

# Ali Dehghan

Postdoc fellow at [Carleton University](#)

- **Contact information:**

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- **Positions and educations:**

- From Aprl. 2016:

**Postdoc fellow at** [Carleton University](#)

Supervisor: [Amir Banihashemi](#)

- Feb. 2015 – Jun. 2015:

**Researcher at** [Carleton University](#)

Supervisor: [Brett Stevens](#)

- 2011 – 2016:

**PhD in Mathematics at** [Amirkabir University of Technology](#)

Supervisor: [Mohammad-Reza \(Rafsanjani\) Sadeghi](#)

- 2009 – 2011:

**MSc in Computer Science at** [Sharif University of Technology](#)

Supervisor: [Ebadollah S. Mahmoodian](#)

- 2005 – 2009:

**BSc in Computer Science at** [Sharif University of Technology](#)

- **Research Interests:**

- Coding and Information Theory,
- Computational Complexity,
- Deep Learning,
- Cryptography,
- Graph Algorithms,
- Probabilistic methods in combinatorics.

- **Publications:**

See: [DBLP](#), [Google Scholar](#), [ORCID](#), [MathSciNet](#).

## Submissions under Review

31-A. Dehghan, A. Banihashemi, Counting Short Cycles in Bipartite Graphs: A Fast Technique/Algorithm and a Hardness Result. Submitted

30-A. Dehghan, A. Banihashemi, On Computing the Number of Short Cycles in Bipartite Graphs Using the Spectrum of the Directed Edge Matrix. Submitted

29-A. Dehghan, A. Banihashemi, Cospectral Bipartite Graphs with the Same Degree Sequences but with Different Number of Large Cycles. Submitted

28-A. Dehghan, A. Banihashemi, On Finding Bipartite Graphs with a Small Number of Short Cycles and Large Girth. Submitted

27-A. Ahadi, Ali Dehghan, M.-R. Sadeghi, B. Stevens, [Regular and irregular decompositions of graphs](#). Submitted.

26-A. Dehghan, On the semi-proper orientations of graphs. Submitted

- 25-A. Ahadi, Ali. Dehghan, [\(2/2/3\)-SAT problem and its applications in dominating set problems](#). Submitted.
- 24-A. Dehghan, A. Ahadi, Partitioning the Vertex Set of Planar Regular Graphs into Galaxies. Submitted
- 23-A. Dehghan, M.-R. Sadeghi, B. Stevens, Playing Arc-Kayles Game on Switchable Graphs is Easy. Submitted

## Journal Papers

### 2019

- 22-A. Dehghan, A. Banihashemi, [Asymptotic Average Number of Different Categories of Trapping Sets, Absorbing Sets and Stopping Sets in Random Regular and Irregular LDPC Code Ensembles](#).  
IEEE Transactions on Information Theory, Accepted 2019. ([ArXiv](#))
- 21-A. Dehghan, A. Banihashemi, [Hardness Results on Finding Leafless Elementary Trapping Sets and Elementary Absorbing Sets of LDPC Codes](#).  
IEEE Transactions on Information Theory, vol. 65, no. 7, pp. 4307 - 4315, July (2019). ([ArXiv](#))
- 20-A. Dehghan, A. Banihashemi, [On Computing the Multiplicity of Cycles in Bipartite Graphs Using the Degree Distribution and the Spectrum of the Graph](#).  
IEEE Transactions on Information Theory, vol. 65, no. 6, pp. 3778 - 3789, June (2019). ([ArXiv](#))
- 19-A. Dehghan, A. Banihashemi, [From Cages to Trapping Sets and Codewords: A Technique to Derive Tight Upper Bounds on the Minimum Size of Trapping Sets and Minimum Distance of LDPC Codes](#).  
IEEE Transactions on Information Theory, vol. 65, no. 4, pp. 2062 - 2074, April (2019). ([ArXiv](#))

### 2018

- 18-A. Dehghan, A. Banihashemi, [On the Tanner Graph Cycle Distribution of Random LDPC, Random Protograph-Based LDPC, and Random Quasi-Cyclic LDPC Code Ensembles](#).  
IEEE Transactions on Information Theory, vol. 64, no. 6, pp. 4438 - 4451, June (2018). ([ArXiv](#))
- 17-Ali Dehghan, M.-R. Sadeghi, A. Ahadi, [Not-All-Equal and 1-In-Degree Decompositions: Algorithmic Complexity and Applications](#).  
Algorithmica, 80(12): 3704-3727 (2018). ([ArXiv](#))
- 16-Ali Dehghan, M.-R. Sadeghi, A. Ahadi, [Sigma Partitioning: Complexity and Random Graphs](#).  
Discrete Mathematics & Theoretical Computer Science, 20(2): 2018. ( [ArXiv](#))

### 2017

- 15-A. Ahadi, A. Dehghan, M. Mollahajiahaei, [Algorithmic Complexity of Weakly Semiregular Partitioning and the Representation Number](#).  
Theoretical Computer Science. 674: 60–72 (2017). ([ArXiv](#))
- 14-Ali Dehghan, M.-R. Sadeghi, [Colorful edge decomposition of graphs: Some polynomial cases](#).  
Discrete Applied Mathematics 231: 155–165 (2017).
- 13-A. Ahadi, A. Dehghan, M. Saghaian, [Is there any polynomial upper bound for the universal labeling of graphs?](#).  
Journal of Combinatorial Optimization. 34(3):760–770 (2017). ([ArXiv](#))
- 12-Ali Dehghan, M. Mollahajiahaei, [On the algorithmic complexity of adjacent vertex closed distinguishing colorings](#)

