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Ali KAYA

Education

- 2001* Ph.D. in Physics, Texas A&M University, College Station, TX
Dissertation: Aspects of *AdS* (Super)Gravity
Supervisor: Prof. Ergin Sezgin.
- 1995* M.S. in Physics, Bogazici University, Istanbul, Turkey
Thesis: Space-time Duality in String Theory
Supervisor: Prof. Rahmi Guven.
- 1993* B.S. in Physics, Bogazici University, Istanbul, Turkey.

Academic Positions

- 2021-present* Instructional Faculty, Department of Physics and Astronomy, Texas A&M University, College Station, TX.
- 2020-2021* Visiting Professor of Physics, Connecticut College, New London, CT.
- 2019-2020* Visiting Scholar, Department of Physics, Harvard University, Cambridge, MA.
- 2009-2019* Professor, Department of Physics, Bogazici University, Istanbul, Turkey.
- 2006-2009* Associate Professor, Department of Physics, Bogazici University, Istanbul, Turkey.
- 2005-2006* Assistant Professor, Department of Physics, Bogazici University, Istanbul, Turkey.
- 2002-2005* Post Doctoral Fellow, Feza Gursey Institute, Istanbul, Turkey.
- 2001 Fall* Visiting Faculty, Department of Physics, Texas A&M University, College Station, TX.
- 1997-2001* Graduate Assistant, Department of Physics, Texas A&M University, College Station, TX.
- 1993-1997* Graduate Assistant, Department of Physics, Bogazici University, Istanbul, Turkey.

Administrative Duties

- 2021-present* Phys 206/226/227 Course Coordinator
- 2005-2016* Graduate Advisor, Department of Physics, Bogazici University, Istanbul, Turkey.
- 2005-2016* Graduate Admission Committee, Department of Physics, Bogazici University, Istanbul, Turkey.

Teaching Experience

<i>2021-present</i>	Currently teaching at Texas A&M University.
<i>2020-2021</i>	Taught upper level undergraduate courses at Connecticut College.
<i>2020 Spring</i>	Taught a graduate course on cosmology at Harvard University Physics Department.
<i>2005-2016</i>	Taught numerous introductory, upper division, and graduate courses as a full-time faculty member at Bogazici University Physics Department.
<i>2009-2010</i>	Taught introductory calculus courses at Koc University Mathematics Department.
<i>2001 Fall</i>	Taught introductory mechanics at Texas A&M University Physics Department.
<i>1997-2001</i>	Taught introductory physics labs at Texas A&M University.
<i>1993-1997</i>	Taught introductory physics labs at Bogazici University.
<i>Courses</i>	<i>Introductory</i> Mechanics, Thermodynamics, Waves and Optics, Electricity and Magnetism, Modern Physics, Calculus, Linear Algebra, Differential Equations. <i>Upper Division</i> Classical Mechanics, Statistical Mechanics, Mathematical Methods, Quantum Physics, Quantum Mechanics, Introduction to Research in Physics, Cosmology. <i>Graduate</i> Quantum Mechanics, Classical Dynamics, Electromagnetic Theory, Statistical Mechanics, General Relativity, Quantum Field Theory, String Theory, Loop Quantum Gravity, Cosmology, Quantum Fields in Curved Spacetime.

Theses Advised

<i>2015</i>	Ph.D. Thesis: On The Cosmological Impact of a Quantized Scalar Field, Merve Tarman Algan, Institute for Graduate Studies in Science and Engineering, Bogazici University.
<i>2011</i>	M.S. Thesis: Cosmological perturbations in string gas cosmology, Ogan Ozsoy, Institute for Graduate Studies in Science and Engineering, Bogazici University.
<i>2009</i>	M.S. Thesis: Aspects of string thermodynamics, Ayse Arslanargin, Institute for Graduate Studies in Science and Engineering, Bogazici University.
<i>2007</i>	M.S. Thesis: On local inflation and cosmological perturbations, Erol Ertan, Institute for Graduate Studies in Science and Engineering, Bogazici University.

Awards and Achievements

<i>2020-2021</i>	IIE-Scholar Rescue Fund Fellow.
<i>2019-2020</i>	Harvard Scholars at Risk Fellow.
<i>2013</i>	Bogazici University Foundation (BUVAK) Excellence in Research Award (Senior).
<i>2013</i>	The article “In-in formalism, pseudo-instantons and rethinking quantum cosmology” has received an honorable mention in the essay competition of Gravity Research Foundation.
<i>2011</i>	The article “Uncertainty relations for cosmological particle creation and existence of large fluctuations in reheating” has received an honorable mention in the essay competition of Gravity Research Foundation.

