Jes Ford

Curriculum Vitae

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Profile

Physics Ph.D. and science educator, with expertise in data science, statistical modeling, astronomy, and effective educational pedagogy.

Education

Postdoctoral Fellow Data Science — Current
eScience Institute & Department of Astronomy
University of Washington (UW), Seattle

Ph.D. Physics — August 2015
University of British Columbia (UBC), Vancouver
Thesis Title: *Galaxy Cluster Studies with Weak Lensing Magnification and Shear.*

B.Sc. Physics, Math Minor, *Summa Cum Laude* — May 2008
University of Nevada, Reno

Academic Research

Moore/Sloan Data Science Postdoctoral Fellowship — Sept 2015
Postdoctoral Researcher at the eScience Institute, bridging the gap between traditional astronomical research and data science techniques including machine learning.

UBC Department of Physics & Astronomy — 2009 - 2015
Graduate Research Assistant: developed new gravitational lensing techniques and constrained dark matter distributions, while working in international collaborations.

- Complex model building, fit optimization, bootstrapping, systematic bias testing, uncertainty estimation and propagation, parallel processing.
- Member of CFHTLenS collaboration, which produced the first and *only* publicly available weak gravitational lensing shear catalog: cfhtlens.org
- Publicly released new astronomical catalog of galaxy clusters.
- Peer-reviewed publications: 3 first-author & 1 co-author journal articles.

Nevada Terawatt Facility Reno, NV — 2006 - 2008
Undergraduate Research Assistant: laboratory astrophysics, developed novel design for high-energy shock wave experiment, co-authored 2 peer-reviewed publications.

NASA Jet Propulsion Laboratory Pasadena, CA — Summer 2007
Summer Undergraduate Research Fellowship: ran gravitational lensing simulations to quantify scientific impact of telescope mirror size, for mission cost-benefit analysis. Publicly released resulting MirrorSTEP simulations.

Fellowships & Awards

- Four-Year-Fellowship, UBC, 2011 - 2015
- Center for Astronomy Education (CAE) Travel Award, Legacy Workshop, 2011
- Competitive award for CAE's Legacy Workshop on effective teaching, for grads 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
- 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.

Learning Outside The Box

Big Data Analytics JPL-Caltech Virtual Summer School Sept 2014
Two-week intensive online 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
8-week online course, with project-based learning of data science. Experience with SQL, MapReduce, Twitter API, Kaggle, AWS, machine learning, visualization.

Big Data Mentorship Group *with mentor from Hootsuite* Mar - June 2014
Small group projects on machine learning in Python, streaming Twitter data, Natural Language Processing for sentiment analysis, using Redis (NoSQL) databases.

Data-Relevant UBC Courses: Machine Learning & Data Mining, Intro to Relational Databases, Advanced Statistics for Astronomers.

Meetup Groups: Data Science, Python User Group, PyLadies, Big Data Developers, Girl Dev, Code & Coffee.

Astronomy Education Workshop: Attended the inaugural Center for Astronomy Education's Legacy Workshop on effective teaching for grad students and postdocs (2011).

Computer Skills

Languages & Tools: Python, C, IDL, SQL, MapReduce, HTML, R, Git, bash/csh, LaTeX
Operating Systems: OS X, Linux

Leadership

Site Host: Software+Data Carpentry Instructor & Helper Retreat 2015
Organized and hosted the Seattle site for this worldwide event on sharing resources and improving teaching techniques and materials for Software Carpentry Workshops.

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

Coordinator: Cosmology Group Weekly Seminar 2012 - 2014
Organized and chaired weekly talks and discussions of recent papers or hot topics in cosmology, for faculty/postdocs/graduate students at UBC.

Co-captain: Graduate Physics & Astronomy Softball Team 2011 - 2015

Publications

J. Ford, J. Stang, C. Anderson. *Simulating Gravity: Dark Matter and Gravitational Lensing in the Classroom.* The Physics Teacher 53, 557 (2015).

J. Ford +19 coauthors. *CFHTLenS: A Weak Lensing Shear Analysis of the 3D-Matched-Filter Galaxy Clusters.* Monthly Notices of the Royal Astronomical Society, 447, 4 (2015).

J. Ford, H. Hildebrandt, L. Van Waerbeke, T. Erben, C. Laigle, M. Milkeraitis, C. Morrison. *Cluster Magnification & the Mass-Richness Relation in CFHTLenS.* Monthly Notices of the Royal Astronomical Society, 439, 4 (2014).

J. Ford, H. Hildebrandt, L. Van Waerbeke, A. Leauthaud, P. Capak, A. Finoguenov, M. Tanaka, M. George, J. Rhodes. *Magnification by Galaxy Group Dark Matter Halos.* Astrophysical Journal 754, 143 (2012).

