Dr. Erika T. Hamden

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RESEARCH INTERESTS

observational astronomy, UV optics and detector technology, thin film optical design, Galactic dust clouds, intergalactic and circumgalactic medium, galactic outflows, integral field spectroscopy

APPOINTMENTS

Assistant Professor, University of Arizona, Fall 2018

California Institute of Technology, 2014 - present

R.A. & G.B. Millikan Prize Postdoctoral Fellowship in Experimental Physics, 2017-present
NSF Astronomy and Astrophysics Postdoctoral Fellowship, 2014-2017
Faculty Sponsor: D. Christopher Martin

EDUCATION

Columbia University, New York, NY
Ph.D., Astronomy, July 2014
Thesis: FIREBall, CHαS, and the diffuse universe
Advisor: David Schiminovich
M.Phil, Astronomy, 2010
M.A., Astronomy, 2009

Harvard College, Cambridge, MA
A.B., Astronomy & Astrophysics, June 2006
Cum Laude with High Honors
Thesis: A Radial Velocity Survey of the Orion Nebula Cluster using Hectochelle
Advisor: Andy Szentgyorgyi

AWARDS AND HONORS

Nancy Grace Roman Technology Fellowship in Astrophysics for Early Career Researchers- Concept Study, 2016 & Development Phase, 2017
NASA Group Achievement Award to Advanced UV/Optical Detector Arrays & Systems Team- 2014
R.A. & G.B. Millikan Prize Postdoctoral Fellowship in Experimental Physics at Caltech 2014-present
NSF Astronomy and Astrophysics Postdoctoral Fellowship 2014-present
NASA Earth and Space Science Fellowship (NESSF), 2011-2014

RESEARCH GRANTS, as PI or Co-PI

NASA RTF 2015 (15-RTF15-0005): EMCCD technology for ultraviolet astronomy and high resolution spectroscopy (PI, **$400K**)
NSF AAG 2016 (1716907): Protogalactic Disks: A New Window on Galaxy Formation (Co-PI with D. Christopher Martin, **$716K**)
NSF AAPF 2014 (1402206): Understanding galaxy growth and history through innovative instruments (PI, **$267K**)

RESEARCH GRANTS, with significant contribution as Co-I

NASA APRA 2015 (15-APRA15-0147): FIREBall-2: Trailblazing observations of the space UV circumgalactic medium. (PI: C. Martin, **$1900K**)
NASA APRA 2014 (14-APRA14-0150): FIREBall-2: Pioneering Space UV Baryon Mapping (Lead Institution). (PI: C. Martin, **$650K**)

COMPETITIVELY OBTAINED TELESCOPE TIME, as PI

Keck II, 2017B: *KCWI Deep Field Pilot Study*, 1 night
Palomar 200 inch, 2017B: *A systematic survey of giant Lyα blobs in over-dense fields*, 3 nights
Palomar 200 inch, 2017A: *A systematic survey of giant Lyα blobs in over-dense fields*, 3 nights
Palomar 200 inch, 2016B: *A systematic survey of giant Lyα blobs in over-dense fields*, 3 nights
Palomar 200 inch, 2016A: *Mapping MgII emission with the Cosmic Web Imager*, 5 nights
Palomar 200 inch, 2015B: *Mapping MgII emission with the Cosmic Web Imager*, 4 nights

RESEARCH EXPERIENCE

Postdoctoral Fellow, California Institute of Technology, 2014 - present

Hamden UV/VIS Detector Lab (HUVD), funded by a Nancy Grace Roman Technology Fellowship. The lab is working to flight test UV optimized EMCCDS for use on future space missions. This testing includes characterizing QE, noise, dark current, radiation hardness, as well as optimizing electrons for readout.

Project Scientist for the Faint Intergalactic Redshifted Emission Balloon (FIREBall), attempted launch in Sept 2017. Expected launch in Sept 2018.

