

Gerald Bryan Cleaver

Center for Astrophysics, Space Physics
& Engineering Research
Department of Physics
Baylor University
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BACKGROUND

Dr. Gerald B. Cleaver is a highly skilled and experienced problem solver. He especially enjoys projects that simultaneously require large- and small-scale analysis, wherein logic meets creativity, and abstract thinking is applied to real-world situations. Cleaver is a dedicated leader with over 20 years of management experience of research groups, and is an eloquent communicator with more than 23 years of teaching experience. He directs the Early Universe Cosmology and Strings (EUCOS) division of Baylor University's Center for Astrophysics, Space Physics, and Engineering Research (CASPER) and has advised the dissertation research of 19 M.S./Ph.D. students (12 graduated, 7 current). During his 2013 to 2022 tenure as Physics Graduate Program Director, Cleaver coordinated the graduate programs of more than 115 students and managed the \sim \$700K teaching assistantship budgets. Cleaver was written over 80 peer-reviewed research journal articles and 25 conference proceedings. He has spoken at over 70 conferences and workshops. Cleaver is co-author of one physics textbook and author of six book chapters.

EDUCATION

California Institute of Technology

- Ph.D. in Early Universe Cosmology and String Theory May 1993
Dissertation: *Kač-Moody Algebras and String Theory*
Advisor: Prof. John H. Schwarz
- M.S. in Physics GPA: 3.8 /4.0, June 1988

Valparaiso University, Indiana

- B.S. with Highest Honors in Physics GPA: 3.97/4.0, June 1985
- B.S. with Highest Honors in Mathematics GPA: 4.0 /4.0, June 1985
- Honors College Scholar Citation

ACADEMIC POSITIONS

Baylor University:

Faculty Senate (Executive Committee, 2021-2022) 2020–2023
Fellow, Baylor Center for Christian Philosophy 2017–
Graduate Program Director 2013–2022
Professor 2013–
Associate Professor 2006–2013
Head of Early Universe Cosmology and Superstrings Division of CASPER 2002–
Assistant Professor 2001–2006

Kingwood College

Adjunct Professor Sum 2001

Texas A & M University

Visiting Assistant Professor 2000–2001
Post-Doctoral Researcher 1998–2000

University of Pennsylvania

Post-Doctoral Researcher 1996–1998

The Ohio State University

Post-Doctoral Researcher 1993–1996

California Institute of Technology

Graduate Researcher Assistant 1986–1993

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CURRENT PHYSICS RESEARCH AREAS

Curvature Invariants of Lorentzian Traversable Wormholes and Warped Spacetimes
Quantum Gravity in the Early Universe and Implications for the CMB
Quaternion Julia Fractal Cryptography
Systematic Statistics Investigations of the String/M Landscape
Casimir Effect (and Experimental Propulsion Systems)
Relativistic Thermodynamics and Blackholes

PH.D. & M.S. GRADUATES

| | |
|---|----------------|
| Abinash Kar, Ph.D. Dissertation: <i>Examinations of the String Landscape and Swampland</i> | 2022 (Planned) |
| Jeffrey Lee, Ph.D. Dissertation: <i>Extremal Conditions in Early Universe Cosmology</i> | 2021 |
| Brandon Mattingly, Ph.D. Dissertation: <i>Curvature Invariants of Traversable Wormholes</i> | 2019 |
| Lesley Vestal, M.S. Dissertation: <i>Encrypting the Universe</i> | 2017 |
| Yanbin Deng, Ph.D. Dissertation: <i>Reflections on General Relativity from Perspectives of Black Hole Physics and Hořava-Lifshitz Gravity</i> | 2015 |
| Douglas Moore, Ph.D. Dissertation: <i>The Weakly Coupled Free Fermionic Heterotic String Gauge Landscape</i> | 2014 |
| Jared Greenwald, Ph.D. Dissertation: <i>Automated Systematic Generation and Exploration of Flat Direction Phenomenology in Free Fermionic Heterotic String Theory</i> | 2013 |
| Timothy Renner, Ph.D. Dissertation: <i>Initial Systematic Investigations of the Weakly Coupled Free Fermionic Heterotic String Landscape Statistics</i> | 2011 |
| Kristen Pechan, M.S. Thesis: <i>Investigation of Low Higgs Models in Weakly Coupled Free Fermionic Heterotic String Theory</i> | 2010 |
| Matthew Robinson, PH.D. Dissertation: <i>Towards a Systematic Investigation of Weakly Coupled Free Fermionic Heterotic String Gauge Group Statistics</i> | 2009 |
| Richard Obousy, PH.D. Dissertation: <i>Investigations into Compactified Dimensions: Casimir Energies and Phenomenological Aspects</i> | 2008 |
| Ben Dundee, M.S. Thesis: <i>Grand Unified Theories in Higher Dimensions</i> | 2006 |
| John Perkins, PH.D. Dissertation: <i>Aspects of String Phenomenology at the Self-Dual Radius</i> | 2005 |

