

Michael P. Fitzgerald

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RESEARCH INTERESTS	Formation and evolution of circumstellar material, particularly extrasolar planets. Indirect and direct techniques for detection and characterization of planetary systems. High-contrast imaging of exoplanets and circumstellar debris. Design and construction of astronomical instruments.	
EDUCATION	University of California, Berkeley Ph.D., Astrophysics, 2007 M.A., Astrophysics, 2002	
	California Institute of Technology B.S., Engineering and Applied Science, 2000	
TECHNICAL PROJECTS	Co-Principal Investigator, Keck HISPEC instrument Co-Principal Investigator, TMT MODHIS instrument Co-Investigator, Keck SCALES instrument Co-Investigator, Keck LIGER instrument Co-Lead Organizer, TMT Planetary Systems Imager instrument Co-Principal Investigator, NIRSPEC Upgrade project Principal Investigator, OSIRIS Imager Upgrade project Lead Co-Investigator, Precision Near-Infrared Radial Velocities with NIRSPEC (concept study) Co-Investigator, Keck Adaptive Optics Optimization Project Lead Co-Investigator, Gemini Planet Imager Exoplanet Survey	2019 – present 2018 – present 2018 – present 2017 – present 2016 – present 2015 – 2020 2013 – 2020 2013 – 2015 2011 – present 2011 – present
SELECTED ROLES AND ACTIVITIES	Executive Committee Member, Keck KPIC instrument Director, UCLA Infrared Laboratory Associate Director, University of California Observatories Co-Chair, Keck Observatory Adaptive Optics Future Study Group Keck Observatory Science Steering Committee Member University of California Observatories Advisory Committee Member UCLA Chapter Lead, Institute for Scientist and Engineer Educators	2022 – present 2020 – present 2020 – present 2019 – present 2018 – present 2017 – present 2013 – 2020
OTHER PROFESSIONAL ACTIVITY HIGHLIGHTS	Co Organizer, CfAO Spring Retreat Co-Lead Organizer, “Getting to Know Your Adaptive Optics System,” CfAO Retreat Co-Lead Organizer, High-Contrast Imaging Session, Center for Adaptive Optics Retreat Lead Organizer, High-Contrast Imaging Session, Center for Adaptive Optics Retreat Lead Organizer, High-Contrast Imaging Session, Center for Adaptive Optics Retreat Co-Lead, Keck Institute for Space Studies Workshop, “Exoplanet Imaging and Characterization: Coherent Differential Imaging and Signal Detection Statistics”	2022 2020 2019 2018 2017 Aug., Dec. 2016

HONORS AND AWARDS	UCLA Dept. of Physics & Astronomy Teaching Award (Astro 3) UCLA Dept. of Physics & Astronomy Teaching Award (Astro 180) NASA Group Achievement Award, Exoplanet Laser Frequency Comb Team UCLA Dept. of Physics & Astronomy Teaching Award (Astro 3) UCLA Dept. of Physics & Astronomy Teaching Award (Astro 180) UCLA Dept. of Physics & Astronomy Teaching Award (Astro 180) UCLA Dept. of Physics & Astronomy Teaching Award (Astro 283) UCLA Dept. of Physics & Astronomy Teaching Award (Astro 283) 2008–2009 AAAS Newcomb Cleveland Prize Michelson Postdoctoral Fellow	Spring 2022 Fall 2017 2017 Spring 2017 Winter 2017 Spring 2016 Winter 2016 Winter 2014 2010 September, 2007 – June, 2010
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ACADEMIC EXPERIENCE	University of California, Los Angeles <i>Professor</i> <i>Associate Professor</i> <i>Assistant Professor</i> Research includes adaptive optics, coronagraphy, near- and mid-infrared imaging of circumstellar debris disks and extrasolar planets, and the design and construction of astronomical instrumentation. Member of the Infrared Laboratory. Instructor in the Department of Physics and Astronomy.	July, 2021 – present July, 2015 – June, 2021 July, 2009 – June, 2015
	<ul style="list-style-type: none"> • Astronomy 3 — Nature of the Universe (Spring 2012, Spring 2014, Winter 2015, Spring 2017, Winter 2019, Spring 2022, Fall 2022) • Astronomy 283 — Numerical and Statistical Methods in Astronomy (Winter 2012, Winter 2013, Winter 2014, Winter 2016, Winter 2018, Winter 2020, Winter 2022) • Astronomy 180 — Astrophysics Laboratory (Winter 2011, Fall 2011, Fall 2012, Fall 2013, Fall 2014, Spring 2016, Winter 2017, Fall 2017, Fall 2018, Fall 2019) • Physics 5A — Physics for Life Sciences Majors: Mechanics and Energy (Spring 2018) • Physics 6A — Physics for Life Sciences Majors: Mechanics (Spring 2015) 	
	Lawrence Livermore National Laboratory <i>Michelson Postdoctoral Fellow</i> Research includes adaptive optics coronagraphy and mid-infrared imaging of circumstellar debris disks and extrasolar planets. Optical and opto-mechanical design of an adaptive optics polarimeter. Advised by Dr. Bruce Macintosh.	September, 2007 – June, 2010
	University of California, Berkeley <i>Graduate Student</i> Ph.D. research and graduate-level coursework in astrophysics. Course topics included radiation processes, gas and fluid dynamics, instrumentation, stellar structure and evolution, the interstellar medium, stellar dynamics and galactic structure, cosmology, and astrophysical computational techniques. Scientific research included study of circumstellar debris through adaptive optics coronagraphy, detection of substellar companions, and high-precision astrometry with adaptive optics. A particular emphasis was on advancing experimental technique. Instrumentation work included implementation of new detector readout schemes on theIRCAL camera, and development of a point-spread function reconstructor on the Lick adaptive optics system. Primarily advised by Professor James Graham.	August, 2000 – August, 2007
	<i>Graduate Student Instructor</i> Head graduate student instructor conducting upper-level undergraduate optical astronomy laboratory.	August – December, 2002
	<ul style="list-style-type: none"> • AY 120 — Optical Astronomy Laboratory (Fall 2002) 	
	<i>Graduate Student Instructor</i>	August, 2000 – May, 2001

