

## **Professor Dr. Hasan Akin**

### **Contact Information:**

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### **RESEARCH AREAS**

1. *Finite and infinite d-dimensional cellular automata,*
2. *Ergodic theory,*
3. *Topological and measure-theoretical entropies,*
4. *Topological dynamical system, symbolic dynamical systems, subshifts of finite type,*
5. *The Gibbs measures of Lattice (Ising and Potts etc.) Models,*
6. *Quantum quadratic stochastic operators and processes and their some ergodic properties,*
7. *The ergodic theorems over von Neumann algebras,*
8. *p-adic Statistical Mechanics and p-adic dynamical systems, p-adic functional analysis,*
9. *Error correcting codes.*

### **EDUCATION**

Name of Institute	Dates attended	Qualification Obtained	Title of Dissertation
Erciyes University, Dep. of Math.	1988-1992	Undergraduate	Mathematics
Yüzüncü Yıl University, Institute of Science	1993-1995	M.Sc. in Mathematics	Some properties of symbolic dynamical systems Supervisor : Prof. Dr. İsmail Tok
Yüzüncü Yıl University, Institute of Science	1995-1998	Ph.D. in Mathematics	On the coding theory and symbolic dynamical systems. Supervisors: Prof. Dr. Abdurrahim YILMAZ

## **EMPLOYMENT HISTORY**

Harran University (state)	2023-present	Associate Professor
<a href="https://www.ictp.it/">https://www.ictp.it/</a> <a href="https://www.ictp.it/math">https://www.ictp.it/math</a>	2021-2023	Visiting Scientist (Professor)
Ankara-Turkey	2016-2021	Professor Dr. (Freelance)
Zirve University (private)	2014-2016	Full Professor
Zirve University (private)	2009-2014	Associate Professor
Harran University (state)	2009-2009	Associate Professor
Harran University (state)	2000-2009	Assistant Professor
Yüzüncü Yıl University (state)	1993-2000	Research and Teaching Assistant

## **ADMINISTRATIVE DUTIES**

Name of Institute	Period of Service	Duties
Harran University Department of Mathematics	2000- 2004	Assistant Head of Chair of Department of Mathematics Harran University
Harran University Department of Mathematics	2000- 2009	Head of Chair of Topology
Harran University Department of Mathematics	2004- 2008	Head of Chair of Department of Mathematics, Harran University
Harran University	2005- 2009	Member of the Board of the Graduate School of Natural and Applied Sciences, Harran University.
Harran University	2008-2009	The director of Harran Un. Ceylanpinar Higher School of Vocational Education
Harran University Department of Mathematics	2009-2009	Head of Chair of Department of Mathematics, Harran University

## **The Council of Higher Education (YÖK) associate professorship jury member (four times).**

### **TEACHING EXPERIENCE\***

\* The following list does not include the courses I taught during my teaching assistantship.

The following courses has been taught several terms.

#### **1) UNDERGRADUATE COURSES**

Linear Algebra I  
Linear Algebra II  
Analysis I

Geometry  
Analytic Geometry  
Pre-calculus

Analysis II	Calculus I
Analysis III	Calculus II
Analysis IV	History of Mathematics
Functional Analysis I	Probability and Statistics
Functional Analysis II	Mathematics I (Department of Primary)
Number Theory	Mathematics II (Department of Primary)
Abstract Algebra I	Calculus I (distance learning)
Abstract Algebra II	Calculus II (distance learning)

## 2) GRADUATE COURSES (Harran University 2000-2009 )

### Name of Course

Topology I  
 Topology II  
 Entropy Theory I  
 Entropy Theory II  
 Ad. Functional Analysis I  
 Ad. Functional Analysis II

### THESES SUPERVISED

#### Master Theses

1. Ahmet TUNC, The measure entropy of additive cellular automata 2003, Harran University, Graduate School of Natural & Applied Sciences.
2. Aydin Bağış, The topological entropy of cellular automata and maximal entropy, 2005, Harran University, Graduate School of Natural & Applied Sciences.
3. Feride Altıngöz, Chaoticity of additive cellular automata and kinds of entropy, 2007, Harran University, Graduate School of Natural & Applied Sciences.
4. Ferhat ŞAH, Algebraic structure of two dimensional cellular automata, 2009, Harran University, Graduate School of Natural & Applied Sciences.
5. Selda Hiçdurmaz, Comparison of the entropies of finite Markov chains with entropies of information, 2009, Harran University, Graduate School of Natural & Applied Sciences.
6. Halit SAYGILI, Dynamic behavior of the Ising model on the Cayley tree with three interactions, 2012, Gaziantep University, Graduate School of Natural & Applied Sciences (co-advisor).