L. Van Waerbeke, H. Hildebrandt, **J. Ford**, M. Milkeraitis. *Magnification as a Probe of Dark Matter Halos at High Redshift.* Astrophysical Journal 723, 1 (2010).

S. Neff, **J. Ford**, S. Wright, D. Martinez, C. Plechaty, R. Presura. *Magnetically Accelerated Foils for Shock Wave Experiments.* Astrophysics and Space Science 322 (2009).

S. Neff, S. Wright, **J. Ford**, R. Royle, R. Presura. *Faraday Cup Measurements of the Energy Spectrum of Laser-Accelerated Protons.* IEEE Trans. Plasma Science 36 (2008).

Conference Presentations

- 2015 *Poster*, Weak Lensing Systematics Workshop, UC Davis
- 2015 *Talk*, SnowCLUSTER: The Physics of Galaxy Clusters, Snowbird/Univ. of Utah
- 2015 *Talk*, American Astronomical Society (dissertation talk), Seattle, WA
- 2013 *Invited Talk*, Weak Lensing Magnification Conference, Universitat Autonoma, Barcelona
- 2013 *Talk*, Canadian Astronomical Society (CASCA) Annual Meeting, Univ. of British Columbia
- 2013 *Talk*, SnowCLUSTER: The Physics of Galaxy Clusters, Snowbird/Univ. of Utah
- 2012 *Talk*, SnowPAC: Gravitational Lensing in the Age of Survey Science, Snowbird/Univ. of Utah
- 2012 *Poster*, Essential Cosmology for the Next Generation, Cancun, Mexico (BCCP)
- 2010 *Poster*, Dark Universe through Extragalactic Lensing (DUEL): 10 Years of Cosmic Shear, Univ. of Edinburgh
- 2008 *Poster*, National Nuclear Security Administration (NNSA) Stockpile Stewardship Academic Alliance Program, Washington DC
- 2008 *Poster*, Nevada Undergraduate Research Symposium, Univ. of Nevada
- 2008 *Poster*, National Conference on Undergrad. Research, Salisbury Univ. (Maryland)
- 2007 *Talk*, Shear TEsting Programme (STEP) Workshop, NASA Jet Propulsion Lab
- 2007 *Talk*, National Conference on Undergrad. Research, Dominican Univ. of California

Non-Conference Talks

- 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

Teaching & Outreach

Software Carpentry Instructor & Helper at eScience Institute 2015
Teaching technical computing skills to scientists, including Bash, Python, and Git/GitHub. Enrolled in official Software Carpentry Teaching Certification in January 2016.

Phenomenal Physics Summer Camp Instructor at UBC 2013 - 2015
Coordinated with other science instructors and camp counselors to plan, prepare and deliver physics & astronomy curriculum for multiple parallel sessions of camp.

Future Science Leaders Fellow at Science World, Vancouver 2013 - 2014
Co-designed FSL physics/astronomy curriculum and taught 3 interactive sessions for gifted high school students (+45 hours as volunteer FSL mentor in 2012). Curriculum recorded for future use at Science World, and submitted to a physics teaching journal.

Graduate Teaching Assistant (TA) at UBC 2009 - 2014
Lectured, facilitated group problem-solving sessions and directed lab experiments for undergraduate physics and astronomy courses (14 semester courses).

- Mentor TA: worked one-on-one with new TAs to encourage best teaching practices, performed peer-observations and gave teaching evaluations.
- Head TA for Intro to Physics: managed $\sim$30 TAs, co-organized weekly meetings and content to prepare TAs to teach upcoming labs and tutorials.
- Participated in multiple workshops and courses for effective evidence-based science instruction.

Classroom Presentations: Developed and delivered classroom presentations and interactive activities for Vancouver area students: (1) *Scientists & Innovators in the Schools* Science World program (2012-2014); (2) *Experience Science Day* for downtown east-side students (2013); (3) *Westcoast Women in Engineering, Science, & Technology* workshop (2013). Lesson plans documented for future outreach use.

Other Outreach: *Let's Talk Science* Volunteer of the Month for co-planning and co-presenting a trades-themed science stage-show at the Skills Canada National Convention (June 2013); *Greater Vancouver Regional Science Fair* judge (2012-2014); multiple presentations given to undergraduate and graduate students.

Interests Snowboarding (former sponsored athlete), hiking, softball, disc golf, camping, music

References

Ludovic Van Waerbeke, Associate Professor (PhD Supervisor)
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Catherine Heymans, Reader in Astrophysics & European Research Council Fellow
Institute for Astronomy, University of Edinburgh
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Jason Rhodes, JPL Scientist
NASA Jet Propulsion Laboratory / Caltech
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