- 2010 Fevzi Akkaya Research Fund for Scientific Activities (FABED) Eser Tumen Prize.
- 2009 Middle East Technical University (METU) Prof. Dr. Mustafa N. Parlar Foundation, Incentive Award.
- 2009 The article “Quantum Mechanical Breakdown of Perfect Homogeneity in Reheating After Inflation” has been selected for Classical and Quantum Gravity Journal Highlights of 2008 and 2009.
- 2008 The article “Cosmological particle creation: Fluctuations and an ensemble picture” has received an honorable mention in the essay competition of Gravity Research Foundation.
- 2008 The Scientific and Technological Research Council of Turkey (TUBITAK) Incentive Award.
- 2005 Bogazici University Foundation (BUVAK) Excellence in Research Award (Young).
- 2005 Turkish Academy of Sciences, Young Investigator Award TUBA-GEBIP.
- 2002 Turkish Journalists Association (TGC) Sedat Simavi Award.
- 1996-1997 The Scientific and Technological Research Council of Turkey (TUBITAK) Scholarship.

Research

Current Working on various problems in the field of theoretical cosmology.

Summary

Theoretical cosmology

Particle creation effects during reheating, cosmological backreaction of quantized fields, adiabatic regularization applied to cosmology, measure and initial value problems in cosmology, loop corrections to cosmological correlation functions, asymptotic symmetries and Ward identities.

String/brane gas cosmology

Moduli stabilization, S-duality in string gas cosmology, string thermodynamics, cosmological solutions with brane gases.

String theory and supergravity

AdS/CFT duality, aspects of D-brane, M-brane and S-brane physics, supergravity brane solutions, AdS instantons, cosmic strings on black hole backgrounds, giant gravitons.

Quantum field theory

Non-gaussian path integrals, exact renormalization group approach applied to quantum fields in cosmological spacetimes, in-in path integral measure, stationary phase approximation for in-in path integrals, $i\epsilon$ prescription for quantum fields in cosmological backgrounds.

Publications

- [1] A Simple Proof of Locality in Quantum Mechanics,
A. Kaya,
arXiv:2108.10694.

- [2] The imprint of primordial gravitational waves on the CMB intensity profile, A. Kaya, arXiv:2105.02236, Physics Letters B 817 (2021) 136353.
- [3] Null geodesic congruences, gravitational lensing and CMB intensity profile, A. Kaya, arXiv:2010.10551 [gr-qc], JCAP 01 (2021) 065.
- [4] Vacuum Arbitrariness and the Hubble Tension, A. Kaya, arXiv:2004.01199 [hep-th], Phys. Rev. D 101 (2020) 083523.
- [5] Initial Condition Problem is Intractable in Cosmology, A. Kaya, arXiv:1905.07731 [gr-qc].
- [6] Initial wave-function of the universe is arbitrary, A. Kaya, arXiv:1901.00199 [hep-th], Mod. Phys. Lett. A34 (2019) 1950295.
- [7] On $i\epsilon$ Prescription in Cosmology, A. Kaya, arXiv:1810.12324 [gr-qc], JCAP 1904 (2019) 002.
- [8] Infrared Logarithms in Minisuperspace Inflation, A. Kaya, arXiv:1801.02034 [gr-qc], Phys. Lett. B782 (2018) 256.
- [9] Issues about Cosmological Ward Identities, A. Kaya, arXiv:1801.02033 [gr-qc], Phys. Rev. D97 (2018) 063520.
- [10] Superhorizon Electromagnetic Field Background from Higgs Loops in Inflation, A. Kaya, arXiv:1801.02032 [gr-qc], JCAP 03 (2018) 046.
- [11] Remarks on inhomogeneous anisotropic cosmology, A. Kaya, arXiv:1603.03443 [gr-qc], Phys. Rev. D94 (2016) 043509.
- [12] Adiabatic regularization of functional determinants in cosmology and radiative corrections during inflation, A. Kaya and E. S. Kutluk, arXiv:1509.00489 [gr-qc], Phys. Rev. D92 (2015) 12, 123505.
- [13] On the breakdown of the curvature perturbation ζ during reheating, M. T. Algan, A. Kaya and E. S. Kutluk, arXiv:1502.01726 [hep-th], JCAP 1504 (2015) 015.
- [14] Entropy mode loops and cosmological correlations during perturbative reheating, A. Kaya and E.S. Kutluk, arXiv:1409.2884 [hep-th], JCAP 1501 (2015) 026.
- [15] More on loops in reheating: Non-gaussianities and tensor power spectrum, N. Katirci, A. Kaya and M. Tarman, arXiv:1402.3316 [hep-th], JCAP 1406 (2014) 022.
- [16] Supersymmetric Warped AdS in Extended Topologically Massive Supergravity, N. S. Deger, A. Kaya, H. Samtleben and E. Sezgin, arXiv:1311.4583 [hep-th], Nucl. Phys. B 884 (2014) 106.

