theoretical Physics*, **56** (2011) 943
5. M. Acharyya, **Nonequilibrium phase transition in the kinetic Ising model driven by propagating magnetic field wave**, *Physica Scripta*, **84** (2011) 035009
6. M. Acharyya, **Monte Carlo study of the dynamic phase transition in Ising metamagnet driven by oscillating magnetic field**, *Journal of Magnetism and Magnetic Materials*, **323** (2011) 2872
7. M. Acharyya, **Pauli spin paramagnetism and electronic specific heat in generalised d dimensions**, *Communications in Theoretical Physics*, **55** (2011) 901
8. M. Acharyya and A. B. Acharyya, **Evidence of invariance of time scale at critical point in the Ising meanfield equilibrium equation of state**, *Communications in Theoretical Physics*, **55** (2011) 1109
9. M. Acharyya, **Nonequilibrium Magnetisation reversal by periodic Impulsive fields in Ising meanfield dynamics**, *Physica Scripta*, **82** (2010) 065703
10. M. Acharyya, **Noninteracting fermions in infinite dimensions**, *European Journal of Physics*, **31** (2010) L89
11. M. Acharyya and A. B. Acharyya, **Critical Slowing down along the dynamic phase boundary in Ising meanfield dynamics**, *Int. J. Mod. Phys. C*, **21** (2010) 481
12. S. Ghosh, M. Acharyya and A. Bagchi, **G-6-PD level and surface nanoscopy: A novel approach in ergonomic stress management of labours performing manual material handling**, *Journal of Human Ergology*, **38** (2009) 51
13. M. Acharyya and A. B. Acharyya, **Inflection point as a manifestation of tricritical point on the dynamic phase boundary in Ising meanfield dynamics**, *Communications in Computational Physics*, **3** (2008) 397
14. M. Acharyya, **Nonequilibrium multicritical behavior in anisotropic Heisenberg ferromagnet driven by oscillating magnetic field**, *Int. J. Mod. Phys. C*, **17** (2006) 1107
15. M. Acharyya, **Nonequilibrium Phase Transitions in model ferromagnets: A review**, *Int. J. Mod. Phys. C*, **16** (2005) 1631
16. M. Acharyya, **Multiple dynamic phase transitions in anisotropic Heisenberg ferromagnet driven by polarised magnetic field**, *Phys. Rev. E*, **69** (2004) 027105

17. M. Acharyya and A. B. Acharyya, **Modelling and computer simulation of an insurance policy: A search for maximum profit**, *Int. J. Mod. Phys. C*, 14 (2003) 1041
18. M. Acharyya, **Axial and off-axial dynamic transitions in uniaxially anisotropic Heisenberg ferromagnet: A comparison**, *Int. J. Mod. Phys. C*, 14 (2003) 49
19. M. Acharyya, **Off-axial symmetry breaking in uniaxially anisotropic Heisenberg ferromagnet**, *Int. J. Mod. Phys. C*, 12 (2001) 709
20. M. Acharyya, A. Basu, R. Pandit & S. Ramaswamy, **Inequivalence of Dynamical Ensembles in a Generalised Driven Diffusive Lattice Gas**, *Phys. Rev. E*, 61 (2000) 1139
21. M. Acharyya, U. Nowak and K. D. Usadel, **Transverse ordering of an antiferromagnet in a field with oblique angle to the easy axis**, *Phys. Rev. B*, 61 (2000) 464
22. B. K. Chakrabarti and M. Acharyya, **Dynamic transitions and Hysteresis**, *Rev. Mod. Phys.*, **71**, (1999) 847 (**Impact factor:32.77**)
23. M. Acharyya, U. Nowak and K. D. Usadel, *Phase diagram of a classical anisotropic Heisenberg antiferromagnet in a field*, in Conference proceeding, *Structure and Dynamics of Heterogeneous systems* Eds. P. Entel and D. E. Wolf, World-Scientific, (1999) pp 317.
24. M. Acharyya, **Nonequilibrium phase transition in the kinetic Ising model: Existence of tricritical point and stochastic resonance**, *Phys. Rev. E*, **59** (1999) 218
25. M. Acharyya and D. Stauffer, **Effects of boundary conditions on the critical spanning probability**, *Int. J. Mod. Phys. C*, **9** (1998) 643
26. M. Acharyya, **Nonequilibrium phase transition in the kinetic Ising model: Is transition point the maximum lossy point ?**, *Phys. Rev. E*, **58** (1998) 179
27. M. Acharyya, **Nonequilibrium phase transition in the kinetic Ising Model: Dynamical symmetry breaking by randomly varying magnetic field**, *Phys. Rev. E*, **58** (1998) 174
28. M. Acharyya and D. Stauffer, **Nucleation and hysteresis in Ising model: Classical theory versus computer simulation**, *European Physical Journal B*, **5** (1998) 571; Erratum EPJB, **7** (1999) 169
29. M. Acharyya, **Comparisons of meanfield and Monte Carlo approaches to dynamic hysteresis in Ising ferromagnets**, *Physica A*, **253** (1998) 199
30. S. S. Mandal and M. Acharyya, **Specific heat in the integer quantum Hall effect: An exact diagonalization approach**, *Physica B*, **252** (1998) 91

