

# Atabey Kaygun

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<b>Contact Information</b>	+90 212 285 6823 kaygun@itu.edu.tr web.itu.edu.tr/kaygun	Atabey_Kaygun github.com/kaygun kaygun.tumblr.com	Department of Mathematics Istanbul Technical University 34469 Maslak Istanbul, Turkey
<b>Research Interests</b>	Homological and homotopical algebra. Cyclic and Hochschild (co)-homology of algebras, coalgebras and Hopf algebras. Applied statistics, machine learning, statistical and topological data analysis.		
<b>Languages</b>	Turkish (native), English (fluent), French (beginner).		
<b>Work Experience</b>	<p>ISTANBUL TECHNICAL UNIVERSITY, Istanbul, Turkey <i>Professor</i> Dec 2019 – Present <i>Associate Professor</i> Feb 2016 – Dec 2019</p> <p>QUEEN'S UNIVERSITY, Kingston, ON, Canada <i>Visiting Professor</i> Jun 2019 – Dec 2020</p> <p>BAHÇEŞEHİR UNIVERSITY, Istanbul, Turkey <i>Associate Professor</i> Jun 2011 – Sep 2015 <i>Assistant Professor</i> Sep 2009 – Jun 2011</p> <p>UNIVERSITY OF BUENOS AIRES, Buenos Aires, Argentina <i>Postdoctoral Researcher</i> Feb 2009 – Jun 2009</p> <p>MAX-PLANCK-INSTITUT FÜR MATHEMATIK, Bonn, Germany <i>Postdoctoral Researcher</i> Jul 2008 – Feb 2009</p> <p>THE OHIO STATE UNIVERSITY, Columbus, Ohio, USA <i>Ross Assistant Professor</i> Sep 2007 – Jul 2008</p> <p>KMMF-WARSAW UNIVERSITY, Warsaw, Poland <i>Postdoctoral Fellow</i> Oct 2006 – Dec 2006</p> <p>THE UNIVERSITY OF WESTERN ONTARIO, London, Ontario, Canada <i>Fields Postdoctoral Fellow</i> Jul 2005 – Jul 2007</p> <p>THE OHIO STATE UNIVERSITY, Columbus, Ohio, USA <i>Adjunct Lecturer</i> Apr 2005 – Jul 2005 <i>Graduate Teaching Assistant</i> Sep 1996 – Apr 2005</p> <p>INTERNATIONAL CENTER FOR THEORETICAL PHYSICS, Trieste, Italy <i>Diploma Fellow</i> Aug 1995 – Aug 1996</p>		
<b>Education</b>	<p>THE OHIO STATE UNIVERSITY, Columbus, Ohio, USA <i>Ph.D. Mathematics</i> [2005] “Bialgebra cyclic homology with coefficients.” Advisor: H. Moscovici</p> <p>BOĞAZIÇI UNIVERSITY, Istanbul, Turkey <i>M.Sc. Mathematics</i> [1995] “<i>t</i>-Motives.” Advisor: I. K. Ikeda <i>B.Sc. Mathematics</i> [1993]</p>		
<b>Publications (in reverse order)</b>	<ol style="list-style-type: none"><li>1. A. Karan and A. Kaygun. <i>Time Series Classification via Topological Data Analysis</i>, arXiv:2102.01956</li><li>2. A. Kaygun. <i>Enumerating Labeled Graphs that Realize a Fixed Degree Sequence</i>, arXiv:2101.02299 (Submitted.)</li></ol>		