Conducted discussion sections and office hours for introductory astronomy courses.

- AY 12 — The Planets (Spring 2001)
- AY 10 — Introduction to Astronomy (Fall 2000)

California Institute of Technology

Undergraduate Student

September, 1996 – June, 2000

Courses included classical and quantum physics, mechanical engineering, electrical engineering (emphasis on digital circuits), optics (including astronomical instrumentation), continuous and discrete-time signal processing, computational and neural systems, applied mathematics, and control of dynamical systems.

PUBLICATIONS

- Lin, J.,[†] **Fitzgerald, M. P.**, Xin, Y., Guyon, O., Leon-Saval, S., Norris, B., Jovanovic, N. “Focal-plane wavefront sensing with photonic lanterns II: characterization and optimization.” In preparation.
- Kim, Y. J.,[†] **Fitzgerald, M. P.**, Lin, J.,[†] Sallum, S., Xin, Y., Jovanovic, N., and Leon-Saval, S. “Coherent Imaging with Photonic Lanterns.” Submitted to *AAS Journals*.
- Crotts, K. A., Matthews, B. C., Duchêne, G., Esposito, T. M., Dong, R., Hom, J., Oppenheimer, R., Rice, M., Wolff, S. G., Chen, C. H., Do Ó, C. R., Kalas, P., Lewis, B. L., Weinberger, A. J., Wilner, D. J., Ammons, M., Arriaga, P., De Rosa, R. J., Debes, J. H., **Fitzgerald, M. P.**, Gonzales, E. C., Hines, D. C., Hinkley, S., Hughes, A. M., Kolokolova, L., Lee, E., Mazoyer, J., Metchev, S., Millar-Blanchaer, M. A., Nielsen, E. L., Patience, J., Perrin, M. D., Pueyo, L., Rantakyrö, F. T., Ren, B. B., Schneider, G., Soummer, R., and Stark, C. C. “A Uniform Analysis of Debris Disks with the Gemini Planet Imager I: An Empirical Search for Perturbations from Planetary Companions in Polarized Light Images.” Submitted to *AAS Journals*.
- Xin, Y., Xuan, J. W., Mawet, D., Wang, J., Ruane, G., Echeverri, D., Jovanovic, N., Do O, C., **Fitzgerald, M. P.**, Horstman, K., Hsu, C.-C., Liberman, J., López, R.,[†] Phillips, C. L., Ren, B. R., Ruffio, J.-B., and Sappey, B. “On-sky speckle nulling through a single-mode fiber with the Keck Planet Imager and Characterizer.” Submitted to *Journal of Astronomical Telescopes, Instruments, and Systems*.
- Carter, A. L., Hinkley, S., Kammerer, J., Skemer, A., Biller, B. A., Leisenring, J. M., Millar-Blanchaer, M. A., Petrus, S., Stone, J. M., Ward-Duong, K., Wang, J. J., Girard, J. H., Hines, D. C., Perrin, M. D., Pueyo, L., Balmer, W. O., Bonavita, M., Bonnafont, M., Chauvin, G., Choquet, E., Christiaens, V., Danielski, C., Kennedy, G. M., Matthews, E. C., Miles, B. E., Patapis, P., Ray, S., Rickman, E., Sallum, S., Stapelfeldt, K. R., Whiteford, N., Zhou, Y., Absil, O., Boccaletti, A., Booth, M., Bowler, B. P., Chen, C. H., Currie, T., Fortney, J. J., Grady, C. A., Greenbaum, A. Z., Henning, T., Hoch, K. K. W., Janson, M., Kalas, P., Kenworthy, M. A., Kervella, P., Kraus, A. L., Lagage, P.-O., Liu, M. C., Macintosh, B., Marino, S., Marley, M. S., Marois, C., Matthews, B. C., Mawet, D., McElwain, M. W., Metchev, S., Meyer, M. R., Molliere, P., Moran, S. E., Morley, C. V., Mukherjee, S., Pantin, E., Quirrenbach, A., Rebollido, I., Ren, B. B., Schneider, G., Vasist, M., Worthen, K., Wyatt, M. C., Briesemeister, Z. W., Bryan, M. L., Calissendorff, P., Cantaloube, F., Cugno, G., De Furio, M., Dupuy, T. J., Factor, S. M., Faherty, J. K., **Fitzgerald, M. P.**, Franson, K., Gonzales, E. C., Hood, C. E., Howe, A. R., Kuzuhara, M., Lagrange, A.-M., Lawson, K., Lazzoni, C., Lew, B. W. P., Liu, P., Lloyd, J. P., Llop-Sayson, J., Martinez, R. A., Mazoyer, J., Quanz, S. P., Adams Redai, J., Samland, M., Schlieder, J. E., Tamura, M., Tan, X., Uyama, T., Vigan, A., Vos, J. M., Wagner, K., Wolff, S. G., Ygouf, M., Zhang, X., Zhang, K. and Zhang, Z, “The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems I: High Contrast Imaging of the Exoplanet HIP 65426 b from 2–16 μm ,” Submitted to *AAS Journals*.