- [17] In-in formalism, pseudo-instantons and rethinking quantum cosmology,
A. Kaya,
arXiv:1306.6541 [gr-qc], Int. J. Mod. Phys. D 23 (2014) 1450026.
- [18] Loops in reheating and cosmological perturbations,
A. Kaya,
arXiv:1306.3236 [hep-th], Phys. Rev. D 90 (2014) 043506.
- [19] Exact RG Flow in Expanding Universe and Screening of Cosmological Constant,
A. Kaya,
arXiv:1303.5459 [hep-th], Phys.Rev. D87 (2013) 123501.
- [20] The Functional Measure for the In-In Path Integral,
A. Kaya,
arXiv:1212.3066 [hep-th], Class. Quant. Grav. 32 (2015) 9, 095008.
- [21] Stationary Phase Approximation and Instanton-like States for Cosmological In-In Path Integrals,
A. Kaya,
arXiv:1209.4694 [hep-th], Phys. Rev. D86 (2012) 123511.
- [22] Comments on the canonical measure in cosmology,
A. Kaya,
arXiv:1203.2807 [gr-qc], Phys. Lett. B713 (2012) 1.
- [23] Uncertainty relations for cosmological particle creation and existence of large fluctuations in reheating,
A. Kaya,
arXiv:1112.4580 [gr-qc], Int. J. Mod. Phys. D20 (2011) 2795.
- [24] Cosmological backreaction of a quantized massless scalar field,
A. Kaya and M. Tarman,
arXiv:1111.2511 [gr-qc], JCAP 1201 (2012) 040.
- [25] Hubble's law and faster than light expansion speeds,
A. Kaya,
arXiv:1107.5168 [physics.gen-ph], Am. J. of Phys. 79 (2011) 1151.
- [26] Stress-Energy Tensor of Adiabatic Vacuum in Friedmann-Robertson-Walker Spacetimes,
A. Kaya and M. Tarman,
arXiv:1104.5562 [gr-qc], JCAP 1104 (2011) 040.
- [27] Deformations of Cosmological Solutions of D=11 Supergravity,
N.S. Deger and A. Kaya,
arXiv:1104.4019 [hep-th], Phys. Rev. D 84 (2011) 046005.
- [28] Cosmological Evolution of Vacuum and Cosmic Acceleration,
A. Kaya,
arXiv:1006.0559 [gr-qc], Class. Quantum Grav. 27 (2010) 235022.
- [29] Fluctuations of Quantum Fields in a Classical Background and Reheating,
A. Kaya,
arXiv:0909.2712 [hep-th], Phys. Rev. D 81 (2010) 023521.
- [30] Chern-Simons S-Brane Solutions in M-theory and Accelerating Cosmologies,
N.S. Deger and A. Kaya,
arXiv:0903.1186 [hep-th], JHEP 0904 (2009) 109.
- [31] Open Strings on D-Branes and Hagedorn Regime in String Gas Cosmology,
A. Arslanargin and A. Kaya,
arXiv:0901.4608 [hep-th], Phys. Rev. D 79 (2009) 066013.