3. İ. Güzel and A. Kaygun. *Hierarchical clustering and zeroth persistent homology*, arXiv:2012.02655 (Submitted.)
4. A. Kaygun. *Birational equivalences and generalized Weyl algebras*, arXiv:2009.14801 (Submitted.)
5. B.A. Ergene and A. Kaygun. *The Textual Evolution of the Ottoman Şeyhülislams' Fetvas: A Cross-Corpora Computational Analysis*. Accepted for publication at *Der Islam*.
6. B.A. Ergene and A. Kaygun. *Semantic Mapping of An Ottoman Fetva Compilation: Fetavayı Ebussuud through a Textual-Computational Lens*. *Journal of Islamic Studies*, Volume 32, Issue 1, 1 January 2021, Pages 62–115.  
DOI: 10.1093/jis/etaa032
7. A. Kaygun and S.Sütlü. *Homology of quantum linear groups*. Accepted for publication at *Homology, Homotopy and Applications*.  
arXiv:1910.09747.
8. A. Kaygun and S.Sütlü. *On the Hochschild homology of smash biproducts*. *Journal of Pure and Applied Algebra*,  
DOI: 10.1016/j.jpaa.2020.106506
9. A. Kaygun. *Noncommutative Fibrations*, *Communications in Algebra*, Volume 47, 2019 - Issue 8.  
DOI: 10.1080/00927872.2018.1559850
10. P.M. Hajac, A. Kaygun and M. Tobolski. *A graded pullback structure of Leavitt path algebras of trimmable graphs*. *Banach Center Publications* 120 (2020), 47-52.  
DOI: 10.4064/bc120-4
11. A. Kaygun and S.Sütlü. *The asymptotic characteristic map and the index cocycles*, *Banach Center Publications* 120 (2020), 221-244.  
DOI: 10.4064/bc120-15
12. A. Kaygun and S. Sütlü *Hopf-Dihedral Cohomology and L-Theory*, *Journal of Noncommutative Geometry* 12 (2018), 69-106.  
DOI: 10.4171/JNCG/271
13. M. Kanuni, A. Kaygun and S. Sütlü, *Hochschild cohomology of reduced incidence algebras*, *Journal of Algebra and Its Applications*, Vol. 16, No. 9. (2017)  
DOI: 10.1142/S0219498817501687
14. A. Kaygun and S. Sütlü, *A characteristic map for compact quantum groups*. *Journal of Homotopy and Related Structures*, (2017) 12:549.  
DOI: 10.1007/s40062-016-0138-y
15. A. Kaygun and S. Sütlü, *Hopf-Cyclic Cohomology of Quantum Enveloping Algebras*, *Journal of Noncommutative Geometry*; Volume 10, Issue 2, 2016, pp. 429–446  
DOI: 10.4171/JNCG/238
16. B.A. Ergene and A. Kaygun *Log-linear Analysis of Intergenerational Mobility in Eighteenth-Century Ottoman Anatolia*. *Journal of the Economic and Social History of the Orient*, Vol. 57, (2014), pp 669-702.  
DOI: 10.1163/15685209-12341361
17. M.M. Coşgel, B.A. Ergene and A. Kaygun *Temporal Analysis of Wealth and Inequality in Eighteenth-Century Ottoman Empire*. *Continuity and Change*, Volume 28, Issue 01 (May 2013), pp 1-26.  
DOI: 10.1017/S026841601300009X