Jovanovic, N., Gatkine, P., Anugu, N., Amezcua-Correa, R., Basu Thakur, R., Beichman, C., Ben-

der, C., Berger, J.-P., Bigioli, A., Bland-Hawthorn, J., Bourdarot, G., Bradford, C. M., Broeke, R., Bryant, J., Bundy, K., Cheriton, R., Cvetojevic, N., Diab, M., Diddams, S. A., Dinkelaker, A. N., Duis, J., Eikenberry, S., Ellis, S., Endo, A., Figer, D. F., **Fitzgerald, M.**, Gris-Sanchez, I., Gross, S., Grossard, L., Guyon, O., Haffert, S. Y., Halverson, S., Harris, R. J., He, J., Herr, T., Hottinger, P., Huby, E., Ireland, M., Jenson-Clem, R., Jewell, J., Jocou, L., Kraus, S., Labadie, L., Lacour, S., Laugier, R., Lawniczuk, K., Lin, J.,[†] Leifer, S., Leon-Saval, S., Martin, G., Martinache, F., Martinod, M.-A., Mazin, B. A., Minardi, S., Monnier, J. D., Moreira, R., Mourard, D., Shankar Nayak, A., Norris, B., Obrzud, E., Perraut, K., Reynaud, F., Sallum, S., Schiminovich, D., Schwab, C., Serbayn, E., Soliman, S., Stoll, A., Tang, L., Tuthill, P., Vahala, K., Vasisht, G., Veilleux, V., Walter, A. B., Wollack, E. J., Xin, Y., Yang, Z., Yerolatsitis, S., Zhang, Y., and Zou, C.-L. “2023 Astrophotonics Roadmap: pathways to realizing multi-functional integrated astrophotonic instruments.” Submitted to *JPhys Photonics*.

Kennedy, G. M., Lovell, J. B., Kalas, P., and **Fitzgerald, M. P.** “ALMA and Keck analysis of Fomalhaut field sources: JWST’s Great Dust Cloud is a background object.” *Monthly Notices of the Royal Astronomical Society*, in press.

Yimiao Zhang, S., Duchêne, G., De Rosa, R. J., Ansdel, M., Konopacky, Q., Esposito, T., Chiang, E., Rice, M., Matthews, B., Kalas, P., Macintosh, B., Marchis, F., Metchev, S., Patience, J., Rameau, J., Ward-Duong, K., Wolff, S., **Fitzgerald, M. P.**, Bailey, V. P., Barman, T. S., Bulger, J., Chen, C. H., Chilcotte, J. K., Cotten, T., Doyon, R., Follette, K. B., Gerard, B. L., Goodsell, S., Graham, J. R., Greenbaum, A. Z., Hibon, P., Hung, L.-W., Ingraham, P., Maire, J., Marley, M. S., Marois, C., Millar-Blanchaer, M. A., Nielsen, E. L., Oppenheimer, R., Palmer, D. W., Perrin, M. D., Poyneer, L. A., Pueyo, L., Rajan, A., Rantakyrö, F. T., Ruffio, J.-B., Savransky, D., Schneider, A. C., Sivaramakrishnan, A., Song, I., Soummer, R., Thomas, S., Wang, J. J., and Wiktorowicz, S. J. “Testing the Interaction Between a Substellar Companion and a Debris Disk in the HR 2562 System.” *Astronomical Journal*, in press.

Finnerty, L.,[†] Schofield, T., Sapye, B., Xuan, J. W., Ruffio, J.-B., Wang, J. J., Delorme, J.-R., Blake, G. A., Buzard, C., **Fitzgerald, M. P.**, Baker, A., Bartos, R., Bond, C. Z., Calvin, B.,[†] Cetre, S., Doppmann, G., Echeverri, D., Jovanovic, N., López, R.,[†] Martin, E. C., Mawet, D., Morris, E., Pezzato, J., Skemer, A., Venenciano, T., Wallace, J. K., Wallack, N. L., Wang, J., and Wizinowich, P. “Keck/KPIC Emission Spectroscopy of WASP-33b.” *Astronomical Journal*, 166 (2023): 31 (19pp).