[number of graphs.](#)

Discrete Applied Mathematics. 218: 82–97 (2017).([ArXiv](#))

2016

11-A. Ahadi, Ali Dehghan, [The inapproximability for the  \$\(0, 1\)\$ -additive number.](#)

Discrete Mathematics & Theoretical Computer Science 17(3): 217-226 (2016)

10-Ali Dehghan, M.-R. Sadeghi, [On the algorithmic complexity of zero-sum edge-coloring.](#)

Inf. Process. Lett. 116(11): 660-667 (2016)

9-Ali Dehghan, [On strongly planar not-all-equal 3SAT.](#)

J. Comb. Optim. 32(3): 721-724 (2016)

2015

8-Ali Dehghan, M.-R. Sadeghi, A. Ahadi, [On the Complexity of Deciding Whether the Regular Number is at Most Two.](#)

Graphs and Combinatorics 31(5): 1359-1365 (2015).([ArXiv](#))

7-Ali Dehghan, M.-R. Sadeghi, [The complexity of the zero-sum 3-flows.](#)

Inf. Process. Lett. 115(2): 316-320 (2015).

2013

6-A. Ahadi, Ali Dehghan, [The complexity of the proper orientation number.](#)

Inf. Process. Lett. 113(19-21): 799-803 (2013).([ArXiv](#))

5-Ali Dehghan, M.-R. Sadeghi, A. Ahadi, [Algorithmic complexity of proper labeling problems.](#)

Theor. Comput. Sci. 495: 25-36 (2013).([ArXiv](#))

4- S. Saqaqqyan, E. Mollaahmadi, A. Dehghan, [On the complexity of the colorful directed paths in vertex coloring of digraphs.](#)

Transactions on Combinatorics 2: 1-7 (2013).

2012

3-Ali Dehghan, A. Ahadi, [Upper bounds for the 2-hued chromatic number of graphs in terms of the independence number.](#)

Discrete Applied Mathematics 160(15): 2142-2146 (2012).([ArXiv](#))

2-A. Ahadi, S. Akbari, Ali Dehghan, M. Ghanbari, [On the difference between chromatic number and dynamic chromatic number of graphs.](#)

Discrete Mathematics 312(17): 2579-2583 (2012)

1-A. Ahadi, Ali Dehghan, M. Kazemi, E. Mollaahmadi, [Computation of lucky number of planar graphs is NP-hard.](#)

Information Processing Letters 112(4): 109-112 (2012).

Conference Papers

8-A. Dehghan, A. Banihashemi, ``On the Computational Complexity of Finding Bipartite Graphs with a Small Number of Short Cycles and Large Girth,"

Accepted for presentation at the 2019 IEEE Information Theory Workshop (ITW), Visby, Gotland, Sweden, Aug. 25-28, 2019.

7-A. Dehghan, A. Banihashemi, ``From the Spectrum of the Adjacency Matrix to the Spectrum of Directed Edge Matrix:

Counting Cycles of a Bipartite Graph Through a Simple Equation,"

Accepted for presentation at the 2019 IEEE Information Theory Workshop (ITW), Visby, Gotland, Sweden, Aug. 25-28, 2019.

6-A. Dehghan, A. Banihashemi, ``Computing the Asymptotic Expected Multiplicity of Leafless Elementary Trapping Sets (LETs) in Random Irregular LDPC Code Ensembles,"

Accepted for presentation at International Symposium on Turbo Codes & Iterative Information Processing (ISTC 2018 ) 2018, Hong Kong, December 3-7, 2018.

5-A. Dehghan, A. Banihashemi, ``On Counting Short Cycles of LDPC Codes Using the Tanner Graph Spectrum,"

Accepted for presentation at International Symposium on Turbo Codes & Iterative Information Processing (ISTC 2018 ) 2018, Hong Kong, December 3-7, 2018.

4-A. Dehghan, A. Banihashemi, ``Computing the Asymptotic Expected Multiplicity of Elementary Trapping Sets (ETs) in Random LDPC Code Ensembles,"

Accepted for presentation at International Symposium on Turbo Codes & Iterative Information Processing (ISTC 2018 ) 2018, Hong Kong, December 3-7, 2018.

3-A. Dehghan, A. Banihashemi, [Asymptotic Average Number of Different Categories of Trapping Sets, Absorbing Sets and Stopping Sets in Random LDPC Code Ensembles.](#)

IEEE International Symposium on Information Theory (IEEE ISIT) 2018, Colorado, USA, June 17-22, 2018.

2-A. Dehghan, A. Banihashemi, [Finding Leafless Elementary Trapping Sets and Elementary Absorbing Sets of LDPC Codes is Hard](#)

IEEE International Symposium on Information Theory (IEEE ISIT) 2018, Colorado, USA, June 17-22, 2018.

1-A. Dehghan, A. Banihashemi, [From Cages to Trapping Sets: A New Technique to Derive Tight Upper Bounds on the Minimum Size of Trapping Sets and Minimum Distance of LDPC Codes.](#)

IEEE International Symposium on Information Theory (IEEE ISIT) 2018, Colorado, USA, June 17-22, 2018.

## Book

[B1]-Ali. Dehghan, N. Ghasem-Aghaee, Mahdi Jaberzadeh Ansari, [Fundamentals of computer and programming by C++](#). Naghoos press, 2007. ([in Persian](#)).

### 1. Projects:

- [Graphical Structure of LDPC Codes.](#)