

## Curriculum Vitae: Ayşe Erzan

---

Professor of Physics (Retired since 2012)

Department of Physics

Faculty of Sciences and Letters

Istanbul Technical University

Maslak, Istanbul 34 469

---

### Research interests

Non-equilibrium phase transitions and critical phenomena, disordered systems, self-organization in complex nonlinear systems, with application to earthquakes, evolution, the physics of polymers and proteins. Network theory, with application to transcriptional and post-transcriptional gene regulatory networks. Field theoretic Renormalization Group on non-metric spaces.

---

### Academic degrees, fellowships, distinctions

*Laureate of the L'Oreal-UNESCO "Women in Science" Prize – Europe, 2003*

*Rammal Medalist, 2010*

Member, [Turkish Academy of Sciences](#) (1995 - resigned 2011 )

Member, [Palestine Academy for Science and Technology](#) (2005-)

Member, [TWAS](#), The World Academy of Sciences (2007-)

Member, [Academia Europaea](#) (2011-)

Founding member, [Bilim Akademisi](#) (Science Academy - İstanbul)

Recipient of the **TUBITAK** (Scientific and Technical Research Council of Turkey)

**Science Prize**, together with Mehmet Erbudak, 1997

International Center for Theoretical Physics (ICTP), Trieste, Associate (1986-1990),  
Senior Associate (1990-97)

Alexander von Humboldt Fellow (1985-87)

Ph. D. in Physics      1976, SUNY at Stonybrook, N.Y., USA (Ph. D. Thesis:  
"Approximate Methods in Phase Transitions and Critical  
Phenomena" (with Prof. George Stell)

BA in Physics      1970, Bryn Mawr College, Pennsylvania, USA  
(Magna cum Laude)

---

**Editorships, offices held etc.**

Associate Editor of European Physical Journal B (1998 -2003)  
Member of the Editorial Board, Journal of Statistical Physics (2002- 2007)  
Associate Editor of ARI, Istanbul Technical University Bulletin (2002 - 2007)

International Union of Pure and Applied Physics -IUPAP (C3) Commission for Statistical  
Physics, member 1996-2002  
Steering Committee for Statphys 21 (Cancun), member  
Steering Committee for Statphys 22 (Bangalore), member  
Steering Committee for Statphys 23 (Genoa), member

Academy Council of the Turkish Academy of Sciences (1999 and 2002-2008 ) member

Executive Committee of the International Human Rights Network of Academies and  
Scholarly Societies, member, (2002 -2005)

ALLEA Standing Committee for Science and Ethics, member (2003-2010)  
TÜBA Ethics Committee, member (2006-2008)

---

**Membership in scholarly societies (present)**

Turkish Physical Society

---

**Positions held**

University Fellowship and Research Assistantship, SUNY at Stonybrook (1970-1976)

Instructor, METU, Ankara (1976-1977)

Assistant, Chair of Statistical Mechanics, Faculty of Basic Sciences, Istanbul Technical  
University (October 1977- July 1982)

Assistant, Theoretical Physics Department, Geneva University, Switzerland (1981-1982)

Visiting Assistant Professor, Physics Department, Faculty of Science, University, Porto, Portugal (1982- 1985)

Alexander von Humboldt Fellow, Physics Department (with Prof. S. Grossmann) Marburg University, Marburg, Germany (1985-1987)

Research Scientist, Solid State Lab, Groningen University, Netherlands (Fundamenteel Onderzoek der Materie) (1987- 1990)

Assistant Professor ITU Faculty of Sciences and Letters, Physics Department (1990-1991)

Associate Professor ITU, Faculty of Sciences and Letters, Physics Department (1991-1996)

Professor ITU, Faculty of Sciences and Letters, Physics Department (1996-2012)

Researcher, TUBITAK (Scientific and Technological Research Council of Turkey) Marmara Research Center, Gebze (1991-1997)

Researcher, TUBITAK – Bosphorus University Feza Gursey Basic Research Institute (1997- 2008)