31. M. Acharyya, **Zero temperature dynamic transition in the random field Ising model: A Monte Carlo study**, *Physica A*, **252** (1998) 151
32. M. Acharyya, **Nonequilibrium phase transition in the kinetic Ising model: Critical slowing down and specific-heat singularity**, *Phys. Rev. E*, **56** (1997) 2407
33. M. Acharyya, **Nonequilibrium phase transition in the kinetic Ising model: Divergences of fluctuations and responses near the transition point**, *Phys. Rev. E*, **56** (1997) 1234
34. M. Acharyya, J. K. Bhattacharjee and B. K. Chakrabarti, **Dynamic Response of Ising System to a Pulsed field**, *Phys. Rev. E*, **55** (1997) 2392
35. M. Acharyya, **Nonequilibrium phase transition and ‘specific-heat’ singularity in the kinetic Ising model: A Monte Carlo study**, *Physica A*, **235** (1997) 469
36. M. Acharyya, P. Ray and B. K. Chakrabarti, **Cluster Statistics in Dielectric Breakdown**, *Physica A*, **224** (1996) 287
37. M. Acharyya and B. K. Chakrabarti, **Response of random dielectric composites and earthquake models to pulses: Prediction possibilities** *Physica A*, **224** (1996) 254
38. M. Acharyya and B. K. Chakrabarti, **Growth of breakdown susceptibility in random composites and stick-slip model of earthquakes: Prediction of breakdown voltage and other catastrophes**, *Phys. Rev. E*, **53** (1996) 140; Erratum, *Phys. Rev. E*, **54** (1996) 2174
39. M. Acharyya and B. K. Chakrabarti, **Growth of breakdown susceptibility in random composites and in BTW model: Prediction of dielectric breakdown and other catastrophes**, *Ind. J. Phys. A* **69** (1995) 205
40. M. Acharyya and B. K. Chakrabarti, **Response of Ising systems to oscillating and pulsed fields: Hysteresis, ac and pulsed susceptibility**, *Phys. Rev. B*, **52** (1995) 6550
41. M. Acharyya and B. K. Chakrabarti, **Study of response to pulses and possible prediction of catastrophes**, *J. Phys. I (France)*, **5** (1995) 153
42. M. Acharyya and B. K. Chakrabarti, **Ising system in oscillating field: Hysteretic response**, in *Annual reviews of computational physics*, Ed. D. Stauffer, (World Scientific, Singapore), Vol. **1** (1994) 107
43. M. Acharyya and B. K. Chakrabarti, **AC susceptibility and hysteresis in Ising magnets**, *J. Mag. Mag. Mat.*, **136** (1994) L29
44. M. Acharyya, B. K. Chakrabarti and R. B. Stinchcombe, **Hysteresis in Ising model in transverse field**, *J. Phys. A: Math. Gen.*, **27**, (1994) 1533

45. M. Acharyya and B. K. Chakrabarti, **Magnetic hysteresis loops as Lissajous plots of relaxationally delayed response to periodic field variation**, *Physica A*, **202** (1994) 467
46. M. Acharyya, **Structural properties of planar random heap of hard discs**, *J. Phys. I (France)*, **3** (1993) 905 ; Erratum, *J. Phys. I (France)*, **3** (1993) 2123
47. M. Acharyya and B. K. Chakrabarti, **Monte Carlo study of hysteretic response and relaxation in Ising models**, *Physica A*, **192** (1993) 471
48. M. Acharyya, B. K. Chakrabarti and A. K. Sen, **Monte Carlo study of the hysteretic response of two dimensional Ising system: Scaling behaviour**, *Physica A*, **186** (1992) 231
49. B. K. Chakrabarti and M. Acharyya, **Instabilities in a sandpile under vibration**, *J. Phys. I (France)*, **2** (1992) 389

#### Manuscript under preparation/review

1. M. Acharyya, Nucleation in Ising ferromagnet by a field spatially spreading in time, (2013) (under review)
2. M. Acharyya, Polarised electromagnetic wave propagation through the ferromagnet: Phase boundary of dynamic phase transition, (2013) (under review)

#### 9. Ongoing research

Presently, I am involved in studying the following matters:

1. Nucleation in Ising ferromagnet having a thermal gradient.
2. The dynamical responses of magnetic model systems to the propagating magnetic field wave: Phase boundary of Dynamic Phase Transitions

#### 10. My Collaborators

Dietrich Stauffer (Cologne University, Germany), Robin Stinchcombe (Oxford University, UK), Ulrich Nowak (Konstanz University, Germany), Klaus Usadel (Duisburg University, Germany), Jayanta Bhattacharjee (SNBNCBS Calcutta), Rahul Pandit (IISC, Bangalore), Sriram Ramaswamy (IISC, Bangalore), Sudhansu Mandal (IACS, Calcutta), Ajanta Bhowal Acharyya (Lady Brabourne College, Calcutta), Abhik Basu (SINP, Calcutta), Bikas Chakrabarti (SINP, Calcutta), Ashok Sen (SINP, Calcutta), Purushottam Ray (IMSC, Chennai).