SELECTED EMPLOYERS OF PH.D. & M.S. GRADUATES

Mitre; Advanced Micro Devices; Global Foundries; Fincad Software; Noesis Energy;
U.S. Department of Defense; U.S. State Department; ExoAnalytiic Solutions;
Sandia National Labs

TEACHING EXPERIENCE

| | |
|---|-----------|
| BIC 4389: Senior Capstone- <i>Scripture, Cosmology, & Creation</i> | 2004–2010 |
| HON 3200-3201: Honors Colloquium | 2002– |
| PHY 6V99: Dissertation in Superstrings | 2002– |
| PHY 5V99: Thesis Research in Superstrings | 2002– |
| PHY 5V95: Graduate Research in Superstrings | 2002– |
| PHY 6373-6375: Quantum Field Theory I-III | 2004– |
| PHY 5381: Special Topics: String Cosmology | 2008 |
| PHY 5370-5371: Quantum Mechanics I-II | 2001– |
| PHY 4373: Intro Nuclear & Particle Physics | 2002– |
| PHY 3372-3373: Intro Quantum Mech I-II | 2002– |
| PHY 1420-1430: General Physics I-II | 2001– |
| PHY 1408-1409: General Physics for Natural and Behavioral Sciences I-II | 2018– |
| PHY 1401: General Physics (<i>Kingwood College</i>) | 2001 |
| PHY 201: University Physics (<i>Texas A & M Univ.</i>) | 2001 |
| PHY 218: Mechanics | 2000 |

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ADDITIONAL ACADEMIC EXPERIENCE

Baylor Physics Department:

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| Chair, Preliminary Exam Committee | 2007–2008, 2013–2014 |
| Chair, Outstanding Faculty and Staff Committee | 2011–2012 |
| Chair, Cosmology and Gravitation Display Committee | 2011 |
| Chair, Astrophysics and Astronomy Brochure Committee | 2011 |
| Co-Chair, Tenure-Track Faculty Searches | 2007–2009 |
| Chair, Faculty Scholarship & Recognition Committee | 2007–2008 |
| Chair, High Energy Physics 2012 Committee | 2005–2010 |
| Graduate Program Committee | 2003–2013 |
| Undergraduate Program Committee | 2003–2006 |
| Chair, Committee for Guidelines for Scholarly Contribution | 2002–2004 |

Baylor University:

