

I. Gordon Blackadder

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A Ph.D. candidate in physics, I have explored machine learning and data analysis at the scale of the universe. As well as extensive numerical skills, programming experience, an affinity towards solving problems, and an eye for complex patterns, I have experience communicating technical subject matters to audiences of many backgrounds.

Technical Skills

- Proficient in python for data analysis (NUMPY, SCIPY, MATPLOTLIB, PANDAS, SCIKIT-LEARN)
- Experience with distributed computing (SLURM)
- Experience with other programming languages: C, C++, SQL

Education

Ph.D. in Physics, Brown University, USA

2011-present

- Research on dark matter decay theory with an emphasis on machine learning and statistical analysis of cosmology data
- Graduating in May 2016

Masters in Theoretical Physics, University of Saint Andrews, UK

2006-2011

- Five-year combined bachelors/masters course
- Graduated with First Class (Honours)

Papers and Publications

“Dark matter with two- and many-body decays with constraints from cosmological probes”

2016

Blackadder and Koushiappas, Physical Review D 93, 023510 (2016)

(preprint arXiv: arxiv.org/abs/1510.06026)

- Performed machine learning (a Markov Chain Monte Carlo analysis) to find the allowed parameter space of decaying dark matter models. The analysis was built in python, with extensive use of NUMPY and SCIPY, and executed through the SLURM workload manager
- Constrained models against multiple astrophysics data sets
- Created sophisticated plots in MATPLOTLIB and a detailed discussion on the causes of the constraints

“Dark matter with two- and many-body decays and supernovae type Ia”

2014

Blackadder and Koushiappas, Physical Review D 90, 103527 (2014)

(preprint arXiv: arxiv.org/abs/1410.0683)

- Derived two general and relativistic models of decaying dark matter
- Modeled in python and constrained against supernova observations with a goodness-of-fit analysis
- Plotted results to effectively show the progress made over previous research findings

Other Data Research Projects

“Are films shorter when the scriptwriter directs,” a data analysis project

2015

Code, data and analysis available on github.com/igblackadder/Film_Project

- Developed a multi-threaded web scraping algorithm in python to obtain data on just under 200,000 films by analyzing nearly 1 million web pages
- Applied machine learning to extract features from the data, which were fitted by a gaussian process regression, using PYMC2 and SCIKIT-LEARN
- Produced detailed and easy to read plots to elegantly show the results

“Diagnosing Bladder Cancer,” a data analysis project, University of Saint Andrews, UK

2010

- Applied Principle Components Analysis (a form of machine learning) to a bladder tissue Raman spectra dataset in an attempt to distinguish between cancerous and non-cancerous samples

Teaching

Teaching Assistant, Brown University, USA

2012-2014

- Instructed undergraduate students in physics concepts and laboratory skills
- Collaborated with students and professors to optimize learning
- Provided formative and summative assessment

Invited Talks

Skyscrapers Astronomical Society, “Dark Matter in the Expanding Universe”

2016

Colby College, “Motivations and Models of Decaying Dark Matter”

2015

Carnegie Mellon University, “Dark Matter Decays: Motivations, Models and Constraints”

2015

- Presenting complex physics and analysis in ways appropriate for the audience

Leadership and Community Service

Youth Group Leader

Providence Presbyterian Church child care, USA

2013-present

Urban Saints weekly youth group, UK

2006-2011

- Designed curricula and lesson plans in a team, ensuring safety and child wellbeing
- Organized a yearly weekend camp for economically disadvantaged teenagers from Saint Andrews

Treasurer, University of Saint Andrews Christian Union, UK

2007-2010

- Wrote and negotiated a budget with an annual expenditure of more than £7500
- Worked in a committee to organize accommodation, transport and speakers for a conference of 120 people

Other Interests

- Co-host of an international politics video discussion blog, “LeafnBean.” The show, previously broadcast weekly on Saint Andrews Radio as “Coffee and Tea,” features discussion on global affairs as well as interviews with UK politicians including the Rt. Hon. Sir Menzies Campbell MP.
- I enjoy taking MOOCs and drinking tea.