Li, Y., Brandt, T. D., Brandt, M., An, Q., Franson, K., Dupuy, T. J., Chen, M., Bowens-Rubin, R., Lewis, B. L.,[†] Bowler, B. P., Gibbs, A.,[†] Kiman, R., Faherty, J., Currie, T., Jensen-Clem, R., Contreras-Martinez, E., **Fitzgerald, M. P.**, Mazin, B. A., and Millar-Blanchaer, M. “Surveying Nearby Brown Dwarfs with HGCA: Direct Imaging Discovery of a Faint, High-Mass Brown Dwarf Orbiting HD 176535 A.” *MNRAS*, 522 (2023): 5622 (16pp).

Miles, B. E., Biller, B. A., Patapis, P., Worthen, K., Rickman, E., Hoch, K. K. W., Skemer, A., Perrin, M. D., Chen, C. H., Mukherjee, S., Morley, C. V., Moran, S. E., Bonnefoy, M., Petrus, S., Carter, A. L., Choquet, E., Hinkley, S., Ward-Duong, K., Leisenring, J. M., Millar-Blanchaer, M. A., Pueyo, L., Ray, S., Stapelfeldt, K. R., Stone, J. M., Wang, J. J., Absil, O., Balmer, W. O., Boccaletti, A., Bonavita, M., Booth, M., Bowler, B. P., Chauvin, G., Christiaens, V., Currie, T., Danielski, C., Fortney, J. J., Girard, J. H., Greenbaum, A. Z., Henning, T., Hines, D. C., Janson, M., Kalas, P., Kammerer, J., Kenworthy, M. A., Kervella, P., Lagage, P.-O., Lew, B. W. P., Liu, M. C., Macintosh, B., Marino, S., Marley, M. S., Marois, C., Matthews, E. C., Matthews, B. C., Mawet, D., McElwain, M. W., Metchev, S., Meyer, M. R., Molliere, P., Pantin, E., Rebollido, I., Quirrenbach, A., Ren, B. B., Vasist, M., Wyatt, M. C., Zhou, Y., Briesemeister, Z. W., Bryan, M. L., Calissendorff, P., Cataloube, F., Cugno, G., De Furio, M., Dupuy, T. J., Factor, S. M., Faherty, J. K., **Fitzgerald, M. P.**, Franson, K., Gonzales, E. C., Hood, C. E., Howe, A. R., Kraus,

[†]Student under supervision

A. L., Kuzuhara, M., Lawson, K., Lazzoni, C., Liu, P., Llop-Sayson, J., Lloyd, J. P., Martinez, R. A., Mazoyer, J., Quanz, S. P., Adams Redai, J., Samland, M., Schlieder, J. E., Tamura, M., Tan, X., Uyama, T., Vigan, A., Vos, J. M., Wagner, K., Wolff, S. G., Ygouf, M., Zhang, K., and Zhang, Z, "The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems II: A 1 to 20 Micron Spectrum of the Planetary-Mass Companion VHS 1256-1257 b." *Astrophysical Journal Letters*, 946 (2023): L6 (19pp).

Ruffio, J.-B., Horstman, K., Mawet, D., Rosenthal, L. J., Batygin, K., Wang, J. J., Millar-Blanchaer, M., Wang, J., Fulton, B. J., Konopacky, Q. M., Agrawal, S., Hirsch, L. A., Howard, A. W., Blunt, S., Nielsen, E., Baker, A., Bartos, R., Bond, C. Z., Calvin, B.,[†] Cetre, S., Delorme, J.-R., Doppmann, G., Echeverri, D., Finnerty, L.,[†] **Fitzgerald, M. P.**, Jovanovic, N., López, R.,[†] Martin, E. C., Morris, E., Pezzato, J., Ruane, G., Sappey, B., Schofield, T., Skemer, A., Venenciano, T., Wallace, J. K., Wallack, N. L., Wizinowich, P., and Xuan, J. W. "Detecting exomoons from radial velocity measurements of self-luminous planets: application to observations of HR 7672 B and future prospects." *Astronomical Journal*, 165 (2023): 113 (13pp).

Terry, S. K., Lu, J. R., Turri, P., Ciurlo, A., Gautam, A. K., Do, T., **Fitzgerald, M. P.**, Ghez, A. M., Hosek Jr., M. W., and Witzel, G. "AIROPA IV: Validating Point Spread Function Reconstruction on Various Science Cases." *Journal of Astronomical Telescopes, Instruments, and Systems*, 9 (2023): 018003 (20pp).

Lewis, B.,[†] **Fitzgerald, M. P.**, Dodkins, R. H., Davis, K. K. and Lin, J.[†] "Speckle Space-Time Covariance in High-Contrast Imaging." *Astronomical Journal*, 165 (2023): 59 (17pp).

