Jes Ford

Curriculum Vitae

Department of Physics & Astronomy
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RESEARCH OVERVIEW:

My research interests are cosmology, clusters, and the evolution of large-scale structure. For my PhD I am working on gravitational lensing magnification, and comparing with results using the much more common shear technique, in order to study the distribution of dark matter in the halos of galaxy clusters in CFHTLenS and COSMOS. In the near future I am interested in advancing characterization and modeling of halo miscentering offsets in various cluster catalogs, and I am also preparing to make much of my code publicly available. I am actively studying machine learning and data science techniques, for extracting insights from large astronomical surveys and making algorithms more efficient and easier to use.

EDUCATION:

Candidate for Ph.D. in Physics, *expected completion in* 2015
University of British Columbia, Vancouver
Supervisor: Ludovic Van Waerbeke
Course Average: 86.9%

B.Sc. in Physics (Math Minor), *Summa Cum Laude*, 2008
University of Nevada, Reno (UNR)
Physics GPA: 3.985/4.0; Cumulative GPA: 3.945/4.0

FELLOWSHIPS & AWARDS:

- Four-Year-Fellowship, UBC, 2011 – 2015
- Center for Astronomy Education (CAE) Travel Award, Legacy Workshop, 2011
  Competitive award for paid travel/attendance of the CAE's Inaugural Legacy Workshop on effective teaching, for graduate students and postdocs.
- Graduate Entrance Scholarship, UBC, 2009 - 2010
- Regents' Scholar Award, UNR, 2008
  $5000 prize awarded annually to a single UNR student "in recognition of outstanding academic achievements, leadership ability, & service contributions."
- Westfall Scholar Award (*highest GPA in Physics*), UNR, 2008
- 2nd Place College of Science Poster Competition, UNR, 2008
- National Science Foundation – Experimental Program to Stimulate Competitive Research (EPSCoR) Undergraduate Research Award, UNR, 2007 – 2008

Research project funding awarded based upon competitive research proposal.

- Honors Undergraduate Research Award, UNR, 2007 - 2008 (declined)
- Summer Undergraduate Research Fellowship (SURF), Caltech/JPL, 2007
- NASA Undergraduate Student Research Program, 2007 (declined)
- NASA/JPL Space Grant Internship Program, 2007 (declined)
- H & S Leifson Physics Scholarship, UNR, 2007 - 2008
- Muse Memorial Scholarship, UNR, 2007 - 2008
- ASUN Science Scholarship, UNR, 2007 - 2008
- Joe E. Moose Scholarship, UNR, 2006 - 2007
- Robert W. Wise Trust Scholarship, UNR, 2004 - 2007
- Presidential Scholarship, Montana State University, 2001 – 2002

  Full tuition waiver & annual stipend, for up to 4 years of study.

PUBLICATIONS:

- **J. Ford**, L. Van Waerbeke, M. Milkeraitis, et al. (2014) "CFHTLenS: A Weak Lensing Shear Analysis of the 3D-Matched-Filter Galaxy Clusters." Monthly Notices of the Royal Astronomical Society, 447, 4. (arXiv:1409.3571)
- **J. Ford**, H. Hildebrandt, L. Van Waerbeke, et al. (2014) "Cluster Magnification & the Mass-Richness Relation in CFHTLenS." Monthly Notices of the Royal Astronomical Society, 439, 4. (arXiv:1310.2295)
- **J. Ford**, J. Stang, C. Anderson. (2014) "Dark Matter and Gravitational Lensing in the Classroom." *Submitted to* The Physics Teacher.
- **J. Ford**, H. Hildebrandt, L. Van Waerbeke, et al. (2012) "Magnification by galaxy group dark matter halos." Astrophysical Journal, 754, 143. (arXiv:1111.3698).
- L. Van Waerbeke, H. Hildebrandt, **J. Ford**, M. Milkeraitis. (2010) "Magnification as a probe of dark matter halos at high redshift." Astrophysical Journal, 723, 1. (arXiv:1004.3793).
- S. Neff, **J. Ford**, S. Wright, D. Martinez, C. Plechaty, R. Presura. (2009) "Magnetically accelerated foils for shock wave experiments." Astrophysics and Space Science, 322: 189-193.
- S. Neff, S. Wright, **J. Ford**, R. Royle, and R. Presura. (2008) "Faraday cup measurements of the energy spectrum of laser-accelerated protons." IEEE Trans. Plasma Science, 36: 2775-2779.