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| Chair, University Research Misconduct Investigation Committee | 2021–2022 |
| Undergraduate Research and Scholarship Achievement Committee | 2020– |
| Illuminate Strategic Plan Human Flourishing, Leadership, & Ethics Sub-Committee | 2018–2020 |
| Illuminate Strategic Plan Faculty Design Team | 2018 |
| Human Flourishing Research Proposal Committee–Directing Technology and Work Focus | 2017–2018 |
| STEM/Humanities Symposium Committee | 2017–2018 |
| (Chair), University Tenure Committee | 2014–(2017) |
| Advisory Board, Baylor Institute for Faith and Learning | 2014–2016 |
| Advisory Board, BU Library & ITS | 2011–2014 |
| BU POD Coordinating Committee | 2011–2014 |
| BU Ad Hoc HEB Scholarship Committee | 2010–2015 |
| Faculty Advisor, Sigma Phi Epsilon Fraternity | 2014–2016 |
| Faculty Advisor, Baylor University Student Branch of the American Scientific Affiliation | 2008–2015 |
| Faculty Advisor, BU Shotokai Club | 2007–2012 |
| Faculty Senate Ad Hoc Committee for Review of Faculty Advancement Requirements | 2007–2008 |
| Director, Annual Baylor Boy Scout Merit Badge College | 2007–2015 |
| Crane Scholar Mentor | 2005–2006 |
| Honors College Honors Program Committee | 2004–2007 |
| College of Arts & Science Academic Computing Committee | 2003–2007 |
| Honors College Dean Search Committee | 2002–2004 |
| Dirac Centenary Conference Organizing Committee | 2001–2002 |
| Math, Science, and Engineering Proposed Joint Research Committee | 2001–2003 |

National & International:

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|---|-----------------|
| Board of Advisers, Rampart Communications, LLC | 2019– |
| Board of Advisers, Space Initiatives, LLC | 2018– |
| College Board/Educational Testing Service Consultant | |
| AP Physics I Development Committee | 2017–2020 |
| AP Physics I Articulation Committee | 2017 |
| AP Physics II Exam ALD Validation Committee | 2016 |
| AP Physics II Exam Standards Committee | 2015 |
| AP Physics II Exam Problem Contributor | 2014, 2021 |
| AP Physics II Exam Reader | 2013, 2019– |
| Consultant for OpenStax Astronomy textbook | 2015–2016, 2021 |
| Reviewer, Pearson Education Texas K-12 Science Textbook Content | 2012–2014 |
| Texas State Review Panel for Supplementary High School Science Material | 2011 |
| Consultant, McGraw-Hill's Grade Summit Project | 2002–2005 |
| Reviewer, McGraw-Hill & Thomson Learning Physics Textbook | 2001–2006 |

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ADDITIONAL ACADEMIC EXPERIENCE cont.

NASA Blue Ribbon Panel for Review of Advanced Propulsion Projects 2014-2015
International Advisory Board, **Journal of the British Interplanetary Society** 2013–
Editor, **Heliyon Physics; Universe** (Field Theory Section) 2018–
Editorial Board, **Symmetry; Quantum Reports; Sci**
Guest Editor, **Advances in Mathematical Physics; Galaxies; Universe; Sci**
Referee for **Proceedings of the Royal Society A; Physical Review Letters; European Physical Journal C; General Relativity and Gravity; Classical and Quantum Gravity; Journal of High Energy Physics; Modern Physics Letters A; Universe; Particles; Physics; Entropy; International Journal of Modern Physics A; Journal of Physics A; Journal of Physics G; Symmetry; Sci; Physics Essays; Journal of the British Interplanetary Society; Acta Astronautica; Mathematics; Journal of Computer Mathematics; Cryptography; Computation; Information; Applied Sciences**