## **PUBLICATIONS IN ACADEMIC JOURNALS\***

\* Journals covered by Web of Science are shown with  and years are shown in ascending order

A) SCI tarafından taranan makaleler

- 1)  **H. Akın**, On the ergodic properties of certain additive cellular automata over  $\mathbb{Z}_m$ , *Applied Mathematics and Computation*, 168 (1), (2005), 192-197. [MR2170026](#)  
<https://doi.org/10.1016/j.amc.2004.08.049>
- 2)  **H. Akın**, On the directional entropy of  $\mathbb{Z}^2$ -actions generated by additive cellular automata, *Applied Mathematics and Computation*, 170 (1), 2005, Pages 339-346 (SCI). DOI: <https://doi.org/10.1016/j.amc.2004.11.032> [MR2177227](#)
- 3)  F. Mukhamedov, **H. Akın** and S. Temir, *On infinite dimensional quadratic Volterra operators*, *Journal of Mathematical Analysis and Applications*, 310 (2), 2005, Pages 533-556 (SCI).  
<https://doi.org/10.1016/j.jmaa.2005.02.022> [MR2022943](#)
- 4)  F. Mukhamedov, S. Temir, **H. Akın**, *On mixing and completely mixing properties of positive  $L^1$ -contractions of finite von Neumann algebras*. *Proceedings of the American Mathematical Society* 134 (2006) 843-850, <https://doi.org/10.1090/S0002-9939-05-08072-X>
- 5)  **H. Akın**, *The topological entropy of nth iteration of an additive cellular automata*, *Applied Mathematics and Computation*, 174 (2), 2006, Pages 1427-1437.  
<https://doi.org/10.1016/j.amc.2005.05.039>
- 6)  N. N. Ganikhodjaev, **H. Akın**, F. Mukhamedov, On the ergodic principle for Markov and quadratic stochastic processes and its relations, *Linear Algebra and its Applications*, 416 (2-3), 2006, Pages 730-741 (SCI). <https://doi.org/10.1016/j.laa.2005.12.032>
- 7)  N. Ganikhodjaev, **H. Akın** and S. Temir, Potts model with two competing binary interactions, *Turkish Journal of Mathematics*, 31 (3) (2007), 229-238. [Abstract](#) Full text:[pdf](#)
- 8)  **H. Akın**, I. ŞİAP, *On cellular automata over Galois rings*, *Information Processing Letters*, 103 (1) (2007) 24-27. <https://doi.org/10.1016/j.ipl.2007.02.002>.
- 9)  **H. Akın**, *The topological entropy of invertible cellular automata*, *Journal of Computational and Applied Mathematics*, 213 (2) (2008) 501-508. <https://doi.org/10.1016/j.cam.2007.01.020>

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### 2009

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- 10)  **H. Akın**, *On the topological directional entropy*, *Journal of Computational and Applied Mathematics*, 225 (2), 2009, Pages 459–466. <https://doi.org/10.1016/j.cam.2008.08.012>
- 11)  **H. Akın**, *The Entropy of Linear Cellular Automata with Respect to Any Bernoulli measure*, *Complex*

*Systems*, 18 (2009) 237–244. [10.25088/ComplexSystems.18.2.237](https://doi.org/10.25088/ComplexSystems.18.2.237)

- 12)  N. Ganikhodjaev, S. Temir, **H. Akın**, Modulated phase of a Potts model with competing binary interactions on a Cayley tree, *Journal of Statistical Physics*, 137, (4), 2009 701-715  
<https://doi.org/10.1007/s10955-009-9869-z>
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2010

- 13)  Akhtam Dzhalilov, **H. Akın**, Seyit Temir, *Conjugations between circle maps with a single break point*, *Journal of Mathematical Analysis and Applications* 366, (1), 2010, Pages 1-10  
<https://doi.org/10.1016/j.jmaa.2009.12.050>
- 14)  F. Mukhamedov, S. Temir, **H. Akın**, A note on dominant contractions of Jordan algebras, *Turkish Journal of Mathematics*, 34 (1) (2010) 85-93, doi:10.3906/mat-0810-24
- 15)  S. Uguz and **H. Akın**, *Phase diagrams of competing quadruple and binary interactions on Cayley tree-like lattice: Triangular Chandelier*, *Physica A: Statistical Mechanics and its Applications* (9) (2010) 1839-1848. <https://doi.org/10.1016/j.physa.2009.12.057>
- 16)  İ. Şiap, **H. Akın**, F. Şah, *Garden of eden configurations for 2-D cellular automata with rule 2460N*, *Information Sciences*, 180 (18), 2010, 3562-3571, <https://doi.org/10.1016/j.ins.2010.05.039>
- 17)  A. A. Rakhimov, **H. Akın**, On mixing and completely mixing properties of positive  $L^1$ -contractions of finite real  $W^*$ -algebras, *Methods of Functional Analysis and Topology*, 16, no. 3, 2010, 259-263.
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2011

- 18)  F. Mukhamedov, **H. Akın**, S. Temir, A. Abduganiev, *On quantum quadratic operators of  $M_2(\mathbb{C})$  and their dynamics*, *Journal of Mathematical Analysis and Applications*, 376 (2), (2011), 641-655 (SCI). <https://doi.org/10.1016/j.jmaa.2010.10.047>
- 19)  **H. Akın**, U. A. Rozikov and S. Temir, *A new set of limiting Gibbs measures for the Ising model on a cayley tree*, *Journal of Statistical Physics*, 142 (2), (2011), 314-321  
<https://doi.org/10.1007/s10955-010-0106-6>
- 20)  N. Ganikhodjaev, **H. Akın**, S. Uguz, S. Temir, *On extreme Gibbs measures of the Vannimenu model*, *Journal of Statistical Mechanics: Theory and Experiment*, doi: [10.1088/1742-5468/2011/03/P03025](https://doi.org/10.1088/1742-5468/2011/03/P03025) (2011) P03025.
- 21)  Z. Çinkır, **H. Akın**, İ. Şiap, *Reversibility of 1D Cellular Automata with Periodic Boundary over Finite Fields  $\mathbb{Z}_p$* , *Journal of Statistical Physics* Volume 143, Number 4, 807-823, (2011)  
<https://doi.org/10.1007/s10955-011-0202-2>