Fellow, Collegium Budapest (October 2004-July 2005)

Visiting Professor at the Department of Physics, Faculty of Sciences and Letters, Akdeniz University, Antalya, Turkey (2008-2009)

---

### **Institutes visited for extended periods**

Visiting Scientist, Theoretical Physics Department, Royal Institute of Technology, Stockholm, Sweden (February 1981- June 1981)

Visiting Researcher, Delft Technical University, Technical Physics Laboratory, Delft, The Netherlands (Fundamenteel Onderzoek for Materie - FOM) (July 1981)

Visiting Researcher, ICTP (SISSA), Trieste, Italy (August-September 1981)

Visitor, Physics Department, Rome University, Italy (February 1990)

Researcher, Solid State Group, ICTP Trieste (April 1990- August 1990)

Institute of Theoretical Physics, Academia Sinica, Beijing, People's Republic of China (August 1995)

Tata Institute for Fundamental Research, Bombay, India (February 1999)

Institute for Mathematical Sciences, Madras, India (February 1999)

Service de Physique Theorique, CEN Saclay, France (June 2007)

Lecturer at the Escola de CBPF, Rio de Janeiro, (July 2008)

---

### **Meetings organized**

1. Miniworkshop on Nonlinearity: Fractals, pattern formation, ICTP, Italy. (with L. Pietronero ve H. Cerdeira) (11 June -6 July 1991)
  1. 2. "Recent Advances in Statistical Physics," Summer School Istanbul Technical University, Istanbul, Turkey (with O. Pekcan) (25 July -6 August 1993)
  2. 1<sup>st</sup> Istanbul Technical University Statistical Physics Days (with A.N. Berker) (14-15 July 1994)
  3. 2<sup>nd</sup> Istanbul Technical University Statistical Physics Days (13-14 July 1995)
  4. 3<sup>rd</sup> Istanbul Technical University Statistical Physics Days (18-19 July 1996)
  5. Workshop on Vortex Dynamics and Trubulence Modeling (with Alp Eden, E.S. Suhubi and H. Ors) (2-6 September 1996)
  6. Research Semester on Interface Dynamics and Non-equilibrium Phase Transitions, Gursey Institute, Istanbul (with Alp Eden and Mete Soner) (15 February-15 June 1998)
  7. Research Workshop on Interface Dynamics and Non-equilibrium Phase Transitions, Gursey Institute and the Istanbul Technical University (with Alp Eden and Mete Soner) (13-17 April 1998)
  8. Workshop on New Directions in Complex Systems, Splendid Palas Hotel, Büyükkada, Istanbul, Turkey (with I. Kondor, J.P.-Eckmann, L.Pietronero) (3-9 September 2006).
-

## **Publications:**

**Ayşe Erzan**

A- Journal articles

B- Articles in conference proceedings

C- Editorship of published conference proceedings

### A - ARTICLES

1. Ayşe **Erzan** and George Stell, "Isotropic Lifshitz Point in  $2 < d < 4$  Dimensions," Phys. Rev. B16, 4146 (1977)
2. Ayşe **Erzan** and George Stell, "Thermodynamic Properties of Permanent Dipoles on a Lattice" Phys. Rev. B18, 408 (1978)
3. Ayşe **Erzan**, "Recent Developments in Statistical Mechanics: Phase Transitions in Lower Dimensional Systems," review article, Cagdas Fizik (Istanbul), May 1979.
4. Ayşe **Erzan**, "Electrical Resistivity of an Exactly Solvable Random Model Exhibiting a Smeared Phase Transition," J. Phys. C 15, 2173(1982)
5. A. **Erzan**, "Resistive Anomalies in Random Systems," Preprint UGVA-DPT 1981/12-329 unpublished.
6. B.Derrida, J.-P. Eckmann, A.**Erzan**, "Renormalization Group Transformations with Periodic and Aperiodic Orbits," J. Phys. A 16, 893 (1983)
7. A. **Erzan**, "Hierarchical q-state Potts Models with Periodic and Aperiodic Renormalization Group Trajectories," Phys. Lett. 93A, 237 (1983)
8. A. **Erzan** and E.J.S. Lage, "The Infinite Ranged Potts Spin Glass Model," J. Phys C 16, L555 (1983).
9. E.J.S. Lage and A. **Erzan**, "Mixed Phase for the Infinite Ranged Potts Spin Glass," J. Phys. C 16 L873 (1983).
10. A. **Erzan**, "Frustrated Spin Systems," review article, Portugal. Phys. 15 9-54 (1984), 139-141 (1984).
11. A. **Erzan**, "Phase Transitions in the Gauge Invariant Random Potts Model," J. Phys. A 18, 2247 (1985)
12. A. **Erzan**, S. Grossmann and A. Hernandez Machado, "Diffusion on Random Hierarchical Structures," J. Phys. A 20 , 3913 (1987)