PHYSICS CONFERENCE/WORKSHOP PRESENTATIONS

Southwest Data Science Conference, 2022, (2 Presentations), Waco, TX, March, 2022
NASA/Tennessee Valley Interstellar Workshop, (Invited Speaker), Wichita, KA, November, 2019.
NASA-Johnson Space Center, (Invited Speaker), Houston, TX, September, 2019.
IGC@25 Multi-messenger Astronomy, State College, PA, June, 2019.
Loops '19, State College, PA, June, 2019.
American Physical Society, (3 Ph.D. Student Presentations & 1 Poster), Denver, CO, April, 2019.
Big Data and its Moral Implications, (Invited Speaker), Bar Ilan U., Israel, Mar, 2018.
Ad Astra Workshop, (Invited Plenary), Apr 2016, Wichita, KS, Apr 2016.
Tennessee Valley Interstellar Workshop, (Invited Plenary), Feb 2016, Chattanooga, TN, Feb 2016.
Army Research Lab Modern Topics in Energy and Power Meeting, Washington, D.C., Jul 2015.
Starship Congress, Dallas, TX, Aug 2013,
String Phenomenology 2012, Cambridge, England, 2012.
PASCOS 2012, (3 Ph.D. Student Speakers), Merida, Mexico, Jun, 2012
Texas Section APS 2011, (2 Ph.D. Student Speakers), Commerce, TX, 2011.
String Vacuum Project III, (3 Ph.D. Speakers), Columbus, OH, Nov 2010.
String Vacuum Project II, Santa Barbara, CA, May 2010,
Strings 2010, College Station, TX, Mar 2010.
Second Texas Cosmology Network Meeting, Austin, TX, Oct 2009,
Interconnection Between Particle Physics and Cosmology, (Plenary Speaker), Norman, OK, May 2009.
Strings 2008, CERN, Geneva, Switzerland, Aug 2008.
APS 2008, Dallas, TX, Apr 2008.
String Vacuum Project, Tucson, AZ, Apr 2008.
Texas Section of the American Physical Society '04, College Station, TX, Oct 2007.
Planck '07, (Invited), Warsaw, Poland, Jun 2007.
Origins of Dark Energy, Ontario, Canada, May 2007.
Particles, Strings & Cosmology '06, Columbus, OH, Sep 2006.
String Phenomenology '06, (Invited), Santa Barbara, CA, Aug–Sep 2006.
Texas Section of the American Physical Society '04, Waco, TX, Oct 2004.
String Phenomenology '04, Ann Arbor, MI, Aug 2004.
American Physical Society April Meeting, Denver, CO, May 2004.
Strings and Cosmology, College Station, TX, Mar 2004.
String Phenomenology '03, Durham, England, Jul 2003.
World Space Conference/COSPAR Houston, TX, Oct 2002.
Dirac Centenary Conference, Waco, TX, Sep–Oct 2002.
String Phenomenology '02, (Invited), Oxford, England, Jul 2002.
Division of Particles & Fields '00, Columbus, OH, Aug 2000.
Texas Section of the American Physical Society '00, College Station, TX, Mar 2000.
Particles, Strings & Cosmology '99, Lake Tahoe, CA, Dec 1999.

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SCIENCE, PHILOSOPHY, & THEOLOGY INTERFACE ACTIVITIES (SINCE 2000)

- PurposeNation** Podcast Interview, Sending Microchips to the Stars on Laser Beams 2017
Evangelizing Science <https://www.purposenation.org/podcast>, 11/15/17.
- SparkDialog** Podcast Interview, World Upon World, Universe Upon Universe 2017
The Multiverse and Its Meaning, <https://sparkdialog.com/universe-upon-universe/> 2/28/17.
- Invited Author, *Multiverse Theories: Philosophical and Religious Perspectives* for the **Oxford Research Encyclopedia of Religion** 2016
- Invited Blog Author, Biologos website 2012, 2015
- Consultant & Ghost Writer for **The Crossroads of Science and Faith: Astronomy Through a Christian Worldview** 2012–2014
- Scientific Consultant for *The Clergy Letter Project* Coordinated by Michael Zimmerman 2009–
- Symposium Developer, *String Theory & the Multiverse: Philosophical & Theological Implications*, Wheaton College 2008
- Co-PI for Baylor’s Proposal for Templeton Foundation’s *Science for Ministry* Program 2008
- Book Reviewer, *Perspectives on Science and Christian Faith* 2007–
- Program Developer & Scientist in Residence, Evangelical Lutheran Church of America’s Summer Theological Institute *Christianity in the Age of Scientific Discovery* 2007
- John Templeton Foundation Grant Recipient for *Baylor Society for Conversations in Religion, Ethics, & Science Templeton LSI* 2005–2010
- John Templeton Foundation Grant Recipient for ASA/JTF Science & Theology Lecture Series 2003–2004
- Reviewer, Theology and Science Textbook for American Scientific Affiliation 2001–2003
- Referee for **Perspectives on Science and Christian Faith; Theology and Science; International Journal of Christianity and Education**

