

KAĆA BRADONJIĆ

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Research Interests General Relativity · Foundations of Physics · Philosophy of Physics
Intersections of Physics and Visual Art

Education BOSTON UNIVERSITY May 2012
Ph.D. in Physics
Dissertation: “Unimodular Conformal and Projective Relativity”
Advisor: John Stachel

NORTHEASTERN UNIVERSITY June 2004
B.S. in Physics and Philosophy

Employment

VISITING ASSISTANT PROFESSOR OF PHYSICS, HAMPSHIRE COLLEGE 2016 – Present

VISITING LECTURER OF PHYSICS, WELLESLEY COLLEGE 2012 – 2016

CONTENT DEVELOPER FOR MITX (SHORT CONTRACT), MIT 2016
Created animations and questions for the MIT 8.01x, edX course on introductory physics, and worked with the instructors to effectively implement visual content into assessments of students’ learning.

WRITING INSTRUCTOR, BOSTON UNIVERSITY 2009–2012
Designed and taught science-focused interdisciplinary writing seminars in the Writing Program, facilitated seminar discussions, provided written and oral feedback on students’ papers.

TEACHING FELLOW IN PHYSICS, BOSTON UNIVERSITY 2005–2010
Taught discussion sections and laboratories for the introductory physics courses for scientists, engineers, and non-science majors.

NSF GK-12 FELLOW, BOSTON UNIVERSITY 2008–2009
Assisted high-school classroom physics instruction by presenting science demonstrations and helping students with in-class assignments and activities.

CORE CURRICULUM NATURAL SCIENCES INSTRUCTOR, BOSTON UNIVERSITY 2007
Taught discussion sections for the Core Natural Science course “CC105: Evolution of the Universe and the Earth,” a survey course in astronomy, physics, chemistry, and earth science aimed to give a general science background to non-science majors.

RESEARCH ASSISTANT, BOSTON UNIVERSITY 2006
Supervisor: Glynn Holt
Performed experimental study of sonoluminescence under various laboratory conditions.

RESEARCH ASSISTANT, NORTHEASTERN UNIVERSITY 2004–2005
Supervisors: Ronald Aaron and Carl Shiffman
Studied the effects of age on the electrical impedance myography of human muscle, organized and analyzed data, ran computer simulations using RC circuits as models of muscle tissue.

- Publications** GENERAL RELATIVITY AS A UNIMODULAR THEORY
Bradonjić, K. Under review.
- DIFFERENTIAL FORMS AS A SUPPLEMENTARY FRAMEWORK FOR TEACHING UPPER-DIVISION ELECTROMAGNETISM
Bradonjić, K., McKenzie, D., and Begović, J. In preparation.
- QUANTUM GRAVITY: MEANING AND MEASUREMENT
 Stachel, J. and **Bradonjić, K.**, Studies in History and Philosophy of Science Part B: Studies in History and Philosophy of Modern Physics, 46, 209-216, **2014**. [arXiv:1302.2285]
- UNIMODULAR CONFORMAL AND PROJECTIVE RELATIVITY: AN ILLUSTRATED INTRODUCTION
Bradonjić, K., Frontiers of Fundamental Physics and Physics Education Research: Springer Proceedings in Physics, 145, 197-203, **2014**.
- QUANTUM MEASUREMENT AND THE AHARONOV-BOHM EFFECT WITH SUPERPOSED MAGNETIC FLUXES **Bradonjić, K.** and Swain, J., Quantum Information Processing, 13(2), 323-331, **2013**. [arXiv:1103.1607]
- UNIMODULAR CONFORMAL AND PROJECTIVE RELATIVITY
Bradonjić, K. and Stachel, J., Europhysics Letters, 97(1), 10001, **2011**. [arXiv:1110.2159]
- ON SPACETIME GEOMETRY ABOVE THE ELECTROWEAK SYMMETRY BREAKING SCALE.
Bradonjić, K., Preprint. **2011**. [arXiv:1103.5164]
- THE CASIMIR EFFECT IN BIOLOGY: THE ROLE OF MOLECULAR QUANTUM ELECTRODYNAMICS IN LINEAR AGGREGATIONS OF RED BLOOD CELLS
Bradonjić, K., Swain, J. D., Widom, A. and Srivastava, Y., Journal of Physics: Conference Series, 161 012035, **2009**. [http://m.iopscience.iop.org]
- RELATIVITY OF MUSICAL MOOD.
Bradonjić, K., Preprint. **2008**. [arXiv.org:0807.2493]
- EFFECTS OF AGE ON MUSCLE AS MEASURED BY ELECTRICAL IMPEDANCE MYOGRAPHY
 Aaron, R., Shiffman, C. A., Esper, G. J., **Bradonjić, K.**, Lee, K. S., Rutkove, S. B. Physiological Measurement, 10(2), 953-959, **2006**.
- Invited Talks** MATH AS THE LANGUAGE OF PHYSICS: WHAT IS LOST IN TRANSLATION?
Physics Department Colloquium, Mount Holyoke College, South Hadley, MA. November 7, **2017**.
- MATH AS THE LANGUAGE OF PHYSICS: WHAT IS LOST IN TRANSLATION?
Physics Department Colloquium, Amherst College, Amherst, MA. October 24, **2017**.
- FLASH TALK ON PERSPECTIVE
Teaching Visuality in the 21st Century, a symposium organized by the Five College Blended Learning project, Hampshire College, Amherst, MA. March 23-24, **2016**.
- LESS IS MORE: THE ADVANTAGES OF UNIMODULAR INVARIANCE
Gravity and Geometry: Centenary Perspectives on General Relativity, Rotman Institute of Philosophy, Western University, London, ON. June 6-7, **2015**.
- MEANING AND UTILITY OF UNIMODULAR INVARIANCE
Seminar talk. Department of Physics, Dartmouth College. Hanover, NH. January 20, **2014**.
- UNIMODULAR CONFORMAL AND PROJECTIVE RELATIVITY
Geometry and Physics: International Fall Workshop, Paris, France. November 28-29, **2013**.