- 22)  **H. Akın**, S. Temir, [On phase transitions of the Potts model with three competing interactions, Condensed Matter Physics](#), Vol. 14, No 2, 23003: 1–11, (2011) DOI:[10.5488/CMP.14.23003](https://doi.org/10.5488/CMP.14.23003)
- 23)  S. Uğuz, **H. Akın**, Modulated Phase of an Ising System with quinary and binary interactions on a Cayley tree-like lattice: Rectangular Chandelier, [Chinese Journal of Physics](#), 49, NO. 3 June 2011, 785-798.
- 24)  İ. Şiap, **H. Akın**, F. Şah, [Characterization of two dimensional cellular automata over ternary fields](#), [Journal of the Franklin Institute](#), 348 (2011) 1258–1275, doi:[10.1016/j.jfranklin.2010.02.002](https://doi.org/10.1016/j.jfranklin.2010.02.002).
- 25)  **H. Akın**, Upper bound of the directional entropy of a  $Z^2$ -action, [International Journal of Modern Physics C \(IJMPC\)](#), 22 No. 7 (2011) 711-718, <http://dx.doi.org/10.1142/S0129183111016555>
- 26)  İ. Şiap, **H. Akın**, and S. Uğuz, [Structure and reversibility of 2D hexagonal cellular automata](#), [Computers & Mathematics with Applications](#), 62 (11), (2011) 4161-4169  
<https://doi.org/10.1016/j.camwa.2011.09.066>
- 27)  N. N. Ganikhodjaev, **H. Akın**, S.Uguz, S. Temir, Phase diagram and extreme Gibbs measures of the Ising model on a Cayley tree in the presence of competing binary and ternary interactions, [Phase Transitions: A Multinational Journal](#), 84 (11-12), (2011), 1045-1063  
<https://doi.org/10.1080/01411594.2011.579395>
- 28)  N. Ganikhodjaev, S. Temir, **H. Akın**, S. Uguz, Potts model with simplest modulated phase, [Journal of Korean Physical Society](#), 59 (5), November 2011, pp. 2971-2979 [doi:  
[10.3938/jkps.59.2971](https://doi.org/10.3938/jkps.59.2971)  [Full Text\(PDF\)](#)
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- 2012
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- 29)  **H. Akın**, [The measure-theoretic entropy of linear cellular automata with respect to a Markov measure](#), [Bulletin of the Malaysian Mathematical Sciences Society](#), 35(1) (2012), 171–178 [Full text PDF](#).
- 30)  **H. Akın**, F. Şah, İ. Şiap, [On 1D reversible cellular automata with reflective boundary over the prime field of order p](#), [International Journal of Modern Physics C \(IJMPC\)](#) DOI: [10.1142/S0129183111017020](https://doi.org/10.1142/S0129183111017020), 23 (1), 1250004 Pages: 13 (2012), [Abstract](#) | [Full Text](#)
- 31)  **H. Akın**, N. Ganikhodjaev, S. Uguz, S. Temir, Behaviors of phase diagrams of Ising model with competing ternary and binary interactions on a Cayley tree of arbitrary order, [Acta Physica Polonica A](#), Vol 121 No.1 (2012) 104-107, [Full Text PDF](#)
- 32)  S. Uguz, N. Ganikhodjaev, **H. Akın**, S. Temir, The competing interactions on a Cayley tree-like lattice: Pentagonal Chandelier, [Acta Physica Polonica A](#), Vol 121 No.1 (2012) 114-118, [Full Text](#)

[PDF](#)

- 33)  S. Uguz, N. Ganikhodjaev, **H. Akın**, S. Temir, [Lyapunov exponents and modulated phases of an ising model on cayley tree of arbitrary order](#), [International Journal of Modern Physics C \(IJMPC\)](#)  
DOI No: [10.1142/S0129183112500398](https://doi.org/10.1142/S0129183112500398), 1250039 (15 Pages), 23, Issue 05, (2012).
- 34)  İ. Siap, **H. Akın**, M.E. Köroğlu, [Reversible cellular automata with penta-cyclic rule and ECCs](#), [International Journal of Modern Physics C \(IJMPC\)](#), Vol. 23, No. 9 (2012) 1250066 (13 pages)  
<https://doi.org/10.1142/S0129183112500660>
- 35)  **H. Akın**, [An upper bound of the directional entropy with respect to the Markov measures](#), [International Journal of Bifurcation and Chaos \(IJBC\)](#), 1250263 [6 pages] 2012, Vol. 22 No.11  
<https://doi.org/10.1142/S021812741250263X>
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2013