SCIENCE, PHILOSOPHY, & THEOLOGY PRESENTATIONS

- “The James Webb Space Telescope and Cosmology”, 3 Lectures at First Presbyterian Church of Waco, Sep, 2022.
- “Cosmology Theology”, (Invited Speaker/Interviewee) Thursday in the City, First Baptist Church San Antonio, May 2019.
- “Multiverse Creation Theology and the Stewardship of Sentient Beings”, *Stewardship of Creation*, Baylor IFL Conf., Sep, 2018.
- “Stringy Big Data and the Scientific Method” (Invited), *Computing Morality: Big Data and its Ramification for Science and Religion*, Bar Ilan U., Israel, Mar, 2018.
- “Is Another Reformation Needed? The State of Evangelical Churches Two Decades After ‘Scandal of the Evangelical Mind’”, *Reformation and the Modern Church*, Baylor IFL Conf., Oct, 2017.
- “Higher Learning and the Missions of the Christian University”, *Higher Learning*, Baylor IFL Conf., Oct, 2016.
- “Multiverse: Philosophical and Theological Perspectives” (Invited), *2016 Symposium on the Theological Interpretation of Scripture*, North Park Theological Seminary, Chicago, IL, Sep, 2016.
- “Multiverse: God’s Indeterminacy in Action”, **ASA 2015**, Tulsa, OK, Jul, 2015.
- “The Beauty, Order, and Complexity of Creation” (Invited) *Campus Edge Ministries Conf.*, East Lansing, MI, Oct, 2012
- “Philosophical and Theological Implications of a Multiverse” (Invited), Faraday Center, Cambridge, Jun, 2012 & Michigan State University, Oct, 2012
- “The String Multiverse, the Cosmological Anthropic Principle, and Anselm’s Ontological Argument”, *ASA 2009*, Waco, TX, Aug, 2009.
- “The Whole Story of the Multiverse in String Cosmology” (Invited), *Metanexus 2009*, Tempe, AZ, Jul, AZ, Jul, 2009.
- “Science and Faith: Breaking Down the Wall”, Coordinating Staff and Speaker. BU Center for Ministry Effectiveness. Presented at 6 Baptist Churches, 2009–2012.
- “God of a Stringy Multiverse” (Invited), *Workshop on Cosmology and Theology*, Wheaton Science Station, Aug, 2008.

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SCIENCE, PHILOSOPHY, & THEOLOGY PRESENTATIONS cont.

- “String Theory & the Multiverse: Philosophical and Theological Implications” (Invited), *Cosmology and Theology*, Wheaton College, Mar, 2008.
- “The New Cosmology and the Glory of God’s Creation” (Featured Speaker), *Faith and Faithfulness: Christianity in the Age of Scientific Discovery*, Seguin, TX, Jul, 2007.
- “Before the Big Bang: String Theory, God, and the Origin of the Universe”, **Metanexus ’06**, Philadelphia, OH, Jun, 2006.
- “String Cosmology: God’s Blueprint for Creation?” (Invited), *ASA 2003*, Lakewood, CO, Jul, 2003; *NFLC*, Washington, D.C., Jun, 2004, & *Intl. Inst. for Christian Studies 2005*, Kansas City, MO, Jul, 2005

FUNDING HISTORY

Grants & Funding Received/In Process:

| | |
|--|-----------|
| University Research Committee Spring Semester Research Sabbatical Grant, \$53,000 | 2020 |
| University Research Committee Summer Research Sabbatical Grant, \$20,000 | 2019 |
| University Research Committee Grant, \$3000 | 2018-2019 |
| University Research Committee Grant, \$2000 | 2017-2018 |
| University Research Committee Grant, \$5000 | 2016-2017 |
| URSA Summer Grant, \$3200 | 2015 |
| University Research Committee Research Sabbatical Grant, \$42,000 | 2014 |
| “Randomness as Indeterminism in Nature: Scientific Warrants and Theological Assessments,” (with CTNS) John Templeton Foundation (JTF) Grant, \$200,000 | 2013–2015 |
| University Research Committee Grant, \$5000 | 2012 |
| University Research Committee Summer Research Sabbatical Grant, \$16,000 | 2011 |
| University Research Committee Summer Research Sabbatical Grant, \$15,000 | 2009 |
| University Research Committee Grant, \$4000 | 2008 |
| Baylor Society for Conversations in Religion, Ethics, and Science, Metanexus LSI, (w/ S. Bratton, Chair of Dept. of Environmental Science) JTF Grant, \$15,000 | 2005–2008 |
| American Scientific Affiliation/JFT Lecture Series, JTF Grant, \$5000 | 2003–2004 |
| Baylor Postdoctoral Funding Grant, \$100,000 | 2001–2004 |