- [32] Cosmological particle creation: Fluctuations and an ensemble picture,
A. Kaya,
arXiv:0810.3060 [gr-qc], Int.J. Mod. Phys. D17 (2009) 2441.
- [33] Quantum Mechanical Breakdown of Perfect Homogeneity in Reheating After Inflation,
A. Kaya,
arXiv:0802.2188 [hep-th], Class. Quantum Grav. 26 (2009) 045017.
- [34] Boundary effects in local inflation and spectrum of density perturbations,
E. Ertan and A. Kaya,
arXiv:0704.2284 [gr-qc], Gen. Rel. Grav. 40 (2008) 1511.
- [35] S-duality in String Gas Cosmology,
S. Arapoglu, A. Karakci and A. Kaya,
hep-th/0611193, Phys. Lett. 645B (2007) 255,
- [36] 6D Dyonic String With Active Hyperscalars,
D.C. Jong, A. Kaya and E. Sezgin,
hep-th/0608034, JHEP 11 (2006) 047.
- [37] Supergravity Solutions for Harmonic, Static and Flux S-branes,
A. Kaya,
hep-th/0601202, JHEP 05 (2006) 058.
- [38] Brane Gases and Stabilization of Sahape Moduli with Momentum and Winding Stress,
A. Kaya,
hep-th/0504208, Phys. Rev. D72 (2005) 066006.
- [39] Linear Cosmological Perturbations in D-brane Gases,
A. Kaya,
hep-th/0502133, JHEP 03 (2005) 003.
- [40] D-brane Gases and Stabilization of Extra Dimensions in Dilaton Gravity,
S. Arapoglu and A. Kaya,
hep-th/0409094, Phys. Lett. B603 (2004) 107.
- [41] Volume Stabilization and Acceleration in Brane Gas Cosmology,
A. Kaya,
hep-th/0405099, JCAP 0408 (2004) 014.
- [42] Non-Gaussian Path Integration in Self-Interacting Scalar Field Theories,
A. Kaya,
hep-th/0403122, Phys. Rev. D70 (2004) 085001.
- [43] Multi-Spin Giants,
S. Arapoglu, N.S. Deger, A. Kaya, E. Sezgin and P. Sundell,
hep-th/0312191, Phys. Rev. D69 (2004) 106006.
- [44] A Note on Supergravity Solutions for Partially Localized Intersecting Branes,
S. Arapoglu, N.S. Deger and A. Kaya,
hep-th/0306040, Phys. Lett. B578 (2004) 203.
- [45] On Winding Branes and Cosmological Evolution of Extra Dimensions in String Theory,
A. Kaya,
hep-th/0302118, Class. Quant. Grav. 20 (2003) 4533.
- [46] Wrapped Branes and Compact Extra Dimensions in Cosmology,
A. Kaya and T. Rador,
hep-th/0301031, Phys. Lett. B565 (2003) 19.

- [47] Open Cosmic Strings in Black Hole Space-times,
A. Kaya,
hep-th/0210275, Phys. Rev. D67 (2003) 024013.
- [48] Intersecting S-brane solutions of $D = 11$ Supergravity,
N.S. Deger and A. Kaya,
hep-th/0206057, JHEP 0207 (2002) 038.
- [49] World-Volume Description of M2-Branes Ending on an M5-brane and Holography,
N.S. Deger and A. Kaya,
hep-th/0203239, Phys. Lett. B538 (2002) 164.
- [50] On Conifolds and D3-branes,
A. Kaya,
hep-th/0110214, Phys. Lett. B524 (2002) 348.
- [51] Chern-Simons Supergravity Plus Matter Near the Boundary of AdS_3 ,
N.S. Deger, A. Kaya, E. Sezgin, P. Sundell and Y. Tanii,
hep-th/0012139, Nucl. Phys. B604 (2001) 343.
- [52] AdS/CFT and Randall-Sundrum Model Without a Brane,
N.S. Deger and A. Kaya,
hep-th/0010141, JHEP 0105 (2001) 030.
- [53] Codimension One Branes,
P.S. Howe, A. Kaya, E. Sezgin and P. Sundell,
hep-th/0001169, Nucl. Phys. B587 (2000) 481.
- [54] New Brane Solutions from Killing Spinor Equations,
A. Kaya,
hep-th/0004199, Nucl.Phys. B583 (2000) 411.
- [55] Scalar Absorption by Non-commutative D3-branes,
A. Kaya,
hep-th/9911183, JHEP 0001 (2000) 012.
- [56] Matter Coupled AdS_3 Supergravities and Their Black Strings,
N.S. Deger, A. Kaya, E. Sezgin and P. Sundell,
hep-th/9908089, Nucl.Phys. B573 (2000) 275.
- [57] On the Geometric Properties of AdS Instantons,
A. Kaya,
hep-th/9905231, JHEP 9906 (1999) 026.
- [58] A Note on a Relation between Killing Spinor and Einstein Equations,
A. Kaya,
hep-th/9902010, Phys. Lett. B458 (1999) 267.
- [59] The Spectrum of $D=6, N=4b$ Supergravity on $AdS_3 \times S^3$,
N.S. Deger, A. Kaya, E. Sezgin and P. Sundell,
hep-th/9804166, Nucl. Phys. B536 (1998) 110.