

Ian J. M. Crossfield

CONTACT INFORMATION

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RESEARCH INTERESTS

Characterization of extrasolar planet atmospheres through innovative methods – with a strong emphasis on infrared spectroscopic and photometric techniques and transiting planets.

RESEARCH EXPERIENCE

Max-Planck-Institut für Astronomie (*Planet & Star Formation Fellow*)

Exoplanetary characterization

07/2012 - present

- Characterization of extrasolar planet atmospheres via transits, secondary eclipses, and phase curves using photometry and spectroscopy from ground- and space-based observatories. Also improved characterization of exoplanet host stars via empirical, flux-calibrated spectra.

Jet Propulsion Laboratory

Exoplanet Transit Spectroscopy

01/2007 - 10/2007

- Reduced ground-based K and L band spectroscopic data of the secondary eclipse of HD 189733b. Part of a team ultimately obtaining the first published ground-based measurement of an exoplanet's spectrum.

Modeling and Design of High-Contrast Imagers

07/2004 - 06/2007

- Analyzed the high-contrast performance of the Planet Formation Instrument, an interferometric nulling coronagraph for the Thirty Meter Telescope. Derived an analytic relation between the segment optical specifications and the light leaking through the coronagraph.
- Designed a full wave-optics model of the Gemini Planet Imager for use in developing the backend wavefront calibration unit.

University of California, Los Angeles

Graduate studies

09/2007 - 06/2012

- Ground-based characterization of extrasolar planet atmospheres via phase curves, secondary eclipses, and transits. Optical photometric refinements of the parameters of known transiting planets.

University of California, Irvine

Undergraduate Research

06/2003 - 06/2004

- Observed cataclysmic variable stars to photometrically determine their orbital periods.

EDUCATION

University of California, Los Angeles, Los Angeles, California USA

Ph.D., Astrophysics (*Dissertation Year Fellow*), 06/2012

- Advisor: [Prof. Bradley Hansen](#)
- Topic: “Toward Characterization of Terrestrial Extrasolar Planets”

M.S., Astrophysics, 06/2009

- Advisor: [Prof. Bradley Hansen](#)
- Topic: “Thermal Emission of Non-Transiting Extrasolar Planets”

University of California, Irvine, Irvine, California USA

B.S., Physics (*magna cum laude*), 06/2004

- Advisor: [Prof. Tammy Smecker-Hane](#)
- Honors Thesis: “Confirmation of Variability in the SU Uma-type Dwarf Nova V1504 Cyg”

ACCEPTED OBSERVING PROPOSALS

- 2013A: LBT/LUCIFER: *one night* of NIR multi-object spectroscopy to observe GJ 3470b in transit.
- 2013A: Keck/MOSFIRE: *one night* of NIR multi-object spectroscopy to observe GJ 3470b in transit.
- 2013A: Gemini/GMOS: *one night* of optical multi-object spectroscopy to observe GJ 3470b in transit.
- 2013A: VLT/FORS2: *0.5 nights* of optical multi-object spectroscopy to observe GJ 436b in transit.
- 2013A: NASA IRTF: PI for *one night* to characterize exoplanet host star companions; *0.8 nights* for flux-calibrated spectra of exoplanet host stars.
- 2012B: Keck/MOSFIRE and Subaru/MOIRCS: *0.5 and one nights*, respectively, to observe WASP-12b. Analysis beginning.
- 2012A: NASA IRTF: PI for *4 nights* to perform transit spectroscopy of HD 97658b. Planet does not transit, but supplementary observations [published in A&A](#).
- 2012A: Subaru: *3 nights* of multi-object spectroscopy with MOIRCS: HAT-P-12b and -18b during transit, and WASP-3b during eclipse. Analysis underway.
- 2011B: Subaru: *One night* of multi-object spectroscopy of WASP-12b with MOIRCS. Observations were limited to 2.3 μm narrowband photometry; paper [published in ApJ](#).
- NASA IRTF: PI for *4 half-nights* to perform transit spectroscopy of GJ 1214b. Data reduction in progress.
- NASA IRTF: PI for *2 half-nights* to perform occultation spectroscopy of WASP-12b. Paper [published in ApJ](#).
- Lick Observatory Shane 3 m: PI for a *5-night* run to detect the secondary eclipse of WASP-12b in the *H* and *K* bands. Data quality was insufficient to detect the planet.
- Lick Observatory Nickel 1 m: PI for *dozens of nights* in collaboration with the Transit Light Curve project to refine parameters of transiting planets, resulting in [co-authorship on multiple papers](#).
- CTIO SMARTS 0.9 m: PI for *3 nights* of DDT observations of new planet WASP-18b; clouded out.