Wang, J., Wang, J., Ruffio, J.-B., Blake, G. A., Mawet, D., Baker, A., Bartos, R., Bond, C. Z., Calvin, B.,[†] Cetre, S., Delorme, J.-R., Doppmann, G., Echeverri, D., Finnerty, L.,[†] **Fitzgerald, M. P.**, Jovanovic, N., Lopez, R.,[†] Martin, E. C., Morris, E., Pezzato, J., Ragland, S., Ruane, G., Sappey, B., Schofield, T., Skemer, A., Venenciano, T., Wallace, J. K., Wizinowich, P., Xuan, J. W., Bryan, M. L., Roy, A., and Wallack, N. L. "Retrieving C and O Abundance of HR 8799 c by Combining High- and Low-Resolution Data." *Astronomical Journal*, 165 (2023): 4 (11pp).

Xin, Y., Jovanovic, N., Mawet, D., **Fitzgerald, M. P.**, Ruane, G., Echeverri, D., Lin, J.,[†] Leon-Saval, S., Gatkine, P., Kim, Y. J.,[†] Norris, B., and Sallum, S. "Efficient detection and characterization of exoplanets within the diffraction limit: nulling with a mode-selective photonic lantern." *Astrophysical Journal*, 938 (2022): 140 (12pp).

Xuan, J. W., Wang, J., Ruffio, J.-B., Knutson, H., Mawet, D., Mollière, P., Kolecki, J., Vigan, A., Mukherjee, S., Wallack, N., Wang, J., Baker, A., Bartos, R., Blake, G. A., Bond, C. Z., Bryan, M., Calvin, B.,[†] Cetre, S., Chun, M., Delorme, J.-R., Doppmann, G., Echeverri, D., Finnerty, L.,[†] **Fitzgerald, M. P.**, Horstman, K., Inglis, J., Jovanovic, N., López, R.,[†] Martin, E. C., Morris, E., Pezzato, J., Ragland, S., Ren, B., Ruane, G., Sappey, B., Schofield, T., Skemer, A., Venenciano, T., Wallace, J. K., and Wizinowich, P. "A Clear View of a Cloudy Brown Dwarf Companion from High-Resolution Spectroscopy." *Astrophysical Journal*, 937 (2022): 54 (25pp).

Ciurlo, A., Turri, P., Witzel, G., Lu, J. R., Do, T., Sitarski, B., **Fitzgerald, M. P.**, Ghez, A. M., Alvarez, C., Terry, S., Doppmann, G., Lyke, J., Ragland, S., Campbell, R., and Matthews, K. "AIROPA II: Modeling Instrumental Aberrations for Off-Axis Point Spread Functions in Adaptive Optics." *Journal of Astronomical Telescopes, Instruments, and Systems*, 8 (2022): 038007 (14pp).

Hinkley, S., Carter, A. L., Ray, S., Skemer, A., Biller, B., Choquet, E., Millar-Blanchaer, M. A., Sallum, S., Miles, B., Whiteford, N., Patapis, P., Perrin, M., Pueyo, L., Schneider, G., Stapelfeldt, K., Wang, J., Ward-Duong, K., Bowler, B. P., Boccaletti, A., Girard, J. H., Hines, D., Kalas, P., Kammerer, J., Kervella, P., Leisenring, J., Pantin, E., Zhou, Y., Meyer, M., Liu, M. C., Bonnefoy, M., Currie, T., McElwain, M., Metchev, S., Wyatt, M., Absil, O., Adams, J., Barman, T., Baraffe,

I., Bonavita, M., Booth, M., Bryan, M., Chauvin, G., Chen, C., Danielski, C., De Furio, M., Factor, S. M., **Fitzgerald, M. P.**, Fortney, J. J., Grady, C., Greenbaum, A., Henning, T., Hoch, K. K. W., Janson, M., Kennedy, G., Kenworthy, M., Kraus, A., Kuzuhara, M., Lagage, P.-O., Lagrange, A.-M., Launhardt, R., Lazzoni, C., Lloyd, J., Marino, S., Marley, M., Martinez, R., Marois, C., Matthews, B., Matthews, E. C., Mawet, D., Mazoyer, J., Phillips, M., Petrus, S., Quanz, S. P., Quirrenbach, A., Rameau, J., Rebollido, I., Rickman, E., Samland, M., Sargent, B., Schlieder, J. E., Sivaramakrishnan, A., Stone, J. M., Tamura, M., Tremblin, P., Uyama, T., Vasist, M., Vigan, A., Wagner, K., and Ygouf, M. “The JWST Early Release Science Program for the Direct Imaging and Spectroscopy of Exoplanetary Systems,” *Publications of the Astronomical Society of the Pacific*, 134 (2022): 095003 (20pp).

Lin, J.,[†] **Fitzgerald, M. P.**, Xin, Y., Guyon, O., Leon-Saval, S., Norris, B., Jovanovic, N. “Focal-plane wavefront sensing with photonic lanterns I: theoretical framework.” *Journal of the Optical Society of America B*, 39 (2022): 2643 (14pp).

