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

General Relativity as a Unimodular Theory
Bradonjić, K. Under review.

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^{st} *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 85^{th} *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^{th} *Anniversary of the First Osgood Hill Conference on Quantum Gravity*, Boston, MA. October 15, **2012**.

Contributed Talks

On Unimodular Invariance
20^{th} 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^{th} Texas Symposium on Relativistic Astrophysics, Dallas, TX. December 8-13, **2013**.

Unimodular Conformal and Projective Relativity in the Massless Regime
15^{th} 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
·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-0103, The Science of Space and Time — Fall 2017, 2018, 2020

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 — Spring 2020
Co-taught with Chirstoph Cox
·NS-0113, Physics of Color (in the Context of the Visual Arts) — Fall 2019, Spring 2017, 2018, 2019
·NS-0208, Science in a Cultural Context — Fall 2017

Independent Studies

·NS-0300, Linear Algebra — Spring 2020
·NS-0300, Using Mathematica for Tensorial Calculations in General Relativity — Spring 2018

·NS-0200-24, Independent Study:Orchestrated Objective Reduction — Spring 2017
Co-advised with John Castorino
·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, 2014, 2015, 2016
Lab — Spring 2014, 2015
·Physics 104, Fundamentals of Mechanics
Lecture — Fall 2012, 2013, 2014
Summer 2013, 2015
Spring 2013
Lab — 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

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?" 2/25/2019
SciTech Café, Northampton, MA

Panelist, APS Conferences for Undergraduate Women in Physics 1/19/2019
UMass Amherst, MA

"The Physics of Color" workshop, Gallery 263 5/5/2018
Designed and facilitated a hands-on workshop on physics of color for the general public as part of the *ArtWeek* festival and with the assistance of artist Mirela Kulović.

Guest, Cambridge-Harvard Summer Academy 8/6/2015
Talked to high school students about pursuing careers in science.

Project Manager for Science, Monks, and Technology Program 2013–2015
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.

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 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.

Artist Residencies

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

Collections

Perimeter Institute, Waterloo, ON, Canada

Languages English, Bosnian/Croatian/Serbian

Last updated July 1, 2021.