HONORS AND AWARDS

- 2013: AAS Doxsey Prize.
- 2012-present: MPIA Postdoctoral Fellow
- 2012: NASA Postdoctoral Fellow (declined)
- 2011-2012: UCLA Dissertation Year Fellow
- 2010: AAS Chambliss Student Achievement Award
- 2009: AAS Chambliss Student Achievement Award
- 2009: Honorable Mention, NSF Graduate Student Research Fellowship
- 2008: Honorable Mention, NSF Graduate Student Research Fellowship
- 2007-2009: UCLA Institute of Geophysics and Planetary Physics Graduate Fellowship
- 2008: UCLA Department of Astronomy First Year Graduate Student Summer Fellowship

- 2007: Jet Propulsion Laboratory: SIM: PlanetQuest Outstanding Performance Award (×2)
- 2004: Outstanding Senior in Physics, UC Irvine Physics Department
- 2003: Herbet H. Chen Award (Outstanding Junior), UC Irvine Physics Department
- 2003: Elected to Phi Beta Kappa and Sigma Pi Sigma.

SCIENTIFIC COMPUTING

- Author of a large public repository of Python software for astronomical computing tasks, including [transit light curves](#), [spectroscopic analysis](#), and [numerical analysis routines](#).
- First author and contributor to [AstroPh](#), the code that runs the web page of the weekly [UCLA Astro-coffee](#) astronomy discussion.

TEACHING EXPERIENCE

University of California, Los Angeles

Fourier Optics: Lab Redesign

Summer 2009

- Led a team in redesigning a hands-on Fourier Optics lab for graduate and professional-level students at the CfAO Adaptive Optics Summer School. The redesign responded to past student concerns by adding a more opportunities for student-directed investigations.

Digital Image Files: Inquiry Design

Fall 2008

- Part of a team designing an inquiry-based activity for engineering students at Maui Community College. The lesson teaches about digital images and engineering process skills and is now a regular part of the MCC Instrumentation course curriculum.

Teaching Assistant

Winter and Spring 2008

- Led weekly discussion sections for: majors' Observing Lab and Introduction to Astrophysics, and non-majors' Cosmology and Introduction to Astronomy. Moderated group discussions on issues of current interest and topical relevance.

SERVICE EXPERIENCE

Papers refereed: **2 (AJ, MNRAS).**

- 2013 Chambliss Student Award judge at Long Beach AAS meeting
- 2012 MPA Planet and Star Formation Retreat: SOC; Session chair
- 2010-2011 Graduate representative to UCLA faculty meetings
- 2011 Chambliss Student Award judge at Seattle AAS meeting
- 2009-2010 UCLA Journal Club coordinator
- 2008-2009 UCLA Planetarium coordinator
- 2008 Contributor to the "Direct Detection of Exoplanets" [white paper](#)
- 2006-2007 Led NASA/JPL "New Professionals' Network"

TALKS

- Talk: *New Opportunities in Exoplanet Characterization and Detection*, AAS 2013, 01/2013
- Invited Talk: *Unraveling the Mysteries of Hot Jupiter Atmospheres*, Colloquium, ETH-Zurich, 12/2012
- Talk: *Re-evaluating the Extremely Hot Jupiter WASP-12b*, [Hot Planets, Cool Stars Conference](#), 11/2012
- Invited Talk: *Revealing the Nature of Hot Jupiter Atmospheres*, U. Hawaii/IFA, 10/2012