CONFERENCE PRESENTATIONS:

Date	Conference	Location	Type
2015	SnowCLUSTER: The Physics of Galaxy Clusters	Snowbird, USA (University of Utah)	Talk
2015	American Astronomical Society (dissertation talk)	Seattle, WA	Talk
2013	Weak Lensing Magnification Conference *(Invited talk)*	Universitat Autonoma, Barcelona	Talk
2013	Canadian Astronomical Society (CASCA) Annual Meeting	University of British Columbia	Talk

2013	SnowCLUSTER: The Physics of Galaxy Clusters	Snowbird, USA (University of Utah)	Talk
2012	SnowPAC: Gravitational Lensing in the Age of Survey Science	Snowbird, USA (University of Utah)	Talk
2012	Essential Cosmology for the Next Generation	Cancun, Mexico (Berkeley Center for Cosmological Physics)	Poster
2010	Dark Universe through Extragalactic Lensing (DUEL): 10 Years of Cosmic Shear	University of Edinburgh	Poster
2010	COSMOS Meeting	University of Hawaii	Talk
2008	National Nuclear Security Administration (NNSA) Stockpile Stewardship Academic Alliance Program	Washington DC	Poster
2008	Nevada Undergraduate Research Symposium	University of Nevada	Poster
2008	National Conference on Undergraduate Research	Salisbury University (Maryland)	Poster
2007	Shear TEsting Programme (STEP) Workshop	NASA Jet Propulsion Lab	Talk
2007	National Conference on Undergraduate Research	Dominican University of California	Talk

NON-CONFERENCE TALKS:

- Speaker, Cosmology Seminar, UC Davis, 2014
- Invited Speaker, Cosmology Seminar, UC Berkeley, 2014
- Invited Speaker, Cosmology Seminar, NASA Jet Propulsion Lab, 2014
- Invited Speaker, Cosmology Seminar, Simon Fraser University, 2014
- Astronomy Club Lecture Series, research talk to undergraduates, UBC, 2012
- American Junior Academy of Science, research talk to visiting students, UBC, 2012
- Invited Speaker, Undergrad. Research Opportunities Program opening ceremony, UNR, 2008
- Invited Speaker, College of Science Scholarship Luncheon, UNR, 2007

SUMMER SCHOOLS:

- Essential Cosmology for the Next Generation, hosted by Berkeley Center for Cosmological Physics & Advanced Institute for Cosmology, Mexico, 2012
- Dark Universe through Extragalactic Lensing (DUEL) Cosmology and Lensing Summer School, hosted by IAP France, 2009

DATA SCIENCE PROJECTS:

- Big Data Analytics, JPL-Caltech Virtual Summer School, 2014
  Two-week intensive summer school focused on big data analysis, machine learning, databases, visualization, statistical resampling and inference, and more
- Intro to Data Science, University of Washington / Coursera, June – Sept 2014
  - Processed > 0.5 TB of data using Amazon Web Services Elastic MapReduce
  - Devised SQL queries to perform in-database analytics, basic relational algebra, and construct and manipulate sparse term-document matrices

- *Designed MapReduce algorithms for common data processing tasks*
- *Classified ocean microbes using decision trees, random forests, and support vector machines in R*
- *Predicted Bike-Sharing Demand in a Kaggle Competition & compared wide range of popular Machine Learning algorithms implemented with Python scikit-learn*
- *Accessed Twitter API to parse text and analyze tweet sentiment*
- *Derived sentiment for unclassified words based on association with training words*
- *Constructed an algorithm for converting tweet location metadata into state*

▪ Big Data Mentorship Group (with mentor from Hootsuite), March – June 2014
- *Researched and applied Python scikit-learn machine learning algorithms to the Kaggle Titanic challenge*
- *Used Twitter API with Python to stream tweet data*
- *Implemented Natural Language Processing for sentiment analysis*
- *Created geographical visualizations of tweet sentiment*
- *Stored and accessed JSON objects in a Redis (NoSQL) database*

▪ Participant in Vancouver Meetup Groups:
Data Science, Big Data Developers, GirlDev, Code & Coffee

▪ Other Relevant Courses:
- *Machine Learning & Data Mining, Fall 2014*
- *Intro to Relational Databases, Spring 2014*
- *Advanced Statistics for Astronomers, Spring 2011*

COMPUTER SKILLS:

▪ Languages & Tools: Python, C, IDL, bash/csh, Git, SQL, MapReduce, HTML/CSS, LaTeX
▪ Operating Systems: OSX, Linux

LEADERSHIP:

▪ Cosmology Group Weekly "Cosmo Coffee" Meeting Coordinator, 2012 – 2014
Volunteer organizer/chair of weekly talks and discussions of recent papers or hot topics in cosmology, for faculty/postdocs/graduate students at UBC.