18. P.M. Hajac, A. Kaygun and B. Zielinski, *Finite closed coverings of compact quantum spaces*, Operator Algebras and Quantum Groups. Banach Center Publ. 98 (2012) P.M. Soltan and W. Pusz Eds.  
DOI: 10.4064/bc98-0-8
19. P.M. Hajac, A. Kaygun and B. Zielinski, *Quantum projective space from Toeplitz cubes*, Journal of Noncommutative Geometry, Volume 6, Issue 3, 2012, pp. 603–621.  
DOI: 10.4171/JNCG/100
20. A. Kaygun, *Jacobi-Zariski exact sequence for Hochschild homology and cyclic cohomology*, Homology, Homotopy and Applications, Vol. 14 (2012), No. 1, pp.65-78.  
DOI: 10.4310/HHA.2012.v14.n1.a4  
*Erratum to “Jacobi–Zariski exact sequence for Hochschild homology and cyclic (co)homology”*, Homology Homotopy Appl. 21, No. 2, 301-303 (2019).  
DOI: 10.4310/HHA.2019.v21.n2.a16
21. B.A. Ergene and A. Kaygun *Spouse Selection and Marital Mobility in the Ottoman Empire: Observations from Eighteenth-Century Kastamonu*. Historical Methods: A Journal of Quantitative and Interdisciplinary History, Volume 45, Issue 1, 2012.  
DOI: 10.1080/01615440.2011.624984
22. A. Kaygun, *A survey on Hopf-cyclic cohomology and Connes-Moscovici characteristic map*. Contemporary Mathematics, Vol. 546 pp. 171-179 (2011)  
DOI: 10.1090/conm/546
23. B.A. Ergene and A. Kaygun *Intergenerational Mobility in the Ottoman Empire: Observations from Eighteenth-Century*. The History of the Family, Volume 16, Issue 1, 15 March 2011, Pages 30-46.  
DOI: 10.1016/j.hisfam.2010.10.003
24. A. Kaygun, *Uniqueness of pairings in Hopf cyclic cohomology*, Journal of K-Theory, Vol. 6 (2010), No. 1, pp.1-21.  
DOI: 10.1017/is009007030jkt086
25. A. Kaygun and M. Khalkhali, *Bivariant Hopf cyclic cohomology*, Communications in Algebra, Vol. 38 (2010), No. 7, pp 2513-2537.  
DOI: 10.1080/00927870903417695
26. A. Kaygun, *Products in Hopf cyclic cohomology*, Homology, Homotopy and Applications, Vol. 10 (2008), No. 2, pp.115-133.  
DOI: 10.4310/HHA.2007.v9.n2.a17
27. A. Kaygun, *The universal Hopf cyclic theory*, Journal of Noncommutative Geometry, Vol. 2 (2008), No. 3, pp. 333-351.  
DOI: 10.4171/JNCG/23
28. A. Kaygun, *Hopf-Hochschild (co)homology of module algebras*, Homology, Homotopy and Applications, Vol. 9 (2007), No. 2, pp.451-472.  
DOI: 10.4310/HHA.2007.v9.n2.a17
29. A. Kaygun and M. Khalkhali, *Excision in Hopf cyclic cohomology*, K-Theory, Vol. 37 (2006), No. 1-2.  
DOI: 10.1007/s10977-006-0002-7
30. A. Kaygun and M. Khalkhali, *Hopf modules and noncommutative differential geometry*, Letters in Mathematical Physics, Vol. 76 (2006) No. 1.  
DOI: 10.1007/s11005-006-0062-x
31. A. Kaygun, *Bialgebra cyclic homology with coefficients*, K-Theory, Vol. 34 (2005), No. 2.  
DOI: 10.1007/s10977-005-1501-7

**Preprints  
(in reverse order)** M. Kanuni and A. Kaygun *Global dimension of some Artinian algebras*, arXiv:math/1206.3726  
A. Kaygun, *A Loday–Quillen–Tsygan theorem for coalgebras*, arXiv:math/0411661  
A. Kaygun, *Bialgebra cyclic homology with coefficients, Part II*, arXiv:math/0409191  
A. Kaygun, *Bialgebra cyclic homology with coefficients, Part I*, arXiv:math/0408094

**Projects** Scientific and Technological Research Council of Turkey, Grant 2219 (Aug 2020–Mar 2021)  
Scientific and Technological Research Council of Turkey, Grant 2221 (Apr 2014–Sep 2014)