- 36)  S. Temir, N. Ganikhodjaev, S. Uguz, **H. Akın**, Behavior of the phase diagrams of Potts model on Cayley tree for order three, [Acta Physica Polonica A](#), Vol:123 (2), (2013) 476-479, [abstract](#) [Full Text PDF](#) <https://doi.org/10.12693/APhysPolA.123.476>
- 37)  S. Uguz, I. Siap, **H. Akın**, 2-dimensional reversible hexagonal cellular automata with periodic boundary, [Acta Physica Polonica A](#), Vol:123 (2), (2013) 480-483, [abstract](#) [Full Text PDF](#) <https://doi.org/10.12693/APhysPolA.123.480>
- 38)  **H. Akın**, N. Ganikhodjaev, S. Temir and S. Uguz, Description of extreme Gibbs measures for the Ising model with three interactions, [Acta Physica Polonica A](#), Vol:123 (2), (2013) 484-487, [abstract](#) [Full Text PDF](#) <https://doi.org/10.12693/APhysPolA.123.484>
- 39)  S. Uguz, **H. Akın**, I. Siap, [Reversibility algorithms for 3-state hexagonal cellular automata with periodic boundaries](#), [International Journal of Bifurcation and Chaos \(IJBC\)](#), Vol. 23, No. 6 (2013) 1350101-1-15 (15 pages), <https://doi.org/10.1142/S0218127413501010>
- 40)  F. Mukhamedov, **H. Akın**, [Phase transitions for  \$p\$ -adic Potts model on the Cayley tree of order three](#), [Journal of Statistical Mechanics: Theory and Experiment](#), (2013) P07014, pp.1-30, doi:[10.1088/1742-5468/2013/07/P07014](https://doi.org/10.1088/1742-5468/2013/07/P07014) Abstract, [Full text PDF \(516 KB\)](#)
- 41)  I. Siap, **H. Akın**, S. Uguz, 2-D reversible cellular automata with nearest and prolonged next nearest neighborhoods under periodic boundary, [European Journal of Pure and Applied Mathematics](#), 6 (3), 2013, 315-334. [PDF](#)
- 42)  F. Mukhamedov, **H. Akın**, [The  \$p\$ -adic Potts model on the Cayley tree of order three](#), [Theoretical and Mathematical Physics](#), 176, Issue 3, 1267-1279 (2013). <https://doi.org/10.1007/s11232-013-0105-2>
- 43)  İ. Siap, **H. Akın**, M.E. Köroğlu, [The Reversibility of  \$\(2r + 1\)\$ -Cyclic Rule Cellular Automata](#),

*TWMS Journal of Pure and Applied Mathematics*, 4 (2), 2013, pp 215-225.

- 44)  **H. Akin**, Jung-Chao Ban, and Chih-Hung Chang, On the quantitative behavior of the linear cellular automata, *Journal of Cellular Automata*, 8 (3-4), 2013, p. 205-231, [Full Text \(IP\)](#)
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2014

- 45)  S. Uguz, U. Sahin, **H. Akin**, I. Siap, *Self-Replicating Patterns in 2D Linear Cellular Automata*, *International Journal of Bifurcation and Chaos (IJBC)*, Vol 24, No 1 (2014) 143000 (25 pages)  
<https://doi.org/10.1142/S021812741430002X>

- 46)  M. E. Koroglu, I. Siap, **H. Akin**, *Error Correcting Codes via Reversible Cellular Automata Over Finite*, *Arabian Journal for Science and Engineering* March 2014, Volume 39, Issue 3 , pp 1881-1887, <https://doi.org/10.1007/s13369-013-0757-0>

- 47)  **H. Akin**, I. Siap, S. Uguz, *One-Dimensional Cellular Automata with Reflective Boundary Conditions and Radius Three*, *Acta Physica Polonica A*, Vol. 125 No. 2 February 2014, page 405-407, [abstract](#) [Full Text PDF](#) <https://doi.org/10.12693/APhysPolA.125.405>

- 48)  S. Uguz, U. Sahin, I. Siap, **H. Akin**, *2D Cellular Automata with an Image Processing Application*, *Acta Physica Polonica A*, Vol. 125 No. 2 February 2014,page 435-438, [abstract](#) [Full Text PDF](#) <https://doi.org/10.12693/APhysPolA.125.435>

- 49)  F. Temiz, I. Siap, **H. Akin**, *On Pseudo Random Bit Generators via Two-Dimensional Hybrid Cellular Automata*, *Acta Physica Polonica A*, Vol. 125 No. 2 February 2014, page 534-537, [abstract](#) [Full Text PDF](#) <https://doi.org/10.12693/APhysPolA.125.534>

- 50)  U. A. Rozikov, **H. Akin**, and S. Uguz, Exact solution of a generated ANNNI model on Cayley tree, *Mathematical Physics, Analysis and Geometry*, June 2014, Volume 17, [Issue 1-2](#), pp 103-114, [arXiv:1008.3307](https://arxiv.org/abs/1008.3307) [pdf, ps, other] <https://doi.org/10.1007/s11040-014-9144-7>

- 51)  F. Mukhamedov, M. Dogan and **H Akin**, *Phase transition for the  $p$ -adic Ising–Vannimenus model on the Cayley tree* , *Journal of Statistical Mechanics: Theory and Experiment* , (2014) P10031, pp. 1-21, [View article PDF \(316 KB\)](#), <https://doi.org/10.1088/1742-5468/2014/10/P10031>
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2015

- 52)  U. Sahin, S. Uguz, **H. Akin**, *The Transition Rules of 2D Linear Cellular Automata Over Ternary Field and Self-Replicating Patterns*, *International Journal of Bifurcation and Chaos* Vol. 25, No. 01, 1550011 (2015) 1550011 <https://doi.org/10.1142/S021812741550011X>

- 53)  U. Sahin, S. Uguz, **H. Akin** and I. Siap, *Three-state von Neumann cellular automata and pattern generation*, *Applied Mathematical Modelling*, Volume 39, Issue 7, 1 April 2015, Pages 2003-2024

<https://doi.org/10.1016/j.apm.2014.10.025>, Abstract, PDF (770 K)