Kassis, M., Allen, S. L., Alvarez, C., Baker, A., Banyal, R. K., Bertz, R., Beichman, C., Brown, A., Brown, M., Bundy, K., Cabak, G., Cetre, S., Chin, J., Chun, M. R., Cooke, J., Delorme, J., Deich, W., Dekany, R. G., Devenot, M., Doppmann, G., Edelstein, J., **Fitzgerald, M. P.**, Fucik, J. R., Gao, M., Gibson, S., Gillingham, P. R., Gomez, P., Gottschalk, C., Halverson, S., Hill, G., Hinz, P., Holden, B. P., Howard, A. W., Jones, T., Jovanovic, N., Kirby, E., Krishnan, S., Kupke, R., Lanclos, K., Larkin, J. E., Leifer, S. D., Lewis, H. A., Lille, S., Lu, J. R., Lyke, J. E., MacDonald, N., Martin, C., Mather, J., Matuszewski, M., Mawet, D., McCarney, B., McGurk, R., Marin, E., Millar-Blanchaer, M. A., Nance, C., Nash, R. B., Neill, J. D., O’Meara, J. M., Peretz, E., Poppett, C., Konopacky, Q., Radovan, M. V., Ragland, S., Rider, K., Roberts, M., Rockosi, C., Roy, A., Rubenzahl, R., Sallum, S., Sandford, D., Savage, M., Shen, B., Simha, S., Skemer, A. J., Steidel, C. C., Stelter, D., Suerndran, A., Thorne, J., Walawender, J., Westfall, K. B., Wizinowich, P., Vahala, K., Wright, S., Wold, T., and Yeh, S. “Innovations and advances in instrumentation at the W. M. Keck Observatory, vol. II.” *Proceedings of the SPIE*, 12184 (2022): 4 (20pp).

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Do, T., **Fitzgerald, M. P.**, Ammons, S. M., Crossfield, I., Yelda, S., Armstrong, J. D., Severson, S. “A Fourier Optics and Wavefront Sensing Laboratory.” *ASP Conference Series* 436 (2010): 160–170.

Perrin, M. D., Graham, J. R., Larkin, J. E., Wiktorowicz, S., Maire, J., Thibault, S., **Fitzgerald, M. P.**, Doyon, R., Macintosh, B. A., Gavel, D. T., Oppenheimer, B. R., Palmer, D. W., Saddlemeyer, L., Wallace, J. K. “Imaging Polarimetry with the Gemini Planet Imager.” *Proceedings of the SPIE*, 7736 (2010): 192–200.

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Fitzgerald, M. P., Kalas, P., Graham, J. R. “Orbital Constraints on the β Pic Inner Planet Candidate with Keck Adaptive Optics.” *Astrophysical Journal* 706 (2009): L41–45.

Chen, C. H., **Fitzgerald, M. P.**, Smith, P. S. “A Possible Icy Kuiper Belt around HD 181327,” *Astrophysical Journal* 689 (2008): 539–544.

Kalas, P., Graham, J. R., Chiang, E., **Fitzgerald, M. P.**, Clampin, M., Kite, E. S., Stapelfeldt, K., Marois, C., Krist, J. “Optical Images of an Exosolar Planet 25 Light-Years from Earth,” *Science* 322 (2008): 1345-1348.

Maness, H. L., **Fitzgerald, M. P.**, Paladini, R., Kalas, P., Duchêne, G., Graham, J. R. “CARMA Millimeter-Wave Aperture Synthesis Imaging of the HD 32297 Debris Disk,” *Astrophysical Journal* 686 (2008): L25–28.

Kalas, P., Duchêne, G., **Fitzgerald, M. P.**, Graham, J. R. “Discovery of an Extended Debris Disk Around the F2V Star HD 15745,” *Astrophysical Journal* 671 (2007): L161–164.

Fitzgerald, M. P., Kalas, P. G., Graham, J. R. “A Ring of Warm Dust in the HD 32297 Debris Disk,” *Astrophysical Journal* 670 (2007): 557–564.

Fitzgerald, M. P., Kalas, P. G., Duchêne, G., Pinte, C., Graham, J. R. “The AU Mic Debris Disk: Multiwavelength Imaging and Modeling,” *Astrophysical Journal* 670 (2007): 536–556.

Kalas, P., **Fitzgerald, M. P.**, Graham, J. R. “Discovery of Extreme Asymmetry in the Debris Disk Surrounding HD 15115,” *Astrophysical Journal* 661 (2007): L85–88.

Kalas, P., Graham, J. R., Clampin, M. C., and **Fitzgerald, M. P.** “First Scattered Light Images of Debris Disks around HD 53143 and HD 139664,” *Astrophysical Journal* 637 (2006): L57–60.

Fitzgerald, M. P., and Graham, J. R. “Speckle Statistics in Adaptively Corrected Images,” *Astrophysical Journal* 637 (2006): 541–547.

SELECTED PRESENTATIONS

Fitzgerald, M. P. “Future with Large Telescopes (TMT+)” Kavili ExoFrontiers Forum, Cambridge, UK, June 2019 (invited).

Fitzgerald, M. P. “Overview of the Planetary Systems Imager” Adaptive Optics for Extremely Large Telescopes 6, Quebec City, Canada, July 2019.

Fitzgerald, M. P. “Project Update for the Planetary Systems Imager” Thirty Meter Telescope Science Forum, Pasadena, California, USA, December 2018.

Fitzgerald, M. P. “The planetary systems imager: a high-contrast instrumentation platform for the Thirty Meter Telescope” SPIE Astronomical Telescopes and Instrumentation, Austin, Texas, USA, June 2018.