#### 11. A partial list of citations of my work:

**Out of total 1100 citations**

Available in [scholar.google.co.in](https://scholar.google.co.in)

1. Clement et al., *Phys. Rev. Lett.*, **69** (1992) 1189

2. P. B. Thomas and D. Dhar, *J. Phys. A*, **26** (1993) 3973
3. M. C. Mahato and S. R. Shenoy, *J. Stat. Phys.*, **73** (1993) 123
4. R. S. Perkins, *J. Phys. I (France)*, **4** (1994) 357
5. Y. L. He et al., *J. Appl. Phys.*, **75** (1994) 5580
6. M. Luse and A. Zangwill, *Phys. Rev. E*, **50** (1994) 224
7. M. C. Mahato and S. R. Shenoy, *Phys. Rev. E*, **50** (1994) 2503
8. Zhong Fan and Zhang Jinxiu, *Phys. Rev. Lett.*, **75** (1995) 2027
9. B. Bonnier, *Phys. Rev. E*, **51** (1995) 779
10. Z. Neda, *Phys. Rev. E*, **51** (1995) 5315
11. Zhong Fan et al., *Phys. Rev. E*, **52** (1995) 1399
12. V. Banerjee et al., *Phys. Rev. E*, **52** (1995) 1436
13. Q. Jiang et al., *Phys. Rev. B*, **52** (1995) 14911
14. S. W. Sides et al., *J. Appl. Phys.*, **79** (1996) 6482
15. Sinelnikov et al., *Colloid Journal*, **57** (1996) 809
16. Z. Neda, *Phys. Lett. A*, **210** (1996) 125
17. Q. Jiang et al., *J. Vac. Sc. & Tech.*, **14** (1996) 3180
18. S. Zapperi et al., *Phys. Rev. Lett.*, **78** (1997) 1408
19. J. S. Suen and J. L. Erskine, *Phys. Rev. Lett.*, **78** (1997) 3567
20. S. Sarkar and D. Bose, *Phys. Rev. E*, **55** (1997) 2013
21. D. Bose and S. Sarkar, *Phys. Rev. E* **56** (1997) 6581
22. G. H. Goldsztein et al., *SIAM J. Appl. Maths.* **57** (1997) 1163
23. S. W. Sides et al., *Phys. Rev. E*, **57** (1998) 6521
24. S. W. Sides et al., *Phys. Rev. Lett.*, **81** (1998) 834
25. G. P. Zheng and J. X. Zhang, *Phys. Rev. E*, **58** (1998) R1187
26. K. Leung and Z. Neda, *Phys. Lett. A*, **246** (1998) 505
27. Vehnkamaki and Ford, *Phys. Rev. E*, **59** (1999) 6483
28. P. A. Rikvold et al., *Phys. Rev. E*, **59** (1999) 2710

29. G. D. Moore et. al, JHEP, **0104** (2001) 017
30. Tomoaki Yasui et al, Phys. Rev. E, **66** (2002) 036123
31. Korniss et al, Phys. Rev. E **66** (2002) 056127
32. G. S. Jeon et. al, Phys. Rev. B., **65** (2002) 184510
33. H. Jang et al, Phys. Rev. B **67** (2003) 094411
34. H. Jang et al, Phys. Rev. E **68** (2003) 046115
35. I. Junier and J. Kurchan, Europhys. Lett, **63** (2003) 674
36. Fujiwara et. al, Phys. Rev. E **70** (2004) 066132
37. Han Zhu et. al., Phy. Rev. B **70** (2004) 132403
38. Z. Huang, F. Zhang, Z. Chen, Y. Du, Eur. Phys. J. B **44** (2005) 423
39. E. Machado et al. Phys. Rev. E **71** (2005) 016120
40. M. Keskin et al. Phys. Rev. E **72** (2005) 036125
41. E. Faraggi, JMMM, **303** (2006) 49
42. M. Keskin et al., et al., JMMM, **313** (2007) L1
43. M. Kirak et al, J. of Korean Phys. Soc. **53** (2008) 497
44. M. Keskin et al, Zeitschrift fur Naturforschung(A), **64** (2009) 185
45. O. Canko et al, Physica A, **388** (2009) 24
46. B. Daviren et al, JMMM, **321** (2009) 1787
47. M. Keskin et al., Phys. Stat. Sol. (B) **244** (2007) 3775
48. G. Gulpinar et al., Phys. Lett. A **373** (2009) 511
49. H. M. Nguyen et. al. J. Appl. Phys. **110** (2011) 043909
50. H. Park and M. Pleimling, Phys. Rev. Lett. **109** (2012) 175703

## **11. Referees:**

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