Project Scientist for the Keck Cosmic Reionization Mapper (KCRM), the red channel for the Keck Cosmic Web Imgaer (KCWI). Lead of KCRM Scientific Oversight Committee and guider design lead.

MgII observations of low-redshift galaxies and other observations with the Palomar Cosmic Web Imager (PCWI).

KCWI Deep Field in the Hubble Ultra Deep Field. Pilot survey in Dec 2017.

A systematic survey of giant Lyα blobs in extreme over-dense fields using PCWI and KCWI.

A study of the ISM of nearby resolved galaxies using PCWI, KCWI, and JWST.

Graduate Research Fellow, Columbia University, 2007 - 2014

Technology: Design, testing, and growth of high efficiency anti-reflection coatings for use on delta-doped CCDs at UV/VIS wavelengths

Observation: Diffuse Galactic FUV background and dusty Galactic clouds with GALEX; Observations of diffuse Hα emission from galactic nebulae and nearby galaxies with proto-type Circumgalactic H-α spectrograph (CHαS).

Instrumentation: FIREBall- building and testing guider/mask system, developed UV anti-reflection coatings for detector and small optical surfaces; proto-type CHαS- built and commissioned narrow-band Hα IFU for MDM telescopes at Kitt Peak; surface metrology and thermal contraction testing for proto-type LSST CCDs

Research Assistant, Harvard-Smithsonian Center for Astrophysics, 2005-2006

Advisor: Pat Slane. Compact object search using XMM-Newton data of supernova remnants

TEACHING AND PUBLIC OUTREACH

Volunteer, Organizer, and Lecturer, Public Outreach, California Institute of Technology, 2016-2018

Telescope Coordinator for monthly outreach program. Program consists of 30 minute public lectures with 90 minutes of stargazing afterwards.

Lecture: "How to prepare for the Great American Eclipse of 2017", *California Institute of Technology*, Pasadena, CA, November 2016

Volunteer for Pasadena Astronomy on Tap lecture series. Program consists of 2 short 20 minute lectures in a casual, bar setting, with Q & A after.

Lecture: "An ode to a lost spacecraft: Cassini at Saturn", *Astronomy on Tap*, Pasadena, CA, October 2017.

Presenter, Caltech Reel Science Series & Science Saturdays, California Institute of Technology, 2015-2017

Presentation of *Planet Earth: Caves*, with scientific introduction and discussion afterward. Directed towards middle school aged students.

Presenter, Caltech Explorer's Club, California Institute of Technology, 2014

Presentation on light, the multi-wavelength universe, and how colors are perceived for after-school club meeting of elementry school aged students.

Mentor & Organizer, Rooftop Variables, Columbia University, 2008 - 2014
Mentored Anthony Finney, high school science teacher, and his class in astronomy education, telescope and CCD usage.
Helped design more general curriculum to teach public school science teachers the basics of observational astronomy and telescope/CCD use.

Volunteer & Lecturer, Public Outreach, Columbia University, 2007 - 2014
Telescope and lecture volunteer for twice monthly outreach program

Lecture: "Comet of the Century?", *Columbia University*, New York, NY, Dec 2013

Lecture: "Strange Shapes: Spirals, Polygons, and Fractals in the Universe" *Columbia University*, New York, NY, February 2008

Weston Science Scholars Program Mentor, Montclair State University, 2006-2012
Mentor for 4-8 high school students for a six week research project. Developed curriculum and research project. Topics included "The Physics of Baseball", "Astrophotography", and "Solar Observing".

Head Teaching Assistant, Columbia University, 2009-2010
Oversaw all undergraduate astronomy lab classes; organized graduate student teaching assistants; coordinated mid-term and final grading for all undergraduate astronomy classes; handled enrollment and final grades.