Fitzgerald, M. P. “A Program for High-Contrast Imaging at TMT” Thirty Meter Telescope Science Forum, Mysore, India, November 2017.

Fitzgerald, M. P. “TMT High-Contrast Exoplanet Science” Thirty Meter Telescope Science Forum, Kyoto, Japan, May 2016 (invited).

Fitzgerald, M. P. “An Instrument for Imaging and Spectroscopy of Planetary Systems with TMT,” Adaptive Optics for ELTs 4, Lake Arrowhead, California, USA, October 2015.

Fitzgerald, M. P. “The Gemini Planet Imager Exoplanet Survey Debris Disk Imaging Campaign,” The Sprit of Lyot 2015, Montreal, Canada, June.

- Fitzgerald, M. P. "Revealing Planet Formation through High-Contrast Imaging of Exoplanets and Circumstellar Debris," University of Toronto, Canada, November 2014 (invited).
- Fitzgerald, M. P. "Revealing Planet Formation through High-Contrast Imaging of Exoplanets and Circumstellar Debris," University of California, Los Angeles, USA, October 2014 (invited).
- Fitzgerald, M. P. "Planet Formation Revealed by High-Contrast Imaging," California State University, Long Beach, USA, April 2014 (invited).
- Fitzgerald, M. P. "Formation of Extrasolar Planets," Gemini North Adaptive Optics Workshop, Victoria, BC, Canada, June 2012 (invited).
- Fitzgerald, M. P. "High-Contrast Imaging of Extrasolar Planets and Circumstellar Debris," California State University, Los Angeles, USA, May 2012 (invited).
- Fitzgerald, M. P. "Gemini Planet Imager: Instrument Status and Campaign Overview," Center for Adaptive Optics Fall Retreat, Lake Arrowhead, California, USA, November 2011.
- Fitzgerald, M. P. "High Spatial Resolution Imaging of a Dynamically Perturbed Debris Disk," Extreme Solar Systems II, Jackson, Wyoming, USA, September 2011.
- Fitzgerald, M. P. "Adaptive Optics Imaging of Circumstellar Debris Disks," OCIW Colloquium, Pasadena, California, USA, June 2011 (invited).
- Fitzgerald, M. P. "Adaptive Optics Imaging of Circumstellar Debris Disks," Caltech Astronomy Colloquium, May 2011 (invited).
- Fitzgerald, M. P. "High-Contrast Imaging of Circumstellar Disks," Center for Adaptive Optics Fall Retreat, Lake Arrowhead, California, USA, November 2009 (invited review).
- Fitzgerald, M. P. "High-Contrast Imaging Orbital Constraints of the β Pic b Planet Candidate," 2009 Sagan/Michelson Fellows Symposium, Pasadena, California, USA, November 2009 (invited).
- Fitzgerald, M. P. "Adaptive Optics Coronagraphy of Circumstellar Debris Disks," 214th Meeting of the American Astronomical Society, Pasadena, California, USA, June 2009 (invited).
- Fitzgerald, M. P. "Tracing Planet Formation through Circumstellar Debris," University of California, Los Angeles, USA, April 2009 (invited).
- Fitzgerald, M. P., Graham, J. R., Kalas, P. G., Duchêne, G. "Thermal Emission from a Newly Resolved Debris Disk: HD 131835," 213th Meeting of the American Astronomical Society, Long Beach, California, USA, January 2009.
- Fitzgerald, M. P., Graham, J. R., Kalas, P. G., Duchêne, G. "Thermal Emission from a Newly Resolved Debris Disk: HD 131835," New Light on Young Stars: Spitzer's View of Circumstellar Disks, Pasadena, California, USA, October 2008.
- Fitzgerald, M. P., Kalas, P. G., Graham, J. R., Duchêne, G., Pinte, C. "High-Resolution Imaging and Modeling of Circumstellar Debris: Architectures of Planetary Systems," 207th Meeting of the American Astronomical Society, Seattle, Washington, USA, January 2007.
- Fitzgerald, M. P., Kalas, P. G., Duchêne, G., Pinte, C., Graham, J. R. "Keck AO and Circumstellar Debris," Center for Adaptive Optics Fall Retreat, Yosemite, California, USA, November 2006.

Fitzgerald, M. P., Kalas, P. G., Duchêne, G., Pinte, C., Graham, J. R. "The AU Mic Debris Disk: Multiwavelength Imaging and Modeling," Keck Science Meeting, University of California, Irvine, California, USA, September 2006.

Fitzgerald, M. P., Gates, E., Gavel, D., Palmer, D. "PSF Reconstruction at Lick." Center for Adaptive Optics Spring Retreat, University of California, Santa Cruz, California, USA, March 2006.

Fitzgerald, M. P., Graham, J. R., Poyneer, L. A. "Experimental Characterization of High Contrast Imaging through Atmospheric Turbulence." Center for Adaptive Optics Fall Retreat, Lake Arrowhead, California, USA, November 2005.

Fitzgerald, M. P., Graham, J. R., Kalas, P., and Matthews, B.C. "High Resolution Near-Infrared Imaging of the Debris Disk around AU Mic." 205th Meeting of the American Astronomical Society, San Diego, California, USA, January 2005.