TO QUANTIZE OR NOT TO QUANTIZE: UNIMODULAR CONFORMAL AND PROJECTIVE RELATIVITY LETS US PICK AND CHOOSE.

An Intellectual Life across Disciplines: Colloquium in Honour of John Stachel's 85th Birthday, Max Planck Institute for the History of Science, Berlin, Germany. September 12-13, **2013**.

UNIMODULAR CONFORMAL AND PROJECTIVE RELATIVITY AND THE COMPATIBILITY OF CAUSAL AND DYNAMICAL STRUCTURES

The 40th Anniversary of the First Osgood Hill Conference on Quantum Gravity, Boston, MA. October 15, **2012**.

Contributed Talks

ON UNIMODULAR INVARIANCE

20th Eastern Gravity Meeting, Penn State, State College, PA June 9-10, **2017**.

DIFFERENTIAL FORMS AS A SUPPLEMENTARY FRAMEWORK FOR TEACHING UPPER-LEVEL ELECTRICITY AND MAGNETISM

AAPT Winter Meeting, New Orleans, LA. January 9-12, **2016**.

UNIMODULAR CONFORMAL AND PROJECTIVE RELATIVITY

7th Texas Symposium on Relativistic Astrophysics, Dallas, TX. December 8-13, **2013**.

UNIMODULAR CONFORMAL AND PROJECTIVE RELATIVITY IN THE MASSLESS REGIME

15th Annual East Coast Gravity Meeting, Syracuse, New York. April 21, **2012**.

UNIMODULAR CONFORMAL AND PROJECTIVE RELATIVITY.

Twelfth International Symposium: Frontiers of Fundamental Physics (FFP12), Udine, Italy. November 23, **2011**.

Teaching

Hampshire College

·NS-0204, PHYSICS I: CLASSICAL AND QUANTUM MECHANICS WITH LAB Fall 2019

·NS-0205, PHYSICS II: FUNDAMENTALS OF ELECTRICITY AND MAGNETISM WITH LAB

Spring 2019, 2020

·NS-0338, THERMAL PHYSICS

Spring 2018

·NS-0206, MODERN PHYSICS

Fall 2018

·NS-0183/NS-0383, BASIC PHYSICS: QUANTUM MECHANICS FOR THE MYRIAD

Fall 2016

·NS-0113, PHYSICS OF COLOR (IN THE CONTEXT OF THE VISUAL ARTS)

Fall 2019

Spring 2017, 2018, 2019

·NS-0103, THE SCIENCE OF SPACE AND TIME

Fall 2017,2018

·NS-0274, LINEAR ALGEBRA

Fall 2016

·NS-0213, SYMMETRIES OF NATURE: AN INTRODUCTION TO GROUP THEORY

Spring 2017

·NS-0200-13, INDEPENDENT STUDY: GROUP THEORY

Fall 2016

·NS/HACU-0243, ON WHAT THERE IS: PHYSICS AND METAPHYSICS

Spring 2020

Co-taught with Chirstoph Cox

·NS-0208, SCIENCE IN A CULTURAL CONTEXT

Fall 2017

·NS-0200-24, INDEPENDENT STUDY:ORCHESTRATED OBJECTIVE REDUCTION

Spring 2017

Wellesley College

·PHYSICS 101, EINSTEIN'S CENTURY: PHYSICS IN THE LAST 100 YEARS

Spring 2016

·PHYSICS 250H, INDEPENDENT STUDY IN GENERAL RELATIVITY

Spring 2016

·PHYSICS 302, QUANTUM MECHANICS

Fall 2015

·PHYSICS 108, PRINCIPLES AND APPLICATIONS OF ELECTRICITY, MAGNETISM, & OPTICS <i>Lab</i>	Spring 2014
·PHYSICS 106, FUNDAMENTALS OF ELECTRICITY, MAGNETISM, & OPTICS <i>Lecture</i>	Fall 2012, 2015
<i>Lab</i>	Spring 2013, 2014, 2015, 2016
<i>Lab</i>	Spring 2014, 2015
·PHYSICS 104, FUNDAMENTALS OF MECHANICS <i>Lecture</i>	Fall 2012, 2013, 2014
	Summer 2013, 2015
	Spring 2013
<i>Lab</i>	Fall 2013, 2014