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- 54)  F. Mukhamedov, **H. Akin**, [On non-Archimedean recurrence equations and their applications](#), [Journal of Mathematical Analysis and Applications](#), Volume 423, Issue 2, 15 March 2015, Pages 1203-1218, <https://doi.org/10.1016/j.jmaa.2014.10.046> Abstract, PDF (321 K), arXiv:1402.4209 [pdf, ps, other].
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2016

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- 55)  M. E. Koroglu, I. Siap, **H. Akin**, [The reversibility problem for a family of two-dimensional cellular automata](#), [Turkish Journal of Mathematics](#), 40, 665-678 (2016), Abstract Full Text: PDF <https://doi.org/10.3906/mat-1503-18> PDF
- 56)  Chih-Hung Chang, **H. Akin**, Some ergodic properties of invertible cellular automata, [Journal of Cellular Automata](#), Volume 11, [Issue 2-3](#), 247-261 (2016).
- 57)  M. Dogan, **H. Akin**, F. Mukhamedov, Existence of  $p$ -Adic Quasi Gibbs Measures for Mixed Type  $p$ -adic Ising  $\lambda$ -Model, [Acta Physica Polonica A](#), 129 (4), (2016) 861-864.  
<https://doi.org/10.12693/APhysPolA.129.861>
- 58)  **H. Akin**, H. Saygılı, On Gibbs measures of the Potts model with three competing interactions on Cayley tree of order 3, [Acta Physica Polonica A](#), 129 (4), (2016) 845- 848.  
<https://doi.org/10.12693/APhysPolA.129.845>
- 59)  S. Uguz, **H. Akin**, I. Siap, U. Sahin, [On the irreversibility of Moore cellular automata over the ternary field and image application](#), [Applied Mathematical Modelling](#), 40 (17-18), (2016) 8017-8032.  
<https://doi.org/10.1016/j.apm.2016.04.027> 7 May 2016 Abstract PDF (11585 K)
- 60)  **H. Akin**, [Using new approaches to obtain Gibbs measures of Vannimenus model on a Cayley tree](#), [Chinese Journal of Physics](#), Volume 54, Issue 4, August 2016, Pages 635-649 arXiv:1510.08405 [pdf, ps, other] Abstract, Research highlights, PDF (1432 K) <https://doi.org/10.1016/j.cjph.2016.07.010>
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2017

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- 61)  E. Acar, S. Uguz and **H. Akin**, Characterization of 2D Hybrid Cellular Automata with Periodic Boundary, [Acta Physica Polonica A](#), 131 (3), 432-436 (2017) abstract Full Text PDF <https://doi.org/10.12693/APhysPolA.131.432>
- 62)  **H. Akin**, Phase transition and Gibbs Measures of Vannimenus model on semi-infinite Cayley tree of order three, [International Journal of Modern Physics B](#), 31 (13), 1750093 (2017) [17 pages]  
DOI: <http://dx.doi.org/10.1142/S021797921750093X>
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- 63)  F. Mukhamedov, **H. Akin**, O. Khakimov, Gibbs measures and free energies of Ising–Vannimenus model on the Cayley tree, *Journal of Statistical Mechanics: Theory and Experiment, Volume 2017, May 2017*, 1-16, 053208 DOI:[10.1088/1742-5468/aa6c88](https://doi.org/10.1088/1742-5468/aa6c88)
- 64)  Chih-Hung Chang; Jing-Yi Su; **H. Akin**; F. Sah, *Reversibility Problem of Multidimensional Finite Cellular Automata*, *Journal of Statistical Physics*, **168** (1), 208-231 (2017) <https://doi.org/10.1007/s10955-017-1799-6>
- 65)  S. Uguz, S. Redjepov, E. Acar, **H. Akin**, Structure and reversibility of 2D von Neumann cellular automata over triangular lattice, *International Journal of Bifurcation and Chaos*, **27** (6) 1750083 (2017) [17 pages] | [PDF \(923 KB\)](#) | <https://doi.org/10.1142/S0218127417500833>
- 66)  F. Mukhamedov, **H. Akin**, M. Doğan, On the chaotic behavior of  $p$ -adic generalized Ising mapping and its application, *Journal of Difference Equations and Applications*, **23** (9), 1542-1561, (2017) <http://dx.doi.org/10.1080/10236198.2017.1340468>
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2018

- 67)  **H. Akin**, Gibbs Measures with memory of length 2 on an arbitrary order Cayley tree, *International Journal of Modern Physics C (IJMPC)* 29, (2) 1850016 (2018) [21 pages] <https://doi.org/10.1142/S012918311850016X>, [arXiv:1701.00715](https://arxiv.org/abs/1701.00715) [[pdf](#), [ps](#), [other](#)]
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2019

- 68)  F. Temiz, F. Sah, **H. Akin**, Reversibility of a family of 2d cellular automata hybridized by diamond and cross rules over finite fields and an application to visual cryptography, *Journal of Cellular Automata*, 14. (3-4), (2019), 241-262. [Full Text \(IP\)](#)
- 69)  **H. Akin**, Gibbs Measures of an Ising model with Competing Interactions on the Triangular Chandelier-lattice, *Condensed Matter Physics*, **22** (2), 23002, 1-14 (2019). Full text [[pdf](#)] [DOI:10.5488/CMP.22.23002](https://doi.org/10.5488/CMP.22.23002). <https://arxiv.org/abs/1801.00781>
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2020

- 70)  **H. Akin**, Chih-Hung Chang, The entropy and reversibility of cellular automata on Cayley tree, *International Journal of Bifurcation and Chaos*, Vol. 30, No. 04, 2050061 (2020), <https://doi.org/10.1142/S0218127420500613>
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2021