FELLOWSHIPS, SCHOLARSHIPS, & HONORS

| | |
|--|-----------|
| Fellow, The Kirby Laing Centre, Cambridge, England | 2022– |
| District Award of Merit, Boy Scouts of America | 2012 |
| Fellow of the American Scientific Affiliation | 2009– |
| Sigma Xi Science Honor Society | 2000– |
| Sigma Rho Phi Science & Theology Honor Society | 2000– |
| Mensa Society Graduate Fellowship | 1986 |
| Presidential and University Scholarships | 1981–1985 |
| Graduating Physics Student of the Year | 1985 |
| Honors College Outstanding Senior Class Thesis | 1985 |
| Senior and Class Honors | 1981–1985 |
| Mortar Board, Membership Chairman | 1984 |
| Lumina Award for Academic Excellence | 1983 |
| Sigma Pi Sigma Physics Honor Society | 1982– |
| Alpha Lambda Delta Freshman Honor Society | 1982– |
| Prometheus Society; Triple-9 Society; Mensa | 1982– |
| International Society for Philosophical Enquiry | 1982– |
| National Dean’s List, National Merit Scholar | 1981–1985 |
| Valedictorian, Westside H. S., Omaha | 1981 |

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PROFESSIONAL SOCIETIES

American Physical Society
Mathematical Association of America
American Association of Physics Teachers
American Association for the Advancement of Science
American Scientific Affiliation (Fellow)
Center for Theology and the Natural Sciences
American Association of Independent Investors

INTERESTS & HOBBIES

Scouting Program (Eagle Scout)
Local, Regional, and State Sci-Eng Fair Judge
Radio Controlled Model Airplanes
Small Boat Sailing, SCUBA, Snow Skiing

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PEER-REVIEWED PHYSICS PUBLICATIONS