13. L. Pietronero, A. **Erzan**, C. Evertsz, "Theory of Fractal Growth," Phys. Rev. Lett. 61, 861(1988)
14. L. Pietronero, A. **Erzan**, C. Evertsz, "Theory of Laplacian Fractals: Diffusion Limited Aggregation and Dielectric Breakdown Model," Physica (Netherlands) A51, 207 (1988)
15. A. Siebesma, R.R. Trembley, A. **Erzan** ve L. Pietronero, "Multifractal Cascades with Interactions," Physica A156, 613 (1989)
16. A. **Erzan**, E. Veermans, R. Hijungs and L. Pietronero, "Glassy Dynamics of Pinned Charge Density Waves," Phys.Rev.B 41,11522 (1990)
17. E. Veermans, A. **Erzan**, R. Hijungs and L. Pietronero, "Dynamics of Pinned Charge Density Waves: Numerical Simulations," Physica A166, 447 (1990)
18. A. **Erzan** and L. Pietronero, "Fixed Scale Transformation for Ising and Potts Clusters" J. Phys. A24, 1875 (1991)
19. A. **Erzan** and S. Sinha, "Spatio-temporal Intermittency on the Sandpile," Phys. Rev. Lett. 66 2750 (1991)
20. A. **Erzan**, "Fixed Scale Transformation Approach to Critical Fluctuations and Fractal Growth," Physica A185, 66 (1992)
21. A. **Erzan** and L. Pietronero, "Fixed Scale Transformation for Directed Percolation," Europhys. Lett. 20, 595 (1992).
22. H. Kaya, A.**Erzan**, F. Kadirgan, "Universality in surface catalysis with diffusion," J. Chem. Phys., 98, 9030 (1993).
23. H. Kaya and A. **Erzan**, "Reactant clustering in heterogenous catalysis with surface diffusion" Surface Science, 320, 185 (1994).
24. M. Hüner and A. **Erzan**, "Fixed Scale Transformation approach to spatio-temporal intermittency in coupled map lattices," Physica A 212, 314 (1994).
25. A. **Erzan**, "Vortex tube formation and the "subcritical scenario" for non Kolmogorov scaling in turbulence," Bull. Tech. Univ. Ist. (Special issue: Suhubi and Continuum Mechanics) 47, 303 (1994).
26. A. **Erzan**, L.Pietronero and A. Vespignani, "The Fixed Scale Transformation Approach to Fractal Growth," Rev. Mod. Phys. 67, 545 (1995).
27. A. **Erzan** and N. Güngör, "Fractal Geometry and Size Distribution of Clay Particles," Jour. Colloid and Interface Sci. 176, 301(1995).