- 71)  **H. Akin**, [Determination of paramagnetic and ferromagnetic phases of an Ising model on a third-order Cayley tree](#), *Condensed Matter Physics*, 2021, vol. 24, No. 1, 13001  
DOI:[10.5488/CMP.24.13001](https://doi.org/10.5488/CMP.24.13001) Full text [[pdf](#)] [arXiv:1708.02585](https://arxiv.org/abs/1708.02585) [[pdf](#), [ps](#), [other](#)]
- 72)  F. Mukhamedov, **H. Akin**, [Characterization of bistochastic Kadison-Schwartz operators on M2\(C\)](#), *Proceedings of the Steklov Institute of Mathematics*, **313**, 165–177 (2021).  
<https://doi.org/10.1134/S0081543821020164> [arXiv:1601.00719](https://arxiv.org/abs/1601.00719)
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1.  **Akin H.**, Liu Chunlin, Directional dynamics  $\mathbb{Z}^2$ -actions generated by 1D-CA and the shift map, (under review), <https://doi.org/10.48550/arXiv.2204.06405>.
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- [1] **Akin H.**, Reversibility of cellular automata on finite triangular grids with mirror boundary conditions.
- [2] **Akin H.**, Liu Chunlin, Ergodic properties of  $\mathbb{Z}^2$ -actions generated by two 1D-cellular automata over product space.
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B) Articles outside the scope of SCI-E

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2. N. Ganikhodjaev, S. Temir, **H. Akin**, The exact solution of the three-state Potts model with competing interactions on the Cayley Tree, *Uzbek Mathematical Journal*, No 3-4, 37-40, 2002. [MR2179462](#)
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14. **H. Akın**, [On strong mixing property of cellular automata with respect to Markov Measures](#), [General Mathematics](#), Vol. 18, No. 4 (2010), 19-30.
15. N. N. Ganikhodjaev, **H. Akın**, S.Uguz, S. Temir, Phase diagrams of an Ising system with competing binary, prolonged ternary and next-nearest interactions on a Cayley tree, [Journal of Concrete and Applicable Mathematics \(JCAAM\)](#), 9 (1), (2011), 26-34.
16.  **H. Akın**, S. Uğuz, and I. Siap, [Characterization of 2D cellular automata with Moore neighborhood over ternary fields](#), [AIP Conf. Proc.](#) [1389](#), (2011), pp. 2008-2011. <https://doi.org/10.1063/1.3637009>
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25.  N. Ganikhodjaev, **H. Akın**, S. Temir, S. Uğuz and A. M. Nawi, Strange attractors in the Vannimenus model on an arbitrary order Cayley tree, [\*Journal of Physics: Conference Series\*](#) Volume 435, 012031 [doi:10.1088/1742-6596/435/1/012031](#) Full text PDF (843 KB) (CPCI-S). (Without self-citations=3)
26.  **H. Akın** and H. Saygılı, [\*Phase transition of the Potts model with three competing interactions on Cayley tree of order 3\*](#), [\*AIP Conf. Proc.\*](#). 1676, 020026 (2015); <http://dx.doi.org/10.1063/1.4930452>
27.  **H. Akın** and F. Mukhamedov, [\*Orthogonality preserving infinite dimensional quadratic stochastic operators\*](#), [\*AIP Conf. Proc.\*](#). 1676, 020008 (2015); <http://dx.doi.org/10.1063/1.4930434> (Without self-citations=6)
28.  M. Dogan, **H. Akın** and F. Mukhamedov, [\*Phase transition of p-adic Ising  \$\lambda\$ -model\*](#), [\*AIP Conf. Proc.\*](#). 1676, 020030 (2015); <http://dx.doi.org/10.1063/1.4930456>
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C) National journals

- 1- S. Temir, **H. Akın**, On the topological entropy function for amenable group actions, [\*Marmara Univ. Journal of Sciences\*](#), **15**, 59-64 (1999).
- 2- **H. Akın**, Topological entropy of the symbolic dynamic system obtained by weak interaction, [\*Marmara Univ. Journal of Sciences\*](#), **16**, 127-132 (2000).
- 3- **H. Akın**, S. Temir, The entropy for expansive  $\mathbb{Z}^d$  subshifts of finite type, [\*Firat Univ. Journal of Sciences and Engineering\*](#), **16** (1), 131-137 (2004).

D) Chapter in the book

- 1) N. Ganikhodjaev, S. Temir, S. Uğuz, **H. Akın**, A renormalization-group study of the Potts model with competing ternary and binary interactions, [\*Nonlinear and Complex Dynamics: Applications in Physical, Biological and Financial Systems\*](#), Editors: J.A. Tenreiro Machado, Dumitru Baleanu, Albert Luo, 2011, Part 1, 117-125, [https://doi.org/10.1007/978-1-4614-0231-2\\_9](https://doi.org/10.1007/978-1-4614-0231-2_9) (Without self-citations=1)