80. W. Julius, M. Gorban, J. Lee, L. Littlejohn, and G. Cleaver, *An Analysis of the Digit Pair Entropy of Large Numbers*, In Preparation for submission to **Experimental Mathematics**.
79. M. Gorban, W. Julius, B. Shakerin, and G. Cleaver, *The Weyl curvature conjecture and the gravitational entropy for evolving wormholes*. In preparation for submission to **General Relativity and Gravity**.
78. B. Mattingly, W. Julius, M. Gorban, J. Lee, and G. Cleaver, *An Investigation of Quaternion Julia Encryption*. Submitted to **Journal of Cybersecurity and Privacy**.
77. C. Watson, W. Julius, M. Gorban, W. Julius, D. McNutt, E. Davis, and G. Cleaver, *An Invariant Classification of Levi-Civita Spacetimes*. **Symmetry** **13** (2021) 1469 (special issue invited paper); arXiv:2107.10360
76. D. McNutt, W. Julius, M. Gorban, B. Mattingly, and G. Cleaver, *Geometric surfaces: An invariant characterization of spherically symmetric black hole horizons and wormhole throats*, **Physical Review D****103** (2021) 124024; arXiv:2104.08935 [gr-qc].
75. B. Mattingly, A. Kar, M. Gorban, W. Julius, C. Watson; M.D. Ali, A. Baas, C. Elmore, J. Lee, B. Shakerin, E. Davis, and G. Cleaver, *Curvature Invariants for the Alcubierre and Natário Warp Drives*, **Universe** **7** (2021) 2, 21.
74. B. Mattingly, A. Kar, M. Gorban, W. Julius, C. Watson; M.D. Ali, A. Baas, C. Elmore, J. Lee, B. Shakerin, E. Davis, and G. Cleaver, *Curvature Invariants for the Accelerating Natário Warp Drive*, **Particles** **3** (2020) 642-659; arXiv:2008.03366.
73. B. Mattingly, A. Kar, M.D. Ali, A. Baas, C. Elmore, C. Watson, S. Shakerin, E. Davis, and G. Cleaver, *Curvature Invariants for Lorentzian Traversable Wormholes*, [gr-qc]. **Universe** **6** (2020) 1, 10; arXiv:1806.10985.
72. J. Lee and G. Cleaver, *Investigation of the Quantum Vacuum as an Energy Sink for Subcritical and Supercritical Vaporization Lasers*, **Heliyon** **6** (2020) e03210; arXiv:1804.07157.
71. B. Lee, T. Zhu, A. Wang, K. Kirsten, G. Cleaver, Q. Sheng and Q. Wu, *Pre-inflationary perturbations from the closed algebra approach in loop quantum cosmology*, **Physical Review D****99** (2019) 10, 103536; arXiv:1812.11191 [gr-qc].
70. T. Zhu, A. Wang, K. Kirsten, G. Cleaver, Q. Sheng and Q. Wu, *Primordial non-Gaussianity and power asymmetry with quantum gravitational effects in loop quantum cosmology*, **Physical Review D****97** (2018) 4, 043501; arXiv:1705.07544 [gr-qc].
69. T. Zhu, A. Wang, G. Cleaver, K. Kirsten, and Q. Sheng and Q. Wu, *Pre-inflationary universe in loop quantum cosmology*, **Physical Review D****96** (2017) 083520; arXiv:1705.07544. [gr-qc].
68. A. Borzou, G. Cleaver, and B. Mirza, *Lorentz Gauge Theory of Gravity in Electron Positron Colliders*, **Classical and Quantum Gravity** **34** (2017) 22, 225013; arXiv:1705.07525 [gr-qc].
67. Y. Deng and G. Cleaver, *Hawking Radiation from Regular Black Hole as a Possible Probe for Black Hole Interior Structure*, **International Journal of Theoretical Physics** **56** (2017) 741; arXiv:1602.06036 [gr-qc].
66. J. Lee and G. Cleaver, *White Holes as the Asymptotic Limit of Evaporating Primordial Black Holes*, **International Journal of Modern Physics A****31** (2016) 30, 1650162; arXiv:1602.05505.
65. T. Zhu, A. Wang, G. Cleaver, K. Kirsten, and Q. Sheng and Q. Wu, *Universal features of quantum bounce in loop quantum gravity*, **Physics Letters B****773** (2017) 196-202; arXiv:1607.06329.

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PEER-REVIEWED PHYSICS PUBLICATIONS cont.