28. M. Canpolat, A. **Erzan**, Ö. Pekcan, "Reptation of a Polymer Chain by Conformal Transitions in the Entangled Regime," Phys. Rev. E 52, 6904 (1995)
29. A. Gorbunov and A. **Erzan**, " Multiscaling of the Graph Length in Coupled Map Lattices," J. Phys. A (Mathematical and General) 30, 785 (1997).
30. A. **Erzan**, "Finite q-differences and the discrete renormalization group," Phys. Lett. A 225, 235 (1997).
31. A. **Erzan** and J.-P. Eckmann, "q-analysis of fractal sets," Phys. Rev. Lett. 78, 3245 (1997)
32. A. Gorbunov and A. **Erzan**, "Non-commutative geometry and irreversibility, Eur. Phys. J. B, 1, 111 (1998)
33. Y. Yilmaz, A. **Erzan**, Ö. Pekcan, "Critical exponents and fractal dimension at the sol-gel phase transition via in situ fluorescence experiments," Phys. Rev. E 58, 7487 (1998).
34. H. Kaya and A. **Erzan**, "Novel Position-Space Renormalization Group Transformation for bond Directed Percolation in two dimensions," Physica A 256, 53 (1999).
35. Ö. Kayalar and A. **Erzan**, "Dynamics of Pinned Interfaces with Inertia," Phys. Rev.E 60, 7600 (1999).
36. H. Kaya, A. Kabakçioğlu, A. **Erzan**, "Delocalisation Transition of a Rough Adsorption-Reaction Interface," Phys. Rev. E 61, 1102(2000).
37. E. Tüzel and A. **Erzan**, "Glassy Dynamics of Protein Folding," Phys. Rev. E 61, R1040 (2000).
38. E. Tüzel and A. **Erzan**, "Dissipative dynamics and the statistics of energy states for a Hookean model for protein folding," J. Stat. Phys, 100, 405 (2000).
39. B. Örçal, V. Sevim, E. Tüzel, N. Jan and A. **Erzan**, "Testing a hypothesis for the evolution of sex," Int. J. Mod. Phys. C 11, 973 (2000).
40. B. Örçal and A. **Erzan**, "Temporal and spatial correlations in a visco-elastic model of heterogeneous faults," Eur. Phys. J. B 18, 721-728 (2000)
41. C. Chisolm, N. Jan, P. Gibbs, and A. **Erzan**, "Self-Organized Criticality in an Asexual Model? " Int. J. Mod. Phys. C 11, 1257 (2000).
42. E. Tüzel, V. Sevim, A. **Erzan**, "Strategies for the Evolution of Sex, " Phys. Rev. E.64, 061908 (2001).

43. E. Tüzel, V. Sevim, A. **Erzan**, "Evolutionary Route to Diploidy and Sex, " *Proc. Nat. Acad. Sci. (USA)* **98**, 13774 (2001).
44. E. Tüzel, **A. Erzan**, "A Thermodynamic Model for Prebiotic Protein Function, " *cond-mat/0107315, Ari*, **54**, 19 (2004)
45. Yılmaz, Y., **Erzan, A.** , Pekcan, Ö., "Slow regions percolate near the glass transition," *Eur. Phys. J. E* **9**, 135 (2002).
46. Balcan, D. , **Erzan, A.**, "Monte Carlo Renormalization Group for Entanglement Percolation, " *Physica A*, **320**, 25 (2003).
47. Özçelik, S. , **Erzan, A.**, "Hamiltonian model for multidimensional epistasis, " *Int. J. Mod. Phys. C* **14**, 169-173 (2003).
49. Söyler, G. , **Erzan, A.** , "Equilibrium correlations in an Ising model for multidimensional epistasis, " *Theory Biosci.* **121**, 387 (2003).
50. Önder, P. and **Erzan, A.** , "Statistics of a hydrophobic chain near a hydrophobic boundary, " *Eur. Phys. J. E.* **9**, 467-76 (2002).
51. **Erzan, A.** , and Tüzel, E., "Hydrophobic Models of Protein Folding and the Thermodynamics of Chain-Boundary Interactions, " *Brazilian Jr. Phys.* **33**, 573-588 (2003).
52. Balcan, D. and **Erzan, A.** "Random model for RNA interference yields scale free network," q-bio.GN/0310027, *Eur. Phys. J. B*, **38**, 253-260 (2004)
53. M. Mungan, A. Kabakcioglu, D. Balcan and **A. Erzan**, "Analytical Solution of a Stochastic Model for Gene Regulation," q-bio.MN/0406049, *J. Phys. A*, **38**, 9599-9620 (2005).
54. A.H. Bilge, **A. Erzan** and D. Balcan, "The shift-match Number and String matching Probabilities for Binary Sequences," q-bio.GN/0409023.
55. Y. Şengün and **A. Erzan**, "Statistics of Hydrophobic Chains, " unpublished.
56. Y. Şengün and **A. Erzan**, "Hydrophobic chains near hydrophobic surfaces – simulations in three dimensions," *J. Phys.: Condensed Matter* **17**, S1183-S1194 (2005).
57. D. Balcan and **A. Erzan**, "Dynamical real-space renormalization group calculations with a new clustering scheme on random networks, " *cond-mat/0408619, Phys. Rev. E.* **71**, 026130 (2005).
- 58.** Y. Şengün and **A. Erzan**, "Content based network model with duplication and divergence," q-bio.MN /0510022, *Physica A* **365**, 446-462 (2006).



