

# KAĆA BRADONJIĆ

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**Research Interests**      General Relativity · Foundations of Physics · Philosophy of Physics

**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 IN PHYSICS, HAMPSHIRE COLLEGE      2016 – Present

VISITING LECTURER OF PHYSICS, WELLESLEY COLLEGE      2012 – 2016  
Taught across the curriculum and supervised student projects.

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

FREELANCE ILLUSTRATOR      2010-Present  
Creating visual content for astronomy and physics textbooks.

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.

PHYSICS TUTOR, SUMMER BRIDGE PROGRAM, BOSTON UNIVERSITY      2009  
Assisted with labs, and held reviews, tutoring sessions, and office hours for a summer program which prepares first-generation college students wanting to major in sciences.

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 21<sup>st</sup> 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 85<sup>th</sup> 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 40<sup>th</sup> Anniversary of the First Osgood Hill Conference on Quantum Gravity*, Boston, MA. October 15, **2012**.

**Contributed Talks**

## ON UNIMODULAR INVARIANCE

20<sup>th</sup> 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

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

## UNIMODULAR CONFORMAL AND PROJECTIVE RELATIVITY IN THE MASSLESS REGIME

15<sup>th</sup> 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-0338, THERMAL PHYSICS	Spring 2018
NS-0113, PHYSICS OF COLOR IN THE CONTEXT OF THE VISUAL ARTS	Spring 2017, 2018
NS-0103, SCIENCE OF SPACE AND TIME	Fall 2017
NS-0208, SCIENCE IN A CULTURAL CONTEXT	Fall 2017
NS-0213, SYMMETRIES OF NATURE: AN INTRODUCTION TO GROUP THEORY	Spring 2017
NS-0200-24, INDEPENDENT STUDY: ORCHESTRATED OBJECTIVE REDUCTION	Spring 2017
NS-0274, LINEAR ALGEBRA	Fall 2016
NS-0183/NS-0383, BASIC PHYSICS: QUANTUM MECHANICS FOR THE MYRIAD	Fall 2016
NS-0200-13, INDEPENDENT STUDY: GROUP THEORY	Fall 2016

**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 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
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**Leadership & Service**

FACULTY ADVISER Math & Physical Sciences Student Interest Group, Hampshire College Society of Physics Students, Wellesley College	2016-Present 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**

A GUEST SPEAKER, CAMBRIDGE-HARVARD SUMMER ACADEMY Talked to students about what it is like to be a scientist.	August 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**

GALLERY AFFILIATIONS: Gallery 263, Cambridge, MA

2013 – 2017

ART EXHIBITS

- *And From My Brief Dream The Eternal Sun*. Curated by Arlinda Shtuni for the Coro Dante Art Song Salon, Dante Alighieri Society, Cambridge, MA. 2018.
- *Members' Show*. Group show. Gallery 263, Cambridge, MA. 2016.
- *Members' Show*. Group show. 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.

PUBLISHED ILLUSTRATIONS

- Kenneth R. Lang, *Life and Death of Stars*. Cambridge University Press: New York: 2013.
- Kenneth R. Lang, *Essential Astrophysics: Undergraduate Lecture Notes in Physics*. Springer Verlag. 2013.
- Gunther Leon, *The Physics of Music and Color*. Springer. 2012.

**Languages**

English, Bosnian/Croatian/Serbian