

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

ASSISTANT PROFESSOR OF PHYSICS, HAMPSHIRE COLLEGE 2021 – Present

VISITING ASSISTANT PROFESSOR OF PHYSICS, HAMPSHIRE COLLEGE 2016 – 2021

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, and 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 office hours for a summer program that prepares first-generation college students in sciences.

NSF GK-12 FELLOW, BOSTON UNIVERSITY 2008–2009
Assisted with physics instruction of academically struggling high-school students by helping them with in-class assignments and activities.

CORE CURRICULUM NATURAL SCIENCES INSTRUCTOR, BOSTON UNIVERSITY 2007
Taught discussion sections for 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
Performed experimental study of sonoluminescence under various laboratory conditions.

RESEARCH ASSISTANT, NORTHEASTERN UNIVERSITY 2004–2005
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 KAĆA BRADONJIĆ; THE PHENOMENAL ATLASES OF CONTEMPORARY PHYSICS: KNOWING THE IMPERCEPTIBLE.

Bradonjić, K. *Leonardo* **2023**. DOI: 10.1162/leon.a_02424

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

RETURN TO THE PHENOMENAL: AN EXPLORATION OF THE SUBJECTIVE, INTERNAL REPRESENTATIONS OF THE KNOWLEDGE OF FUNDAMENTAL PHYSICS AND THEIR RELATIONS TO THE COLLECTIVE PURSUITS OF KNOWLEDGE

Internal Discussion Seminar, Institute for Artificial Intelligence and Fundamental Interactions, MIT, Cambridge, MA. October 21, **2022**.

THE PHENOMENAL ATLASES OF PHYSICS

Physics Department Colloquium, Bard College, Annandale-On-Hudson, NY. November 11, **2022**.

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, **2017**.

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

BEYOND THE LITERAL/METAPHORICAL DICHOTOMY IN PHYSICAL SCIENCES

Science: between literal and metaphorical meanings, University of Lisbon. Lisbon, Portugal. April 20-21, **2023**.

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****Physics**

- NS-0204, PHYSICS I: QUANTUM AND CLASSICAL MECHANICS WITH LAB Fall 2019
Spring 2021, 2022
- 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, Spring 2022
- NS-0183/NS-0383, BASIC PHYSICS: QUANTUM MECHANICS FOR THE MYRIAD Fall 2016
- NS-0103, THE SCIENCE OF SPACE AND TIME Fall 2017, 2018, 2020
- NS-0125/NS-0325, ENERGY Fall 2021

Math

- NS-0274, LINEAR ALGEBRA Fall 2016, 2020

·NS-0213, SYMMETRIES OF NATURE: AN INTRODUCTION TO GROUP THEORY
Spring 2017, 2021

Interdisciplinary

·NS/HACU-0243, ON WHAT THERE IS: PHYSICS AND METAPHYSICS
Co-taught with Chirstoph Cox
Spring 2020

·NS-0113, PHYSICS OF COLOR (IN THE CONTEXT OF THE VISUAL ARTS)
Fall 2019
Spring 2017 – 2019

·NS-0208, SCIENCE IN A CULTURAL CONTEXT
Fall 2017

Independent Studies

·NS-0203, INDEPENDENT STUDY: PHILOSOPHY OF PHYSICS
Spring 2022

·NS-0300, INDEPENDENT STUDY: LINEAR ALGEBRA
Spring 2020

·NS-0300, INDEPENDENT STUDY: USING MATHEMATICA FOR TENSORIAL CALCULATIONS IN
GENERAL RELATIVITY
Spring 2018

·NS-0200-24, INDEPENDENT STUDY: ORCHESTRATED OBJECTIVE REDUCTION
Co-advised with John Castorino
Spring 2017

·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
Lab
Spring 2014

·PHYSICS 106, FUNDAMENTALS OF ELECTRICITY, MAGNETISM, & OPTICS
Lecture
Fall 2012, 2015
Spring 2013 – 2016

Lab
Spring 2014, 2015

·PHYSICS 104, FUNDAMENTALS OF MECHANICS
Lecture
Fall 2012, 2013, 2014
Summer 2013, 2015

Lab
Spring 2013
Fall 2013, 2014

Boston University

·WR100, WRITING SEMINAR, SPACE AND TIME: COMMON SENSE
AND BEYOND
Fall 2009 – 2011

·WR150, WRITING AND RESEARCH SEMINAR
Spring 2010 – 2012

Leadership & Service

FACULTY COORDINATOR (DIRECTOR) OF THE LEARNING COLLABORATIVES NETWORK
August 2021-July 2022

ACADEMIC CONTINUITY COMMITTEE
March-July 2020

AAUP WORKLOAD WORKING GROUP
June 2020

NON-TENURE-TRACK FACULTY CAUCUS
Spring 2020

	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
	CURRICULUM INNOVATION GRANT, WELLESLEY COLLEGE	Fall 2014
	Co-wrote a successful internal grant proposal for developing active-learning activities in introductory mechanics course for non-majors.	
	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	2006
	Organized an AAPT-sponsored regional conference on teaching physics.	
Awards	PHYSICS TEACHING FELLOW OF THE YEAR, BOSTON UNIVERSITY	2007
Outreach	“WHAT DOES PHYSICS TELL US ABOUT TIME?” SciTech Café, Northampton, MA	2/25/2019
	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 and with the assistance of artist Mirela Kulović.	5/5/2018
	GUEST, CAMBRIDGE-HARVARD SUMMER ACADEMY Talked to high school students about pursuing 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
	ARTIST RESIDENCIES	
	· Institute for Artificial Intelligence and Fundamental Interactions, MIT, Cambridge, MA, October 1, 2022 – Present	
	· Conference “Regular Black Holes in Quantum Gravity and Beyond: from Theory to Shadow Observations,” Virtual, October 18–21, 2021	
	· Perimeter Institute, June 5-7, 2018	
	· Boston University, Center for Philosophy and History of Science, October 2018-2021	

PUBLISHED ARTWORK

BOOK COVERS

- Gordon Belot. *Accelerated Expansion: Philosophy and Physics with a Positive Cosmological Constant*. Oxford University Press. 2023.
- Dean Rickles. *Covered with 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.

COLLECTIONS

Perimeter Institute, Waterloo, ON, Canada

Languages English, Bosnian/Croatian/Serbian