59. A. Erzan and D. Balcan, "Content based networks – from topology to dynamics," *Nonlin. Phen. Comp. Syst.*, **10**, 59-71 (2007).
60. D. Balcan, A. Kabakçioğlu, M. Mungan, and A. Erzan, "Spontaneous Self-Assembly of Transcription Factor Based Gene Regulation Networks," [q-bio.MN/0605045](https://doi.org/10.1371/journal.pbio.0605045); "The Information Coded in the Yeast Response Elements Accounts for Most of the Topological Properties of Its Transcriptional Regulation Network," *PLoS ONE* **2**, e501 (2007).
61. D. Balcan and A. Erzan, "[Content-based networks: a pedagogical overview](#)," *Chaos* **17**, 026108 (2007).
62. B. Malkoç, D. Balcan, A. Erzan, "[Information content based model for the topological properties of the gene regulatory network of \*E. coli\*](#)," *J. Theor. Bio.*, 203, 281-294 (2010).
63. M. Erbudak, A. Erzan, "[Tracking tumor evolution via prostate-specific antigen: an individual post-operative study](#)," *Theoretical Biology and Medical Modelling* **7**:30 (2010)
64. B. Danacı, M.A. Anıl, A. Erzan, "[Motif statistics of artificially evolved and biological networks](#)," *Phys. Rev. E* **89**, 062719 (2014).
65. A. Tuncer, A. Erzan, "Spectral renormalization group for the Gaussian model and  $\psi^4$  theory on nonspatial networks," *Phys. Rev. E* **92**, 022106 (2015).
66. B. Danacı, A. Erzan, "Metanetworks of artificially evolved regulatory networks," *J. Stat. Mech.: Theor. Exp.* **2016**, 043501 (2016)

## **B – Articles in Conference Proceedings**

1. L. Pietronero, A. **Erzan** and C. Evertsz, "Theory of Fractal Growth" in Proceedings of the Les Houches meeting on Universalities in Condensed Matter, 15-24 March 1988 (Springer, Berlin).
2. A. **Erzan**, C. Evertsz and L. Pietronero, "Fractals in Condensed Matter," Proc. International Workshop on the Physics Materials, 10-21 October 1988, Shenyang (P.R. China).
3. A. **Erzan**, C. Evertsz and L. Pietronero, "New Theoretical Methods for Fractal Growth," in L. Pietronero ed., *Fractals* (Proceedings, Erice, 1988; Plenum, N.Y. 1989).
4. N. Güngör and A. **Erzan**, "The Fractal Properties of Clays," Proceedings, VI. National Symposium on Clays, Bosphorus University, Istanbul, 6-11 September 1993.
5. A. **Erzan** "Mechanical Properties of Fractals" Proceedings, VIII. National Mechanics Symposium, Antalya, 6-10 September 1993.