- Talk: *Re-evaluating the Extremely Hot Jupiter WASP-12b*, [MPIA Exoplanet Atmospheres Conference](#), 07/2012
- Dissertation Talk: *Infrared Observations of Exoplanet Atmospheres*, [UCLA Astronomy Division](#), 05/2012
- Invited Talk (declined), [UCLA ESS planetary science](#) seminar.
- Talk: *Infrared Observations of Exoplanet Atmospheres*, [Max-Planck Institut für Astronomie](#), 02/2012
- Talk: *NIR Spectroscopy and Narrowband Photometry of WASP-12b*, [ExoClimes 2012](#), 01/2012
- Talk: *NIR Spectroscopy and Narrowband Photometry of WASP-12b*, [AAS 2012](#), 01/2012
- Talk: *Infrared Observations of Exoplanet Atmospheres*, [U. Hawaii/IfA](#), 12/2011
- Talk: *Infrared Observations of Exoplanet Atmospheres*, [California Institute of Technology](#), 12/2011
- Talk: *Infrared Observations of Exoplanet Atmospheres*, [UC Santa Cruz Planet Lunch](#), 11/2011
- Talk: *Unraveling the Mystery of GJ1214b with NIRSPEC*, [Keck Science Meeting](#), 09/2011
- Invited Talk: *Thermal Emission and Atmospheric Circulation in Extrasolar Planets*, [UCLA Earth & Space Science Planetology Seminar](#), 02/2011
- Talk: *The unusual phase curve offset of upsilon Andromedae b*, [AAS 2011](#), 01/2011
- Talk: *An updated 24 micron Phase Curve for upsilon Andromedae b*, [DPS 2010](#), 09/2010
- Public Talks: *Extrasolar Planets* (and many other topics) at the [UCLA Planetarium](#), 2008-2011
- Invited Talk: *The Planet Formation Instrument: Extreme Adaptive Optics on the Thirty Meter Telescope*, [UC Berkeley Star Formation Seminar Series](#), 01/2007
- Talk: *High Contrast on Segmented Telescopes: Contrast Sensitivity and Prediction*, [Center for Adaptive Optics Fall Retreat](#), 11/2006
- *Periodic Variability in Dwarf Nova V1504 Cyg*, [UC Irvine Undergraduate Research Symposium](#), 05/2004

REFEREED PUBLICATIONS

- **Crossfield, I.J.M.**; *On High-Contrast Characterization of Nearby, Short-period Exoplanets with Giant Segmented Mirror Telescopes*, [A&A](#) submitted: Dec 2012 (preprint available upon request).
- **Crossfield, I.J.M.**; Barman, T.; Hansen, B.M.S.; Tanaka, I.; Kodama, T.; *Re-evaluating WASP-12 b: Strong Emission at 2.315 μm , Deeper Occultations, and an Isothermal Atmosphere*, 2012, [ApJ](#), 760, 140
- **Crossfield, I.J.M.**. *ACME Stellar Spectra. I. Absolutely Calibrated, Mostly Empirical Flux Densities of 55 Cancri and its Transiting Planet 55 Cancri e*, 2012, [A&A](#), 545, A97
- **Crossfield, I.J.M.**; Knutson, H.; Fortney, J.; Showman, A.; Cowan, N.B.; Deming, D.; *Spitzer/MIPS 24 μm Observations of HD 209458b: 3 eclipses, 2.5 transits, and a Phase Curve Corrupted by Instrumental Sensitivity Variations*, 2012, [ApJ](#), 752, 81
- **Crossfield, I.J.M.**; Hansen, B.M.S.; Barman, T.; *Ground-based, Near-infrared Exospectroscopy. II. A Tentative Detection of Emission From the Extremely Hot Jupiter WASP-12b*, 2012, [ApJ](#), 746, 46
- **Crossfield, I.J.M.**; Barman, T.; Hansen, B.M.S.; *High Resolution, Differential, Near-infrared Transmission Spectroscopy of GJ 1214b*, 2011, [ApJ](#), 736, 132
- **Crossfield, I.J.M.**; Hansen, B.M.S.; Harrington, J.; Cho, J.Y-K.; Deming, D.; Menou, K.; Seager, S.; *A New 24 micron Phase Curve for upsilon Andromedae b*, 2010, [ApJ](#), 723, 1436
- **Crossfield, I.J.** and Troy, M.; *Segment Aberration Effects on Contrast*, 2007, [Applied Optics](#), 46, 4533
- Johnson, J.A.; Gazak, J.Z.; Apps, K.; Muirhead, P.S.; Crepp, J.R.; **Crossfield, I.J.M.**; Boyagin, T.; von Braun, K.; Rojas-Ayala, B.; Howard, A.W.; Lloyd, J.P.; Covey, K.R.; Schlawin, E.; Hamren, K.; Marcy, G.; Morton, T.D.; *Characterizing the Cool KOIs. II. The M Dwarf KOI-254 and Its Hot Jupiter*, 2012, [AJ](#), 143, 111.
- Johnson, J.A.; Apps, K.; Gazak, J.Z.; Crepp, J.R.; **Crossfield, I.J.**; Holman, A.W.; Marcy, G.; Morton, T.D.; Chubak, C.; Isaacson, H.; *LHS6343C: A Transiting Field Brown Dwarf Discovered by the Kepler Mission*, 2011, [ApJ](#), 730, 79.
- Swain, M. R.; Deroo, P.; Griffith, C. A.; Tinetti, G.; Thatte, A.; Vasisht, G.; Chen, P.; Bouwman, J.; **Crossfield, I.J.**; Angerhausen, D.; *A ground-based near-infrared emission spectrum of the exoplanet HD189733b*, 2010, [Nature](#), 463, 637
- Winn, J.N.; Johnson, J.A.; Albrecht, S.; Howard, A.W.; Marcy, G.W.; **Crossfield, I.J.**; Holman, M.J.; *HAT-P-7: A Retrograde or Polar Orbit, and a Third Body*, 2009, [ApJ](#), 703, 99

