

# Curriculum Vitae

---

## TIRTHABIR BISWAS

**Assistant Professor of Physics at Loyola University**

2833 Magazine street, Apt 103

New Orleans, LA 70115

Phone: (320)292-4317

Email: [tbiswas@loyno.edu](mailto:tbiswas@loyno.edu)

### Principle Research Areas:

- Cosmology
- Gravitational Physics

### Education:

2003      PhD., Physics, Stony Brook University, NY, advisor: Warren Siegel

1998      Integrated Masters, Physics, Indian Institute of Technology, Kanpur, India

### Positions Held:

2010 – present    Assistant Professor, Loyola University, New Orleans, LA

2011 (Spring)    Visiting Assistant Professor, University of Minnesota, Minneapolis, MN

2009 – 2010      Visiting Assistant Professor, St. Cloud State University, St. Cloud, MN

2007 – 2009      Post-doctoral Fellow, Penn State University, University Park, PA

2003 – 2006      Post-doctoral Fellow, McGill University, Montreal, QC, Canada

### Grants & Awards:

- “Excellence in Research” award, 2012, College of Humanities and Natural Sciences, Loyola University
- “Bobet Fellowship”, Loyola University, 2012
- Course Development grant (jointly with some of the other science faculty), Loyola University, 2011
- “Research Competitiveness Subprogram” Grant, Louisiana Board of Regents, 2011-13. Title of Research Proposal: Numerical Explorations of the Cyclic Inflationary Model of the Early Universe  
Grant amount: \$ 34,780.
- Research and Development Grant, Fall 2010, Loyola University

- [1], [7] & [8] in my “Selected Works” list received “Honorable Mention” in the Gravity Research Foundation (GRF) Essay Competition in 2013, 2008 & 2005 respectively.

#### **Refereed for:**

- Physical Review D
- Journal of High Energy Physics (JHEP)
- Journal of Cosmology and Astroparticle Physics (JCAP)
- Classical and Quantum Gravity
- General Relativity and Gravitation
- European Physical Journal C

#### **Courses Taught/Teaching:**

##### **Common Curriculum courses for Non-Science Students**

- Investigating Nature (online), Loyola University, 2013, summer
- Investigating Nature, Loyola University, 2012, 2013
- Solar System, St. Cloud State university, 2010

##### **100/200 Level Introductory Physics courses**

- Introduction to Mechanics, Loyola University, 2013
- Electromagnetism and Special Theory of Relativity, Loyola University, 2013
- Introductory Physics for Sciences & Engineering I, University of Minnesota, 2011
- Physics for Life Sciences I, Loyola University, 2010
- General Physics I, St. Cloud State university, 2010
- Preparatory Physics, St. Cloud State University, 2009
- Mechanics, Penn State University, 2008
- Introduction to Classical Mechanics, McGill University, 2004

##### **300/400 Level Advanced Physics courses**

- Introduction to Modern Cosmology, 2013
- Quantum Mechanics, Loyola University, 2012, 2013
- Classical Mechanics, Loyola University, 2011
- Elementary Particle Physics, Loyola University, 2011

#### **Course Development, Innovative Pedagogy & Assessment:**

- I have been involved in the development of a *multi-disciplinary team taught* “Investigating Nature” course which aims at introducing the students to the process of science and scientific research. I received a course development grant from Loyola to design a 13-lecture “module” based on my research on Dark Energy. I have taught this

course several times and have been instrumental in developing a framework needed to administer such a course including an assessment system to monitor the effectiveness of the course.

- This year summer, I developed an *online version* of the Investigating Nature which not only included online quizzes, assignments, *numerical simulation experiments*, but also *live discussion sessions*, and *video recordings* of my lectures. The venture was very successful.
- I was part of a pilot program testing the viability of online teaching via “*Adobe Connect*”. I have administered several (live and recorded) lectures using this software, and I have been working with the “Media Services” department to improve the quality of the online delivery using the software. I should note that the web-lectures have turned out to be quite a success with the students. I have also been conducting research with my undergraduate students through this web portal.
- I have been routinely using in-class responders (clickers) in my lectures for the 100/200 level and the common curriculum courses. This semester, with the help of clickers I have been experimenting with “*peer-instruction*” methodology. So far, it has been very successful.
- I was part of the committee responsible for prescribing Learning Outcomes for the new Advanced Common Curriculum courses in Science and evaluating the course proposals.
- I was part of the committee responsible for prescribing Learning Outcomes for new Common Curriculum Lab courses and evaluating the course proposals.
- I developed two new electives titled “*Elementary Particle Physics*” and “*Introduction to Modern Cosmology*”.

#### **Undergraduate Student Projects:**

- Riley Mayes & Colleen Lattyak, “Tracking Fluctuations in Cyclic Cosmology”, current.
- William Duhe, “Emergent Cyclic Inflation”, 2012-2013
  - Mr. Duhe presented a seminar at the American Physical Society conference held at Denver, CO, 2013
  - Mr. Duhe presented a seminar at the Gulf Coast Gravity Meeting held at Oxford, MS, 2013
  - Mr. Duhe presented a seminar at the international Student Physics Society conference held at Netherlands, 2012
- Kingsley Hansen & Riley Mayes, “Introduction to Cosmology & Numerical Investigations”, 2012
- William Duhe, “*p*-adic string thermodynamics in the Early Universe and Cosmic Microwave Background Radiation”, 2011
  - Mr. Duhe made a Poster Presentation at LAspace Conference held at Baton Rouge, 2011

- Marcus Thomas and Kevin Rybicki, co-supervised Summer Projects on “Resolving Singularities in Higher derivative theories of Gravity”, 2009
- Joel Mazer and Ismael Pedraza, co-supervised Independent Studies on “Introductory Cosmology and Cosmic Singularities”, 2008