**Graduate Students** Deniz Gözen: *Hopkins-Levitzki Theorem for Cocommutative Coalgebras*. (MSc 2012)  
İrem Karaduman: *Using Graph Theory in Solving Problems in Bioinformatics*. (MSc 2013)  
Mehmet Emin Gönen: *Counting and Listing a Special Class of Directed Graphs*. (MSc 2013)  
Kadriye Dilek Tefenlili: *Categories of Graphs and Operations on Graphs*. (MSc 2014)  
Deniz Topuz: *A Survey in Machine Learning Algorithms and Anomaly Detection*. (MSc 2014)  
Betül Güvenç: *Machine Learning Methods in Natural Language Processing* (MSc 2015)  
Ecem Tuğçe Cesur: *Path algebra and monomial ideals* (MSc 2016)  
Mine Melodi Çalışkan: *Data stream analysis* (MSc 2018)  
Elif Altınok: *Linear algebraic methods for machine learning* (MSc 2019)  
Kerem Kabil: *Discrete classification and clustering algorithms in Machine Learning* (MSc 2019)  
Alp Eren Yılmaz: *A taxonomy of artificial neural networks* (MSc 2020)

**Conferences and  
Workshops  
Organized** 1. *Noncommutative Geometry Days in Istanbul I*, IMBM, July 2010.  
2. *Noncommutative Geometry Days in Istanbul II*, IMBM, July 2011.  
3. *ESF Exploratory Workshop on Interfaces of Noncommutative Geometry with the Representation Theory of Hopf Algebras and Artin Algebras*, IMBM, August 2012.

**Invited  
Presentations** • *Noncommutative Geometry for Fun and Profit*. Colloquium, Queen’s University. Kingston, Ontario, Canada. November, 2019.  
• *Distributive Laws, Smash Biproducts and Hochschild Homology*. Geometry and Representation Theory Seminar, Queen’s University, Kingston, Ontario, Canada. September, 2019.  
• *Cohomology of topological algebras via coalgebras*. Noncommutative Geometry Seminar. Noncommutative Geometry Seminar. IMPAN, Warsaw; October 2017.  
• *Jacobi-Zariski exact sequence in Hochschild and cyclic cohomology*. Alexandroff Readings International Topological Conference Moscow (Russia); May 2012.  
• *Products in Hopf–cyclic (co)homology*, Colloquium, University of Western Ontario; London, Ontario, Canada; August 2010.  
• *Uniqueness of pairings in Hopf-cyclic cohomology*. Noncommutative Geometric Methods in Global Analysis, *Conference in Honor of Henri Moscovici*, Hausdorff center for mathematics, Bonn, Germany; July 2009.  
•  *$L_\infty$ -algebras and Introduction to Formality Theorem*. Kontsevich Formality Theorem and the Duflo Isomorphism Workshop, IMPAN, Warsaw, Poland; April 2009.  
• *A panoramic view of Hopf-cyclic cohomology*, Polish Mathematical Society Colloquium, IMPAN; Warsaw, Poland, December 2008.

- *Connes-Moscovici characteristic map and uniqueness of pairings in Hopf-cyclic cohomology*. Noncommutative Geometry Workshop, Hausdorff Research Institute for Mathematics, Bonn, Germany; July 2008.
- *Products in Hopf-cyclic (co)homology*. Noncommutative Geometry and the geometry over the field with one element  $\mathbb{F}_1$  workshop, Vanderbilt University, Nashville Tennessee, USA; May 2008.
- *Hopf-cyclic (co)homology*, Colloquium, Wayne State University; Detroit, Michigan, USA; January 2008.
- *Hopf-Hochschild cohomology*, Kempner Colloquium, University of Colorado at Boulder; Boulder, Colorado, USA; December 2007.
- *Hopf-Hochschild (co)homology of module algebras*. Noncommutative Geometry Workshop, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach-Walke, Germany; September 2007.
- *Hopf cyclic (co)homology*. Mini course at Conference and Spring School on Noncommutative Geometry and Applications Vanderbilt University, Nashville Tennessee, USA; May 2007.
- *Hopf equivariant cyclic (co)homology and Morita invariance*. Noncommutative Geometry and Cyclic Cohomology Workshop, Cambridge, UK; August, 2006.
- *Bivariant Hopf cyclic cohomology*. Noncommutative Geometry Workshop, Banff International Research Station, Banff Alberta, Canada; April 2006.