- Winn, J.N.; Johnson, J.A.; Fabrycky, D.; Howard, A.W.; Marcy, G.W.; Narita, N.; **Crossfield, I.J.**; Suto, Y.; Turner, E.L.; Esquerdo, G.; Holman, M.J. *On the Spin-Orbit Misalignment of the XO-3 Exoplanetary System*, 2009, ApJ, 700, 302

PROCEEDINGS AND OTHER WORK

- **Crossfield, I.J.M.**; Barman, T.; Hansen, B.M.S.; Tanaka, I.; Kodama, T.; *Re-evaluating WASP-12 b: An Update*, 2013, Proceedings of the “Hot Planets, Cool Stars” Conference.
- Henning, Th., et al; *Science Instrument Provision for the M3 Mission Candidate EChO: Scientific Objectives*, Nov 2012, in response to [ESA M3 Announcement of Opportunity](#).
- Levine, M.; Soummer, R.; et al; *Overview of Technologies for Direct Optical Imaging of Exoplanets*, 2010, Astro2010 Decadal Survey white paper
- Morzinski, K.M.; Crockett, C.J.; **Crossfield, I.J.**; *Digital image exploration at Maui Community College*, 2010, ASPC, 436, 274
- Do, T.; Fitzgerald, M.; Ammons, S. M.; **Crossfield, I.J.**; Yelda, S.; Armstrong, J. D.; Severson, S.; *A Fourier Optics and Wavefront Sensing Laboratory Activity*, 2010, ASPC, 436, 160
- Nissly, C.R.; Seo, B.-J.; Troy, M.; Angeli, G.Z.; **Crossfield, I.J.**; Ellerbroek, B.L.; Gilles, L.; Sigrist, N.; *High-resolution Optical Modeling of the Thirty Meter Telescope for Systematic Performance Trades*, 2008, Proceedings of the SPIE, 7017-30
- Troy, M.; **Crossfield, I.J.**; Chanan, G.; Dumont, P.; Green, J.J.; Macintosh, B.; *Effects of Diffraction and Static Wavefront Errors on High-Contrast Imaging from the Thirty Meter Telescope*, 2006, Proceedings of the SPIE, 62722C
- Vasisht, G.; **Crossfield, I.J.**; Dumont, P.; Levine, B.M.; Troy, M.; Shao, M.; Shelton, J.C.; Wallace, J.K.; *Post-Coronagraph Wavefront Sensing for the TMT Planet Formation Imager*, 2006, Proceedings of the SPIE, 627253
- Macintosh, B.; et al.; *Extreme adaptive optics for the Thirty Meter Telescope*, 2006, Proceedings of the SPIE, 6272
- Chanan, G.; Troy, M.; **Crossfield, I.J.**; Nelson, J.; Mast, T.; *The Alignment and Phasing System for the Thirty Meter Telescope*, 2006, Proceedings of the SPIE, 62672V
- Hemmati, H.; Chen, Y.; **Crossfield, I.J.**; *Telescope Wavefront Aberration Compensation with a Deformable Mirror in an Adaptive Optics System*, 2006, Proceedings of the SPIE, 61050O

LANGUAGES

English (native speaker)

German (moderate fluency)