## **PROJECTS and SUPPORTS**

### **RESEARCH PROJECTS**

1. “Limit behaviors of dynamic systems for lattice models on the Cayley tree and their phase diagrams”, Role: **Project manager and principle investigator (Hasan AKIN)**, Type of Grant: [TUBITAK](#) the research project 1010 EVRENA, Funding Agency: [TUBITAK](#), Duration: May 15, 2010-June 15, 2012, Project Number: **TBAG-109T678** (Other Participants: Seyit Temir and Selman Uguz). International Participant: [Nasir Ganikhodjaev](#) (completed).
2. “*Behavior and algebraic structures of 2-dimensional cellular automata over fields and rings*” Role: **Project manager and principle investigator (Hasan AKIN)**, Type of Grant: [TUBITAK](#) the research project 1001, Funding Agency: [TUBITAK](#), Duration: May 01, 2011-June 01, 2013. Project Number: **TBAG-110T713** (Other Participants: İrfan Siap and Selman Uguz) (completed). (In this project, we have obtained 10 international articles, 17 web of science ([Web of Science](#)) articles, 3 master's theses, 1 doctoral thesis and 15 international conference papers).
3. “*p-adic statistical mechanics and associated dynamical systems*” Participants: [Farrukh Mukhamedov](#), [Otabek Khakimov](#), [Utkir Rozikov](#), [Mansoor Saburov](#), [Hasan Akin](#), [Mutlay Dogan](#). In the present project we investigate Gibbs measures associated with p-adic statistical models. Moreover, the phase transitions is going to be studied by means of exploring associated p-adic dynamical systems.
4. “*Directional dynamics*”, Participants: Chunlin Liu, Leiye Xu, Hasan Akin. Goal: 1. Directional dynamics in ergodic theory, 2. Directional dynamics in topological dynamical systems.

### **COAUTHORS FOR WHOM HASAN AKIN GOT FELLOWSHIP and SUPPORT FROM GOVERNMENT**

1. Professor [Nasir Ganikhodjaev](#), TUBITAK (The Scientific and Technological Research Council of Turkey) (NATO-D) ([2003](#)), Harran University
2. Associate Professor Farrukh MUKHAMEDOV, TÜBİTAK-2221- Fellowships for visiting scientists program (2004), Harran University.
3. Professor Akhtam Dzhalilov, TÜBİTAK-2221- Fellowships for visiting scientists program (2007), Harran University.
4. Associate Professor Farrukh MUKHAMEDOV, TÜBİTAK-2221-Fellowships for visiting scientists program (2008), Harran University.
5. Professor [Nasir Ganikhodjaev](#), TÜBİTAK-2221- Fellowships for visiting scientists program ([2009](#)), Harran University.
6. Professor Dr. Utkir Rozikov, TÜBİTAK-2221- Fellowships for visiting scientists program (2010).

7. Professor Farrukh MUKHAMEDOV, TÜBİTAK-2221- Fellowships for visiting scientists program (2015).

### **GRANTS and AWARDS FOR PUBLICATIONS:**

1. Reward for International Publications, **TUBITAK** (30 times), 2005-2018.
2. Grant for a visit to the **International Islamic University Malaysia** to conduct a series of research and evaluation of project outcomes (2 times).
3. Selected by **International Mathematical Union** (IMU) for a grant to attendance in International Congress of Mathematicians (ICM)-SEOUL ICM 2014, August 13 - 21, 2014, Coex, Seoul, Korea.
4. Selected by **International Mathematical Union** (IMU) for a grant to attendance in International Congress of Mathematicians (ICM) 2018 in Rio De Janerio /Brazil.
5. [Simons Foundation | Advancing Research in Basic Science, Grant 2021-2023](#)

### **STATE GRANTED RESEARCH VISITS:**

- International University of Malaysia, Kuantan, Malaysia, June-July 2011. (Invited by Prof. Dr. Nasir Ganikhodjaev and supported by TUBITAK).
- International University of Malaysia, Kuantan, Malaysia, January 2016. (Invited by Prof. Dr. Farrukh Mukhamedov and supported by TUBITAK).

### **EDITORIAL BOARD MEMBERSHIPS:**

1. Editorial Board of [\*The Scientific World Journal\*](#): Mathematical Analysis. Impact Factor 1.730. ([...-2016](#))
2. Editorial Board of [\*Journal of Algebra Combinatorics Discrete Structures and Applications\*](#) ([...-2016](#))
3. Advisory Board Members (International): [http://www.scientificjournals.org/editorial\\_board.htm](http://www.scientificjournals.org/editorial_board.htm) ([...-2016](#))

### **REVIEWER IN**

1. *Mathematical Reviews*: [Mathematical Reviews Database](#) (Reviewer) (116 papers)
2. [Zentralblatt MATH](#) (Reviewer) ( [227 Reviews](#), 6 books).

### **BOOK REVIEWS:**

1. **Akin, H.** (2012). Book review: [Mainzer, Klaus; Chua, Leon O.](#) The universe as automaton. From simplicity and symmetry to complexity. (*English*) [Zbl 1237.37002](#) Springer Briefs in Complexity. Berlin: Springer (ISBN 978-3-642-23476-7/pbk; 978-3-642-23477-4/ebook). viii, 108 p.
2. **Akin, H.** (2012). Book review: [Chua, Leon O.](#), A nonlinear dynamics perspective of Wolfram's new kind of science. Vol. 4. (*English*) [Zbl 1246.37002](#) World Scientific Series on Nonlinear Science. Series A 76. Hackensack, NJ: World Scientific (ISBN 978-981-4317-30-6/hbk; 978-981-4317-31-3/ebook). ix, 392 p.