▪ Lead Organizer: Graduate Student Workshop at CASCA 2013, UBC
Planned and coordinated a full day career-oriented workshop for graduate students at the Canadian Astronomical Society (CASCA) annual conference.

▪ Co-captain of the graduate Physics & Astronomy Softball Team, 2011-2013

PUBLIC OUTREACH:

▪ Experience Science Day at UBC, 2013
Gave 3 classroom talks/activities on space science for under-privileged elementary kids from Vancouver's downtown eastside.

▪ "Science of Sports" Workshop at UBC, 2013
Led activities on physics of sports for middle school female athletes, as part of the Westcoast Women in Engineering, Science, and Technology (WWEST) initiative.

▪ Stage show at Skills Canada National Convention, 2013

Demonstration of physics applications with Let's Talk Science, featured on National Website: www.letstalkscience.ca/news-and-events/news/1349-skills-canada-national-competition.html

- Scientists & Innovators in the Schools (SIS) program, 2013
  3 classroom visits to BC secondary schools, talks/activities on dark matter and cosmology (1x) and the physics of extreme sports (2x).

VOLUNTEERING:

- Future Science Leaders Fellow, taught 3 sessions/yr on physics & space to group of top-ranked high school students, Science World, 2014 & 2015
- Volunteer of the Month, Let's Talk Science, June 2013
- Greater Vancouver Regional Science Fair Judge, 2012 & 2013
- Future Science Leaders Program at Science World, mentor for top high school students, 45 hours total, 2012
- Volunteer Scientist, Networking Event for high school students at Science World, 2012
- Volunteer Interviewee, for 1st year Science students, 5 interviews in total, 2011-2013
- Let's Talk Science member (Canadian science outreach program), 2010 - present
- Student Panel for UNR College of Science prospective student recruitment events, 2007 - 2008
- International Student Volunteer Program, Environmental Conservation project, New Zealand, 2005

TEACHING:

The Carl Wieman Science Education Initiative (CWSEI) at UBC was started by physics Nobel Laureate & former White House Associate Director for Science, Carl Wieman. I have been involved in many facets of this program, aimed at achieving highly effective, evidence-based science education for undergraduates in physics and astronomy.

- Astronomy Summer Camp Teacher, 2013 & 2014
  Led elementary sessions on cosmology (5x), galaxies (4x), and particle physics (2x)
- Instructor for Home-Schooled elementary students, 2012
  8 hours of activities & demonstrations on the Physics of Fluids.
- Teaching Assistant: Cosmology (2 terms), UBC, 2012-2013
- Communicating Science Workshop, participant, Science World, 2012
  Two-day (8 hours) workshop on effectively communicating science to the public.
- Lecture Assistant (CWSEI), 1st-year Physics, UBC, (2 terms) 2011
  Lecture-hall assistance with clickers, in-class worksheets, interactive classroom demos, think-pair-share activities; helping restructure course Learning Goals.
- Course Specific Training Facilitator (CWSEI), 1st-year Physics, UBC, 2011
  Head TA, organized weekly training on lab experiments for ~20 TAs.
- UBC Peer Instruction Workshop (CWSEI), participant, UBC, 2011
- Center for Astronomy Education Legacy Workshop, participant, Hawaii, 2011
  Two-day workshop on effective teaching and interactive learning strategies.
- Peer Review Workshop, participant, UBC, 2010 & 2011
  4-hour workshop on mentoring, active listening, classroom observations, by UBC's Centre for Teaching, Learning & Technology (attended 2x).

- Mentor TA (CWSEI), UBC, 2010
  Mentor for new graduate student TAs, peer observation, review, & feedback.
- Teaching Techniques in Physics & Astronomy (CWSEI), UBC course, 2010-2011
- Lab & Tutorial Instructor TA, 1st-year Physics, UBC, (4 terms) 2009-2011
- Math Help Center Tutor, UNR, 2006

EXTRACURRICULAR ACTIVITIES:

- Sponsored competitive snowboarder (`www.phas.ubc.ca/~jesford/Snowboarding.html`), 1999 – 2009
- Avid snowboarder, skateboarder, surfer, softball player, swimmer, hiker, backpacker & outdoors enthusiast.
- Music: I enjoy playing the piano and bass guitar (and learning various other instruments).

REFERENCES

Ludovic Van Waerbeke, Associate Professor (PhD Supervisor)
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