Lab Instructor, Columbia University, 2007 - 2010
Astronomy 1403: "Earth, Moon & Planets"
Astronomy 1404: "Beyond the Solar System"

PUBLICATIONS, referreed

1. "Keck/Palomar Cosmic Web Imagers (KCWI/PCWI) Reveal an Enormous Ly Nebula in an Extremely Overdense QSO Pair Field at z=2.45". Z. Cai, **E. T. Hamden**, M. Matuszewski, J. X. Prochaska, Q. Li, S. Cantalupo, F. A. Battaia, C. Martin, J. D. Neill, D. O'Sullivan, R. Wang, A. Moore, P. Morrissey. *Submitted to Astrophysical Journal, Letters*, 2018.
2. "High-efficiency UV/optical/NIR detectors for large aperture telescopes and UV explorer missions: development of and field observations with delta-doped arrays". S. Nikzad; A. D. Jewell; M. E. Hoenk; T. J. Jones; J. Hennessy; T. M. Goodsall; A. G. Carver; C. Shapiro; S. R. Cheng; **E. T. Hamden**; G. Kyne; D. C. Martin; D. Schiminovich; P. Scowen; K. France; S. McCandliss; & R. E. Lupu. *Journal of Astronomical Telescopes, Instruments, and Systems*, 3(3), 036002, Sept 2017.
3. "Discovery of an Enormous Lyα nebula in a massive galaxy overdensity at $z = 2.3$", Z. Cai, Z. Fan, Y. Yang, F. Bian, J. X. Prochaska, A. Zabludoff, I. McGreer, Z. Zheng, R. Green, S. Cantalupo, B. Frye, **E. Hamden,** L. Jiang, N. Kashikawa, R. Wang. *Astrophysical Journal*, 837:71, Mar. 2017
4. "CCD detectors with high QE at UV wavelengths". **E. T. Hamden**, A. D. Jewell, C. A. Shapiro, S. R. Cheng, T. M. Goodsall, J. Hennessy, M. E. Hoenk, T. J. Jones, S. Gordon, H. Ong, D. Schiminovich, D. C. Martin, S. Nikzad. *Journal of Astronomical Telescopes, Instruments, and Systems* 2(3), 036003, Sep. 2016.
5. "The Diffuse Galactic Far Ultraviolet Sky". **E. T. Hamden**, D. Schiminovich, and M. Seibert. *Astrophysical Journal*, 799:180H, Dec. 2013
6. "Atomically precise surface engineering of silicon CCDs for enhanced UV quantum efficiency". F. Greer, **E. T. Hamden**, B. C. Jacquot, M. E. Hoenk, T. J. Jones, M. R. Dickie, S. P. Monacos, and S. Nikzad. *Journal of Vacuum Science and Technology A*, 31:01A103, Sept. 2013 *Cover Article*
7. "The GALFA-H I Compact Cloud Catalog". D. R. Saul, J. E. G. Peek, J. Grcevich, M. E. Putman, K. A. Douglas, E. J. Korpela, S. Stanimirović, C. Heiles, S. J. Gibson, M. Lee, A. Begum, A. R. H. Brown, B. Burkhart, **E. T. Hamden**, N. M. Pingel, and S. Tonnesen. *Astrophysical Journal*, 758:44, Oct. 2012.

8. "Ultraviolet anti-reflection coatings for use in silicon detector design". **E. T. Hamden**, F. Greer, M. E. Hoenk, J. Blacksberg, M. R. Dickie, S. Nikzad, D. C. Martin, and D. Schiminovich. *Applied Optics*, 50:4180–4188, July 2011.
9. "Delta-doped electron-multiplied CCD with absolute quantum efficiency over 50% in the near to far ultraviolet range for single photon counting applications". S. Nikzad, M. E. Hoenk, F. Greer, B. Jacquot, S. Monacos, T. J. Jones, J. Blacksberg, **E. T. Hamden**, D. Schiminovich, *Applied Optics*, 51:365, Jan. 2011.
10. "Measuring Transverse Motions for Nearby Galaxy Clusters". **E. T. Hamden**, C. M. Simpson, K. V. Johnston, and D. M. Lee. *Astrophysical Journal, Letters*, 716:L205–L208, June 2010.
11. "Kinematic Structure of the Orion Nebula Cluster and its Surroundings". G. Fűrész, L. W. Hartmann, S. T. Megeath, A. H. Szentgyorgyi, and **E. T. Hamden**. *Astrophysical Journal*, 676:1109–1122, Apr. 2008.