3. **Akin, H.** (2013). Book review: “[Rozikov, Utkir A. Gibbs measures on Cayley trees. \(English\) Zbl 06210278](#) Hackensack, NJ: World Scientific (ISBN 978-981-4513-37-1/hbk; 978-981-4513-39-5/ebook). xviii, 385 p. £ 84.00 (2013).”
4. **Akin, H.** (2014). Book review: [Lowenstein, John H.](#) Pseudochaotic kicked oscillators. Renormalization, symbolic dynamics, and transport. (English) [Zbl 06006277](#), Berlin: Springer; Beijing: Higher Education Press (ISBN 978-3-642-28153-2/hbk; 978-3-642-28154-9/ebook; 978-7-04-032279-8/hbk). xii, 215 p. EUR 90.90 (2012).
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6. **Akin, H.** (2023). Book review: [Candela, Pablo; Szegedy, Balázs](#), Nilspace factors for general uniformity seminorms, cubic exchangeability and limits. (English) [Zbl 07704124](#) [Memoirs of the American Mathematical Society](#) 1425. Providence, RI: American Mathematical Society (AMS) (ISBN 978-1-4704-6548-3/pbk; 978-1-4704-7541-3/ebook). v, 101 p. (2023).

### **REFEREED IN JOURNALS**

1. [Mathematical Methods in the Applied Sciences](#)
2. [Information Sciences](#)
3. [Soft Computing](#)
4. [Journal of Cellular Automata](#)
5. [Applied Mathematics and Computation](#)
6. [Computers & Mathematics with Applications](#)
7. [Physics Letters A](#)
8. [Journal of the Franklin Institute](#)
9. [Qualitative Theory of Dynamical Systems](#)
10. [Turkish Journal of Mathematics](#)
11. [Journal of Algebra Combinatorics Discrete Structures and Applications](#)
12. [Journal of Statistical Mechanics: Theory and Experiment](#)
13. [Chaos: An Interdisciplinary Journal of Nonlinear Science – AIP](#)
14. [Heliyon / Journal / ScienceDirect.com by Elsevier](#)

**MEMBERSHIPS:** [American Mathematical Society](#) (AMS) 2007-present

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### ***INTERNATIONAL CONFERENCE-MEETING-***

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**PRESENTATIONS AND ABSTRACTS:**

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1. I. Siap, **H. Akın**, F. Sah, Characterization of two dimensional Cellular automata over ternary fields, [Third International Conference on Modeling, Simulation and Applied Optimization \(ICMSAO09\)](#), 22-24 January, 2009, Sharjah, UAE.
  2. **H. Akın**, I. Siap, F. Sah, Two Dimensional Hybrid Cellular automata over ternary fields, [Third International Conference on Modeling, Simulation and Applied Optimization \(ICMSAO09\)](#), 22-24 January 2009, Sharjah, UAE.
  3. N. Ganikhodjaev, **H. Akın**, S. Uguz, S. Temir, Phase diagrams of an Ising system with competing binary, prolonged ternary and next-nearest interactions on a Cayley tree, (Abstract -page 62), 3<sup>rd</sup> International Interdisciplinary Chaos Symposium on [Chaos and Complex Systems](#) May 21-24, 2010, Istanbul, Turkey.
  4. S. Temir, N. N. Ganikhodjaev, S. Uguz, **H. Akın**, The phase diagram for potts model with competing ternary and binary interactions on a Cayley tree, 3<sup>rd</sup>Conference on Nonlinear Science and Complexity, ([Cankaya Universitesi-3rd NSC Conference](#)), 28- 31 July, 2010, Ankara, Turkey, [cankaya.edu.tr Alanindan \[PDF\].](http://cankaya.edu.tr Alanindan [PDF].)
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  6. S. Temir, N. Ganikhodjaev, **H. Akın** and S. Uğuz, Phase Diagrams of a Potts Model with Competing Binary and Ternary Interactions, 8th International Conference of Numerical Analysis and Applied Mathematics [ICNAAM 2010](#) , 19-25 September 2010, Rhodes, Greece.
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  9. **H. Akın**, İ. Siap, and S. Uğuz, Non-regular hexagonal cellular automata over the field  $Z_3$ , [ICMS International Conference on Mathematical Sciences 2010](#), Izzet Baysal Univ., 23-27 November 2010, Bolu, Turkey.
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11. S. Uguz, **H. Akın**, S. Temir, N. N. Ganikhodjaev, The competing binary and ternary interactions on a Cayley tree-like lattice: pentagonal chandelier, “Advances in Applied Physics and Materials Science Congress” [apmas2011](#), May 13-15, Antalya-Kemer-Turkey.
12. H. **Akın**, İ. Şiap, and S. Uğuz, “Two-dimensional cellular automata with nearest and prolonged next nearest neighborhoods”, [International Conference on Applied Analysis and Algebra](#), pp. 299-300, 29-30 June and 1-2 July 2011 in Istanbul, Turkey.
13. F. Sah, H. **Akın**, İ. Şiap, “On 1D reversible cellular automata with reflective boundary over finite fields  $Z_p$ ” [International Conference on Applied Analysis and Algebra](#), pp. 309-391, 29-30 June and 1-2 July 2011 in Istanbul, Turkey.
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16. **H. Akın**, N. N. Ganikhodjaev, S.Uguz, S. Temir, [Periodic extreme Gibbs measures with memory length 2 of Vannimenus model](#), [ICNAAM 2011](#), G-Hotels, Halkidiki, Greece, 19-25 September 2011.
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19. I. Siap and **H. Akın**, One dimensional penta-cyclic rule cellular automata with periodic boundary over finite fields with  $p$  elements, 2nd [World Conference on Information Technology](#), Antalya, TURKEY, November 23-26 2011, pp. 66.
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