Boston University

·WR100, WRITING SEMINAR, SPACE AND TIME: COMMON SENSE AND BEYOND	Fall 2009, 2010, 2011
·WR150, WRITING AND RESEARCH SEMINAR:	Spring 2010, 2011, 2012

**Leadership
& Service**

FACULTY ADVISER	
Math & Physical Sciences Student Interest Group, Hampshire College	2016–2019
Society of Physics Students, Wellesley College	2015–2016
SCIENCE CENTER SUMMER RESEARCH COMMITTEE, WELLESLEY COLLEGE	2015
PHYSICS GRE REVIEW FOR MAJORS, WELLESLEY COLLEGE	2012–2013
VICE-PRESIDENT, BOSTON UNIVERSITY WOMEN IN PHYSICS STUDENT ORGANIZATION	2009–2010
ORGANIZING CHAIR, NEW ENGLAND PHYSICS TEACHING ASSISTANTS' FORUM Organized an AAPT-sponsored regional conference on teaching physics.	2006

Awards

PHYSICS TEACHING FELLOW OF THE YEAR, BOSTON UNIVERSITY	2007
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Outreach

“WHAT DOES PHYSICS TELL US ABOUT TIME?” SciTech Café, Northampton, MA	2/18/2018
GUEST ON <i>The Bill Newman Show</i> WHMP Radio, Northampton, MA	2/22/2019
PANELIST, APS CONFERENCES FOR UNDERGRADUATE WOMEN IN PHYSICS UMass Amherst, MA	1/19/2019
“THE PHYSICS OF COLOR” WORKSHOP, GALLERY 263 Designed and facilitated a hands-on workshop on physics of color for the general public as part of the <i>ArtWeek</i> festival.	5/5/2018
GUEST, CAMBRIDGE-HARVARD SUMMER ACADEMY Talked to high school students about careers in science.	8/6/2015
PROJECT MANAGER FOR SCIENCE, MONKS, AND TECHNOLOGY PROGRAM Mentored Tibetan students in India who worked on projects that improve science and math education in their school, including a survey of middle-school students on their attitudes toward mathematics.	2013–2015

Art & Illustration My artistic work explores the intersection of physics and art in an attempt to understand the role of symbolic representation and metaphor in these pursuits. I also illustrate texts on physics and astronomy.

GALLERY AFFILIATIONS: Gallery 263, Cambridge, MA

2013 – 2017

PUBLISHED ARTWORK

BOOK COVERS

- Dean Rickles. *Covered in Deep Mist: The Development of Quantum Gravity (1916-1956)*. Oxford University Press. 2020.
- *Why Trust a Theory? Epistemology of Fundamental Physics*, Ed. R. Dardashti, R. Dawid, and K. Thébault. Cambridge University Press. 2019.

BOOK ILLUSTRATIONS

- Lee Smolin, *Einstein's Unfinished Revolution: The Search for What Lies Beyond the Quantum*. Penguin Press. 2019.
- Kenneth R. Lang, *Life and Death of Stars*. Cambridge University Press. 2013.
- Kenneth R. Lang, *Essential Astrophysics: Undergraduate Lecture Notes in Physics*. Springer Verlag. 2013.
- Gunther Leon, *The Physics of Music and Color*. Springer. 2012.

EXHIBITS

- *And From My Brief Dream The Eternal Sun*. Solo show curated by Arlinda Shtuni for the Coro Dante Art Song Salon, Dante Alighieri Society, Cambridge, MA. 2018.
- *Members' Show*. Group exhibition. Gallery 263, Cambridge, MA. 2016.
- *Members' Show*. Group exhibition. Gallery 263, Cambridge, MA. 2015.
- *Works on Paper*. National Show juried by Al Miner. South Shore Art Center, Cohasset, MA, 2014.
- *Magic Without Tricks*. Group exhibition juried by Arlinda Shtuni. The Nave Gallery Annex, Somerville, MA. 2014.
- *Folk*. Group exhibition juried by Kate McNamara. Gallery 263, Cambridge, MA. 2014.
- *Massachusetts*. Group exhibition juried by Dina Deitsch. Gallery 263, Cambridge, MA. 2014.
- *Art/Identity*. Group exhibition juried by Group exhibition juried by Susan Sills and Geoff Hargadon. Gallery 263, Cambridge, MA. 2013.

ARTIST RESIDENCIES

- Perimeter Institute, June 5-7, 2018
- Boston University, Center for Philosophy and History of Science, October–November, 2018

COLLECTIONS

Perimeter Institute, Waterloo, ON, Canada

Languages English, Bosnian/Croatian/Serbian