PUBLICATIONS, unreferreed

1. Gillian Kyne, Erika T. Hamden, Nicole R. Lingner, Patrick Morrissey, Shouleh Nikzad, D. Christopher Martin, "The faint intergalactic-medium red-shifted emission balloon: future UV observations with EMCCDs", Proceedings of SPIE Vol. 9915, 991507 (2016)
2. Robert Grange, Bruno Milliard, Gerard R. Lemaitre, Samuel Quiret, Sandrine Pascal, Alain Orign, Erika T. Hamden, David Schiminovich, "Fireball multi object spectrograph: as-built optic performances", Proceedings of SPIE Vol. 9905, 990531 (2016)
3. Erika T. Hamden, Nicole R. Lingner, Gillian Kyne, Patrick Morrissey, D. Christopher Martin, "Noise and dark performance for FIREBall-2 EMCCD delta-doped CCD detector", Proceedings of SPIE Vol. 9601, 96010O (2015)
4. April D. Jewell, Erika T. Hamden, Hwei Ru Ong, John Hennessy, Timothy M. Goodsall, Charles A. Shapiro, Samuel R. Cheng, Todd J. Jones, Alexander G. Carver, Michael E. Hoenk, David Schiminovich, D. Christopher Martin, Shouleh Nikzad, "Detector performance for the FIREBall-2 UV experiment", Proceedings of SPIE Vol. 9601, 96010N (2015)
5. Erika T. Hamden, April D. Jewell, Samuel Gordon, John Hennessy, Michael E. Hoenk, Shouleh Nikzad, David Schiminovich, D. Christopher Martin, "High efficiency CCD detectors at UV wavelengths", Proceedings of SPIE Vol. 9144, 91442X (2014)
6. Erika T. Hamden, Frank Greer, David Schiminovich, Shouleh Nikzad, D. Christopher Martin, "UV photon-counting CCD detectors that enable the next generation of UV spectroscopy missions: AR coatings that can achieve 80-90% QE", Proceedings of SPIE Vol. 8453, 845309 (2012)

ACADEMIC SERVICE & MEMBERSHIP

Review Panel Member: SPARCS CubeSat Systems Requirements Review, 2018

Caltech Colloquium Committee: Postdoc Representative, 2017-2018

Time Allocation Committee: Caltech Optical Observatories, 2017A & 2017B

Review Panel: NASA APRA, 2016, 2018

Review Panel: NASA NESSF, 2016, 2017, 2018

Workshop Organizer, panel moderator, speaker: July 28, 2015
Astronomical Spectroscopy with Electron-Multiplied CCDs (EMCCDs)
Caltech and JPL one day workshop discussing applications, challanges, and future uses for EMCCDS in astronomical spectroscopy. Thirty participants.

Member: American Astronomical Society, 2008-present

Member: SPIE, 2008-present

SKILLS

Languages & Software: IDL, Lab View, TFCalc, Zemax, Solid Works, LaTex, Altium
Machinery and Technology: JPL MDL class 1000 clean room certified (2008-present), atomic layer deposition (Beneq and Oxford), AJA dielectric sputtering, ellipsometry, thermal evaporation, reflectance/transmittance measurement, surface metrology