6. A. **Erzan** and L. Pietronero, "Fractals and fractal growth models," Turkish Journal of Physics (Proceedings, Recent Advances in Statistical Physics, Istanbul, 25 July- 7 August 1993) 18, 157 (1994).

7. M. Hüner, A. **Erzan**, "Analytical Approach to Spatiotemporal Intermittency in Coupled Map Lattices," Tr. J. of Physics (Proceedings, 1. ITU Statistical Physics Days, 14-15 July 1994) 19, 27 (1995).

8. A. **Erzan**, A. Gorbon, "q-calculus and irreversible dynamics on a hierarchical lattice" Tr. J. of Physics (Proceedings, 4. ITU Statistical Physics Days, 17-18 July 1997) 23, 9 (1999).

9. A. **Erzan** and A. Gorbon, "Noncommutative geometry, irreversibility and log-periodicity," (Proceedings of the IX'th symposium on Continuum Models and Discrete Systems, Istanbul, 1998) in E. Inan and K.Z. Markov eds., Continuum Models and Discrete Systems (World Scientific, Singapore, 1999).

10. A. **Erzan**, "Directed Percolation, The Fixed Scale Transformation and the Renormalization Group," Proceedings of the Zanjan Summer School on Scaling in Disordered Systems," in D. Stauffer ed., Advances in Computational Physics (World Scientific, Singapore, 2001).

11. E. Tüzel and A. **Erzan**, "Dissipative Dynamics and Relaxation Behaviour of a Generic Model for Hydrophobic Collapse," Proceedings of the Zanjan Summer School on Scaling in Disordered Systems, in D. Stauffer ed., Advances in Computational Physics, (World Scientific, Singapore, 2001).

12. A. Erzan, H. Kaya, A. Kabakçioğlu, "Scaling behaviour of a multiply connected fluctuating interface in two dimensions," in *Scaling and Disordered Systems* (International Workshop and Collection of Articles Honoring Professor Antonio Coniglio on the Occasion of his 60th Birthday, Paris, France 13 - 14 April 2000) F. Family, M. Daoud, H. J. Herrmann, and H. Eugene Stanley eds. (World Scientific, Singapore, 2002) and **Erzan, A.**, Kaya, H. and Kabakçioğlu, A, "Scaling behaviour of a multiply connected fluctuating interface in two dimensions, " *Fractals* **11**, 227-232 Suppl. S. (2003).

13. D. Balcan and A. Erzan, "Dynamics of content based networks," V. N. Alexandrov et al. (Eds.): ICCS 2006, Part III, LNCS **3993**, pp. 1083-1090 (Springer-Verlag, Berlin 2006).

14. G. Arpağ, A. Erzan, "An Ensemble Approach to the Evolution of Complex Systems," *J. Biosciences* **39**, 259-280 (2014).

## **C – Editorship of Published Conference Proceedings**

1. (with Önder Pekcan) Proceedings, Recent Advances in Statistical Physics, Istanbul, 25 July- 7 August 1993, Turkish Journal of Physics 18, issue 3 (1994), guest editor.
2. Proceedings, 2. ITU Statistics Physics Days, 13-14 July 1995, Turkish Journal of Physics 20, issue 1 (1996), guest editor.
3. Proceedings, 3. ITU Statistics Physics Days, 18-19 July 1996, Turkish Journal of Physics, issue 1 (1997), guest editor.
4. Proceedings, Workshop on Vortex Dynamics and Turbulence Modeling, 2-6 September 1996, ITU, Istanbul, editor (with Olus Boratav and Alp Eden), Springer Verlag (1997).
5. (With G. Caldarelli and A. Vespignani), Special Issue of the European Physical Journal B, incorporating papers from the Midterm conference COSIN, on Coevolution and Self-Organization in Dynamical Networks, Rome, *Eur. Phys. J. B*, **38**, No. 2 (March II 2004)