### Professional Service:

- University:

Member of the

- University Committee on Internal Grants
- Search Committee for the Dean of College of Natural Sciences and Humanities
- Committee overseeing the Computational Science minor program
- Working Group on implementing new Advanced Science Common Curricular courses
- Working Group on implementing new Science Lab courses
- Adobe Connect Pilot Project

- Departmental:

- Member of the Search Committee for hiring Extra-ordinary faculty for year 2012-13
- Organizing SPS physics seminars & outreach events
- Faculty Advisor of the local Student Physics Society
- Member of the Search Committee for hiring Administrative Assistant for the department

- Advising: Currently advising 5 juniors and 1 senior

- Organizing Outreach events:

- Participation at the “Science Night” at Samuel J. Green Charter School for elementary and middle school students.
- Participation at the “Wild about Science” night at Lake Forest school for elementary and middle school students.
- Participation at the Science Fair organized by City Year and STEM aimed at school kids from 3<sup>rd</sup> to 8<sup>th</sup> grade in the spring of 2012.
- “Nano-days” event held at the Loyola campus in the spring of 2012

### Selected Works:

1. [Before the Bang](#), T. Biswas, “Honorable Mention” in the Gravity Research Foundation Essay Competition, 2013
2. [Emergent Cyclic Inflation, a Numerical Investigation](#), W. Duhe and T. Biswas, submitted for a publication in Journal of Cosmology and Astroparticle Physics
3. [Towards singularity and ghost free theories of gravity](#), T. Biswas, E. Gerwick, T. Koivisto and A. Mazumdar, Phys. Rev. Lett. **108**, 031101 (2012)

4. [Wiggles in the cosmic microwave background radiation: echoes from non-singular cyclic-inflation](#), T. Biswas, A. Mazumdar and A. Shafieloo, Phys. Rev. **D 82**, 123517 (2010)
5. [Thermal Duality and Hagedorn Transition from p-adic Strings](#), T. Biswas, J. A. R. Cembranos and J. I. Kapusta, Phys. Rev. Lett. **104**, 021601 (2010)
6. [Cosmological Bardeen-Cooper-Schrieffer condensate as dark energy](#), S. Alexander, T. Biswas and G. Calcagni, Phys. Rev. **D 81**, 043511 (2010)
7. [The Hagedorn Soup and an Emergent Cyclic Universe](#), T. Biswas, "Honorable Mention" in the Gravity Research Foundation Essay Competition 2008
8. [Can inflation solve the hierarchy problem?](#), T. Biswas and A. Notari, "Honorable Mention" in the Gravity Research Foundation Essay Competition 2005, Phys. Rev. **D 74**, 043508 (2006)
9. [p-adic Inflation](#), N. Barnaby, T. Biswas and J. M. Cline, JHEP **0704**, 056 (2007)
10. [Non-perturbative Gravity, Hagedorn Bounce & CMB](#), T. Biswas, R. Brandenberger, A. Mazumdar and W. Siegel, JCAP **0712**, 011 (2007)
11. [Bouncing universes in string-inspired gravity](#), T. Biswas, A. Mazumdar and W. Siegel, JCAP **0603**, 009 (2006)

### Invited Talks & Seminars

- *"Towards consistent nonlocal theories of gravity"*  
Workshop: Adventures in Superspace, McGill University, Montreal, Canada, May, 2013
- *"Nonlocal Field Theories & Gravity"*  
Perimeter Institute, Waterloo, Canada, June, 2012
- *"Stringy Nonlocal Theories"*  
Symposium on Subatomic Physics, McGill University, Montreal, Canada, June, 2012
- *"Towards a Singularity-free Universe"*  
University of Alabama, Tuscaloosa, April, 2012
- *"Nonsingular Cosmology"*  
University of New Orleans, New Orleans, October, 2011
- *"Towards a Nonsingular Universe"*  
Louisiana State University, Baton Rouge, October, 2011
- *"Cyclic Inflation"*  
Pre-Planckian Inflation workshop, University of Minnesota, Minneapolis, October, 2011
- *"p-adic strings: Thermal duality and the cosmological constant"*  
Miami 2012, a topical conference on elementary particles, astrophysics, and cosmology, University of Miami, Fort Lauderdale, December, 2010
- *"Challenges for Cyclic Universes: Playing the Devil's advocate"*  
University of Minnesota, Minneapolis, October, 2009
- *"Dark Energy vs. Local Void"*  
SLAC, Stanford, November, 2008
- *"Towards Emergence of a "scale-invariant" Cyclic Universe"*  
Micro-symposium on Bouncing and Cyclic Cosmologies, Princeton University, Princeton, November, 2008

- *“Towards Emergence of a “scale-invariant” Cyclic Universe”*  
University of Wisconsin, Madison, October, 2008
- *“Nonsingular Universes”*  
IMSc, Chennai, India, May, 2008
- *“Nonsingular Universes”*  
JNU, New Delhi, India, May, 2008
- *“Dark Energy vs. Local Void”*  
Topical workshop on Cosmology: Interplay between Theory and Observation at Penn State University, State College, May, 2008
- *“Generating Inflation and Hierarchy in Supergravity Models”*  
IGC Inaugural Conference, Penn State University, University Park, August, 2007
- *“Swiss-Cheese Cosmology & the Dark Energy Problem”*  
YITP Anniversary Symposium, Stony Brook University, Stony Brook, May, 2
- *“Asymptotically free Gravity & the Big Bounce”*  
Cosmology 2005: a reality check, conference, Copenhagen, December, 2005