64. T. Zhu, A. Wang, G. Cleaver, K. Kirsten, Q. Sheng and Q. Wu, *High-Order Primordial Perturbations with Quantum Gravitational Effects*, **Physical Review D****93** (2016) 12, 123525; arXiv:1604.05739 [gr-qc].
63. J. Lee and G. Cleaver, *Exclusion of the Magnus Effect as a Mechanism for Shotgun Pellet Dispersion*, **SCIREA Journal of Physics** **2** (2017) 9.
62. T. Zhu, A. Wang, G. Cleaver, K. Kirsten, Q. Sheng and Q. Wu, *Inflationary spectra with inverse-volume corrections in loop quantum cosmology and their observational constraints from Planck 2015*, **Journal of Cosmology and Astroparticle Physics** **03** (2016) 046; arXiv:1510.03855 [gr-qc].
61. J. Lee and G. Cleaver, *The Cosmic Microwave Radiation Power Spectrum as a Random Bit Generator for Symmetric and Asymmetric-Key Cryptography*. **Heliyon** **3** (2017) e00422; arXiv:1508.04817 [cs.crypt];
60. T. Zhu, A. Wang, G. Cleaver, K. Kirsten, and Q. Sheng, *Scalar and tensor perturbations in loop quantum gravity: high-order corrections*, **Journal of Cosmology and Astrophysics** **1510** (2015) 10, 052; arXiv:1508.03239 [gr-qc].
59. J. Lee and G. Cleaver, *Black Suns: Ocular Invisibility of Relativistic Luminous Astrophysical Bodies*, **Journal of High Energy Physics, Gravitation & Cosmology** **2** (2016) 562; arXiv:1508.04817 [phys.gen-ph].
58. J. Lee and G. Cleaver, *Apparent Ultra-Relativistic Density Inflation of Astrophysical Bodies into Apparent Black Stars*, **Journal of Applied Physical Sciences International** **9** (2017) 51-53.
57. J. Lee and G. Cleaver, *Relativistic Drag and Emission Pressure in an Isotropic Photonic Gas*, **Modern Physics Letters A****31** (2016) 1650118; arXiv:1508.00534 [gr-qc].
56. J. Lee and G. Cleaver, *Relativistic Blackbody Spectrum in Inertial and Non-Inertial Reference Frames*, **New Astronomy** **52** (2017) 20; arXiv:1507.06663 [gr-qc].
55. T. Zhu, A. Wang, G. Cleaver, K. Kirsten, and Q. Sheng, *Detecting quantum gravitational effects of loop quantum cosmology in the early universe*, **Astrophysical Journal** **807** (2015) 1, L17; arXiv:1503.06761 [astro-ph.CO]
54. T. Zhu, A. Wang, G. Cleaver, K. Kirsten, and Q. Sheng, *Power Spectra and Spectral Indices of k -inflation: Higher-Order Corrections*, **Physical Review D****90** (2014) 103517; arXiv:1407.8011 [astro-ph.CO]
53. J. Lee and G. Cleaver, *Ultra-Relativistic Thermodynamics and Aberrations of the Cosmic Microwave Background Radiation*, **Modern Physics Letters A****30** (2015) 1550045.
52. J. Lee and G. Cleaver, *Effects of External Radiation on an Alcubierre Warp Bubble*, **Physics Essays** **29** (2016) 201.
51. J. Lee and G. Cleaver, *The Inability of the White-Juday Warp Field Interferometer to Spectrally Resolve Spacetime Distortions*, **International Journal of Modern Physics: Advances in Theory and Application** **2** (2017) 35; arXiv:1407.7772.
50. X. Wang, J. Yang, M. Tian, A. Wang, Y. Deng, and G. Cleaver, *Effects of Higher-Operators in Non-Relativistic Lifshitz Holography*, **Physical Review D****91** (2015) 6, 064018; arXiv:1407.1194.
49. T. Zhu, A. Wang, G. Cleaver, K. Kirsten, and Q. Sheng, *Gravitational Quantum Effects on Power Spectrum and Spectral Indices with Higher-Order Corrections*, **Physical Review D****90** (2014) 06350; arXiv:1405.5301.
48. T. Zhu, A. Wang, G. Cleaver, K. Kirsten, and Q. Sheng, *Inflationary Cosmology with Non-Linear Dispersion Relations*, **Physical Review D****89** (2104) 043507; arXiv:1308.5708.

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PEER-REVIEWED PHYSICS PUBLICATIONS cont.

47. T. Zhu, A. Wang, G. Cleaver, K. Kirsten, and Q. Sheng, *Constructing Analytical Solutions of Linear Perturbations of Inflation with Modified Dispersion Relations*, **International Journal of Modern Physics A29** (2014) 14501; arXiv:1308.1104.
46. D. Moore, J. Greenwald, and G. Cleaver, *Gauge Models in D Dimensions*, **Modern Physics Letters A** (2013) 1350055; arXiv:1302.5353.
45. J. Greenwald, D. Moore, T. Renner, and G. Cleaver, *Initial Systematic Investigation of the Landscape of Low Layer NAHE-Variation Extensions*, **ISRN High Energy Physics** (2013) 595070; arXiv:1111.1917.
44. J. Greenwald, D. Moore, T. Renner, and G. Cleaver, *Initial Systematic Investigation of the Landscape of Low Layer NAHE Extensions*, **European Physical Journal C72** (2012) 2167; arXiv:1111.1263.
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