Fitzgerald, M. P., Kalas, P., Graham, J. R. "AO Coronagraphy of a Circumstellar Debris Disk: Multicolor Imaging of AU Microscopii." Center for Adaptive Optics Fall Retreat, Lake Arrowhead, California, USA, November 2004.

Fitzgerald, M. P. "Astrometry with Adaptive Optics." Astrometry 2004, Flagstaff, Arizona, USA, October 2004.

Fitzgerald, M. P. "Status of PSF Reconstruction at Lick Observatory." Workshop on Adaptive Optics Point Spread Function Reconstruction, Victoria, British Columbia, Canada, May 2004.

Fitzgerald, M. P. "PSF Reconstruction at Lick - Introduction and Status Report." Center for Adaptive Optics Fall Retreat, Yosemite, California, USA, September 2003.

COMPUTER SKILLS

- Languages: x86 ASM, DSP5600x ASM, BASIC, FORTRAN, Pascal, C, C++, Unix shell scripting, Tcl/Tk, Perl, Python.
- High-level numerical languages: Mathematica, Matlab, IDL, Numerical Python.
- Large-scale computing: MPI.
- Applications: L^AT_EX, common word processing, spreadsheet, database, and presentation software. Revision control systems (CVS, svn, bzr, git). Optical design tools (e.g. ZEMAX), mechanical design (SolidWorks), and project management software.
- Operating Systems: Unix/Linux, Macintosh, Windows, VxWorks.
- General: Experience in digital circuit design, digital signal processors, real-time controllers, and UNIX system administration.

OTHER ACADEMIC AND PROFESSIONAL EXPERIENCE

Professional Experience

- *Keck Interferometer Project, Jet Propulsion Laboratory* **February – July, 2000**
Software development for fringe tracker. Under the direction of Drs. Mark Colavita and Gautam Vasisht.

Caltech Summer Undergraduate Research Fellowships

- *Keck Interferometer Project, Jet Propulsion Laboratory* **June – August, 1999**
See above.
- *Dept. of Artificial Intelligence, University of Edinburgh, Scotland* **June – August, 1998**
Designed and implemented communications protocol for autonomous robotic vehicle. Under the direction of Dr. John Hallam.
- *Stephen Quake Laboratory, California Institute of Technology* **June – August, 1997**
Assisted in design, fabrication, and testing of microfluidic arrays for processing of DNA samples.

Under the direction of Professor Stephen Quake.

Short Courses

- *Center for Adaptive Optics Professional Development Program* March 2–6, 2007
Workshop on facilitating inquiry-based educational activities.
- *Center for Adaptive Optics Professional Development Workshop* February 5–10, 2006
Introduction to facilitation of inquiry-based educational activities.
- *Center for Adaptive Optics Professional Development Workshop* March 16–21, 2005
Introduction to inquiry-based education.
- *Michelson Summer School* July 25–29, 2005
Emphasis on astrometric detection of extrasolar planets.
- *Michelson Summer School* July 20–23, 2004
Emphasis on nulling interferometry and coronagraphy.
- *Center for Adaptive Optics Summer School* August 9–15, 2003
Advanced instrumentation and techniques for adaptive optics.
- *Michelson Summer School* June 24–28, 2002
Fundamentals of long-baseline interferometry with emphasis in the near infrared.
- *SPIE Short Course: High Dynamic Range Coronagraphy* August 25, 2002

Other Pedagogy

- *Center for Adaptive Optics Summer School* July 31 – August 5, 2016
Lecturer, “Measuring AO Performance.”
- *Center for Adaptive Optics Summer School* August 3–8, 2014
Lecturer, “Measuring AO Performance.”
- *Center for Adaptive Optics Summer School* August 4–9, 2013
Lecturer, “Measuring AO Performance.”
- *Center for Adaptive Optics Summer School* August 5–10, 2012
Lecturer, “Measuring AO Performance.”
- *Dunlap Institute Instrumentation Summer School* July 29–August 3, 2012
Laboratory Instructor, “Wavefront Sensing.”
- *UCLA Research Experience for Undergraduates* Summer, 2011
Supervised an undergraduate research student.
- *Center for Adaptive Optics Summer School* August 7–12, 2011
Lecturer, “Measuring AO Performance.”
- *Center for Adaptive Optics Summer School* August 8–13, 2010
Lecturer, “Measuring AO Performance.”
- *Center for Adaptive Optics Summer School* August 9–14, 2009
Director.
- *Center for Adaptive Optics Fall Retreat* November 6–9, 2008
Instructor, Career Development Workshop: Project Management.
- *Center for Adaptive Optics Summer School* August 4–8, 2008
Instructor, Fourier Optics laboratory.
- *Center for Adaptive Optics Summer School* August 6–10, 2007
Instructor, Fourier Optics laboratory.
- *Center for Adaptive Optics Summer School* August 4–11, 2006
Instructor, Fourier Optics laboratory.
- *Center for Adaptive Optics Mainland Internship Program* Summer, 2006
Supervised a community college student.