SELECTED CONFERENCES and TALKS

Colloquium: Cal State Los Angeles, Los Angeles, CA, October 2017

Colloquium: University of California, Santa Cruz, CA, May 2017

Colloquium: Pomona College, Claremont, CA, March 2017

Colloquium: Carnegie Observatories, Pasadena, CA, March 2017

Colloquium: Columbia University, New York, NY, February 2017

Invited Seminar: University of Chicago, Chicago, IL, January 2017

Invited Seminar: University of Toronto, Toronto, Ontario, Canada, January 2017

Colloquium: University of Arizona, Tucson, AZ, January 2017

Colloquium: California Institute of Technology, Pasadena, CA, November 2016

Colloquium: University of California, San Diego, CA, October 2016

Colloquium: Montclair State University, Montclair, NJ, October 2016

Conference Talk: "FIREBall: future UV observations of the circumgalactic medium", *From Wall to Web*, Berlin, Germany, July 2016

Conference Talk: "The faint intergalactic medium redshifted emission balloon: FIREBall-2 ready for flight", *SPIE Astronomical Telescopes and Instrumentation*, Edinburgh, Scotland, June 2016

Conference Talk: "FIREBall: future UV observations of the circumgalactic medium", Carnegie Observatories Lunch Talk, Pasadena, CA, March 2016

Conference Talk: "Noise and dark performance for the FIREBall-2 EMCCD delta-doped UV optimized detector", *AAS*, Kissimmee, FL, January 2016

Conference Talk and Paper: "Noise and Dark Performance for the FIREBall-2 EMCCD detector", *SPIE Optics and Photonics*, San Diego, CA, August 2015

Conference Talk: "The Faint Intergalactic Redshifted Emission Balloon: future UV observations of the circumgalactic medium.", Dunlap Institute, University of Toronto, Toronto, Canada, August 2015

Conference Talk: "The Faint Intergalactic Redshifted Emission Balloon: future UV observations of the circumgalactic medium.", KNI/MDL Seminar, Pasadena, CA, May 2015

Lunch Talk: "FIREBall: UV observations of the circumgalactic medium at z$\sim$0.7", NOAO Friday Scientific Lunch Talks, Tucson, AZ, March 2015

Poster and Paper: "High efficiency CCD detectors at UV wavelengths", *SPIE Astronomical Telescopes and Instrumentation*, Montreal, Canada, July 2014

Poster: "The circumgalactic H-alpha spectrograph", *SPIE Astronomical Telescopes and Instrumentation*, Montreal, Canada, July 2014

Dissertation Talk: "FIREBall, CHaS, and the diffuse Universe", *AAS*, Washington, DC, January 2014

Poster: "The Diffuse Galactic Far Ultraviolet Sky", *Phases of the ISM*, Heidelberg, Germany, July 2013

Conference Talk: "FUV Signatures of Diffuse Galactic Clouds", *GALEXFest*, Pasadena, CA, September 2012

Conference Talk and Paper: "UV photon-counting CCD detectors that enable the next generation of UV spectroscopy missions: AR coatings that can achieve 80-90% QE", *SPIE Astronomical Telescopes and Instrumentation*, Amsterdam, The Netherlands, July 2012

Conference Talk: "FUV Signatures of Dusty Galactic Clouds", *AAS*, Austin, TX, January 2012

Attendee: *KISS Closing Workshop*, Pasadena, CA, Dec 2011

Poster: "UV Anti-Reflection Coatings", *KISS Workshop*, Pasadena, CA, August 2011

Conference Talk, Poster, and Paper: "Anti-Reflection Coatings for Silicon Ultraviolet Detectors" *Optical Interference Coatings*, Tucson, AZ, June 2010

Attendee: Single Photon Counting Detector Workshop, Pasadena, CA, January 25-29, 2010

Conference Talk and Poster: "The First Steps to a High Efficiency CCD Based UV Detector: Anti-Reflection Coatings for Increased Performance in the Space Ultraviolet" & "Rooftop Variables: Connecting New York City Astronomers with Public School Teachers" *AAS*, Washington, DC, January 2010

Attendee: *Canary Island Winter School on Local Group Cosmology*, Tenerife, Spain, November 2008

REFERENCES

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