#### Conferences and Workshops Attended

- *ESF Exploratory Workshop on Interfaces of Noncommutative Geometry with the Representation Theory of Hopf Algebras and Artin Algebras*, Istanbul Center for Mathematical Sciences, August 2012.
- *Noncommutative Geometry Days in Istanbul, II*; Istanbul Center for Mathematical Sciences, Istanbul Turkey; July 2011.
- *Noncommutative Geometry Days in Istanbul*, Istanbul Center for Mathematical Sciences, Istanbul Turkey; June 2010.
- *Geometry over  $\mathbb{F}_1$ , Noncommutative Geometry and Zeta*, Vanderbilt University, Nashville Tennessee, USA; May 2009.
- *Kontsevich Formality Theorem and Duflo Isomorphism Workshop*, IMPAN, Warsaw, Poland; April 2009.
- *Noncommutative Geometry And Geometry Over The Field With One Element  $\mathbb{F}_1$  II*, Johns Hopkins University, Baltimore Maryland, USA; March 2009.
- *Noncommutative Geometry, Arithmetic and Related Topics*, Johns Hopkins University, Baltimore Maryland, USA; March 2009.
- *Noncommutative Geometry Workshop*, Hausdorff Research Institute for Mathematics, Bonn, Germany; July 2008.
- *Noncommutative Geometry and the geometry over the field with one element  $\mathbb{F}_1$  workshop*, Vanderbilt University, Nashville Tennessee, USA; May 2008.
- *Noncommutative Geometry Workshop*, Mathematisches Forschungsinstitut Oberwolfach, Germany; September 2007.
- *Conference and Spring School on Noncommutative Geometry and Applications*, Vanderbilt University, Nashville Tennessee, USA, May 2007.

- *Noncommutative Geometry and Cyclic Cohomology Workshop*, Cambridge, UK; December, 2006.
- *Noncommutative Geometry and Cyclic Cohomology Workshop*, Cambridge, UK; August, 2006.
- *Conference and Spring School on Noncommutative Geometry and Applications*, Vanderbilt University, Nashville Tennessee, USA; May 2006.
- *Noncommutative Geometry Workshop*, Banff International Research Station, Banff Alberta, Canada; April 2006.
- *Conference and Spring School on Noncommutative Geometry and Applications*, Vanderbilt University, Nashville Tennessee, USA; May 2003.

**Teaching Experience**

ISTANBUL TECHNICAL UNIVERSITY:

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|--|-------------|
| • <i>Math 485E</i> : Graph Theory                          | Spring 2019 |
| • <i>Math 388E</i> : Data Science for Fundamental Sciences | Autumn 2018 |
| • <i>Math 332E</i> : Real Analysis I                       | Autumn 2018 |
| • <i>Math 355E</i> : Topology                              | Spring 2017 |

BAHÇEŞEHİR UNIVERSITY:

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|---|--------------------------|
| • <i>Math 2033</i> : Discrete Mathematics | Academic Years 2009-2015 |
| • <i>Math 1051, 1052</i> : Calculus I,II  | Academic Years 2009-2014 |
| • <i>Math 2008</i> : Topology             | Academic Years 2009-2015 |
| • <i>Graduate Algebra I, II</i>           | Academic Year 2011-2012  |

**Professional service**

Reviewer for *AMS Mathematical Reviews* (About 30 Reviews)

Refereed for the journals *K-Theory*; *Letters in Mathematical Physics*; *Communications in Mathematical Physics*; *Journal of Noncommutative Geometry*; *Journal of K-Theory*; *Homotopy, Homology and Applications*; and *Turkish Journal of Mathematics*.

**Computers and related experience**

R, python, common lisp, scheme, clojure, scala, perl, c and c++, fortran, julia, sage, singular, maxima, GAP, octave, matlab, mathematica, maple, L<sup>A</sup>T<sub>E</sub>X. Moderate experience with java and haskell. Unix shell programming with bash, ksh and csh.