

Michael P. Fitzgerald

CONTACT INFORMATION

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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	2019 – present
Co-Principal Investigator, TMT MODHIS instrument	2018 – present
Co-Investigator, Keck SCALES instrument	2018 – present
Co-Investigator, Keck LIGER instrument	2017 – present
Co-Lead Organizer, TMT Planetary Systems Imager instrument	2016 – present
Co-Principal Investigator, NIRSPEC Upgrade project	2015 – 2020
Principal Investigator, OSIRIS Imager Upgrade project	2013 – 2020
Lead Co-Investigator, Precision Near-Infrared Radial Velocities with NIRSPEC (concept study)	2013 – 2015
Co-Investigator, Keck Adaptive Optics Optimization Project	2011 – present
Lead Co-Investigator, Gemini Planet Imager Exoplanet Survey	2011 – present

SELECTED ROLES AND ACTIVITIES

Executive Committee Member, Keck KPIC instrument	2022 – present
Director, UCLA Infrared Laboratory	2020 – present
Associate Director, University of California Observatories	2020 – present
Co-Chair, Keck Observatory Adaptive Optics Future Study Group	2019 – 2024
Keck Observatory Science Steering Committee Member	2018 – 2024
University of California Observatories Advisory Committee Member	2017 – present
UCLA Chapter Lead, Institute for Scientist and Engineer Educators	2013 – 2020

OTHER PROFESSIONAL ACTIVITY HIGHLIGHTS

Co-Lead Organizer, “Astrophotonics,” CfAO Retreat	2024
Co-Lead Organizer, “Keck High-Contrast Testbed,” CfAO Retreat	2023
Co Organizer, CfAO Spring Retreat	2022
Co-Lead Organizer, “Getting to Know Your Adaptive Optics System,” CfAO Retreat	2020
Co-Lead Organizer, High-Contrast Imaging Session, Center for Adaptive Optics Retreat	2019
Lead Organizer, High-Contrast Imaging Session, Center for Adaptive Optics Retreat	2018
Lead Organizer, High-Contrast Imaging Session, Center for Adaptive Optics Retreat	2017
Co-Lead, Keck Institute for Space Studies Workshop, “Exoplanet Imaging and Characterization: Coherent Differential Imaging and Signal Detection Statistics”	Aug., Dec. 2016

HONORS AND
AWARDS

UCLA Dept. of Physics & Astronomy Teaching Award (Astro 180)	Spring 2023
UCLA Dept. of Physics & Astronomy Teaching Award (Astro 3)	Spring 2022
UCLA Dept. of Physics & Astronomy Teaching Award (Astro 180)	Fall 2017
NASA Group Achievement Award, Exoplanet Laser Frequency Comb Team	2017
UCLA Dept. of Physics & Astronomy Teaching Award (Astro 3)	Spring 2017
UCLA Dept. of Physics & Astronomy Teaching Award (Astro 180)	Winter 2017
UCLA Dept. of Physics & Astronomy Teaching Award (Astro 180)	Spring 2016
UCLA Dept. of Physics & Astronomy Teaching Award (Astro 283)	Winter 2016
UCLA Dept. of Physics & Astronomy Teaching Award (Astro 283)	Winter 2014
2008–2009 AAAS Newcomb Cleveland Prize	2010
Michelson Postdoctoral Fellow	September, 2007 – June, 2010

ACADEMIC
EXPERIENCE

University of California, Los Angeles

Professor

July, 2021 – present

Associate Professor

July, 2015 – June, 2021

Assistant Professor

July, 2009 – June, 2015

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.

- Astronomy 3 — Nature of the Universe (Spring 2012, Spring 2014, Winter 2015, Spring 2017, Winter 2019, Spring 2022, Fall 2022, Fall 2024, Winter 2025)
- Astronomy 142 — Data and Computation in Astrophysics (Fall 2023)
- Astronomy 180 — Astrophysics Laboratory (Winter 2011, Fall 2011, Fall 2012, Fall 2013, Fall 2014, Spring 2016, Winter 2017, Fall 2017, Fall 2018, Fall 2019, Spring 2023)
- Astronomy 283 — Numerical and Statistical Methods in Astronomy (Winter 2012, Winter 2013, Winter 2014, Winter 2016, Winter 2018, Winter 2020, Winter 2022, Winter 2024)
- 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

Michelson Postdoctoral Fellow

September, 2007 – June, 2010

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.

University of California, Berkeley

Graduate Student

August, 2000 – August, 2007

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 the IRCAL camera, and development of a point-spread function reconstructor on the Lick adaptive optics system. Primarily advised by Professor James Graham.

Graduate Student Instructor

August – December, 2002

Head graduate student instructor conducting upper-level undergraduate optical astronomy laboratory.

- AY 120 — Optical Astronomy Laboratory (Fall 2002)

Graduate Student Instructor

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

López, R.[†] **Fitzgerald, M. P.** et al. “The Warp of HD 110058.” In preparation.

Xin, Y., Echeverri, D., Jovanovic, N., Lin, J.,[†] Kim, Y. J.,[†] Mawet, D., Leon-Saval, S., Amezcua-Correa, R., Yerolatsitis, S., **Fitzgerald, M.**, Gatkine, P., Norris, B., Ruane, G., and Sallum, S. “Implicit Electric Field Conjugation with a Photonic Lantern Nuller.” Submitted to *Journal of Astronomical Telescopes, Instruments, and Systems*.

Kalas, P., Wang, J. J., Millar-Blanchaer, M. A., Ren, B. B., Wyatt, M. C., Kennedy, G. N., Sommer, M., Esposito, T. M., De Rosa, R. J., **Fitzgerald, M.** “Fireworks around Fomalhaut: A second violent planetesimal collision imaged in just 20 years.” Submitted.

Lin, J.,[†] **Fitzgerald, M. P.**, Xin, Y., Kim, Y. J.,[†] Guyon, O., Norris, B., Betters, C., Leon-Saval, S., Ahn, K., Deo, V., Lozi, J., Vievard, S., Levinstein, D., Sallum, S., and Jovanovic, N. “Experimental and on-sky demonstration of spectrally dispersed wavefront sensing using a photonic lantern.” *Optics Letters*, in press.

Finnerty, L.,[†] Xin, Y., Xuan, J. W., Inglis, J., **Fitzgerald, M. P.**, Agrawal, S., Baker, A., Bartos, R., Blake, G. A., Calvin, B.,[†] Cetre, S., Delorme, J.-R., Doppmann, G., Echeverri, D., Hsu, C.-C., Jovanovic, N., Liberman, J., López, R. A., Martin, E. C., Mawet, D., Morris, E., Pezzato, J., Ruffio, J.-B., Sappey, B., Schofield, T., Skemer, A., Venenciano, T., Wallace, J. K., Wallack, N. L., Wang, J. J., and Wang, J. “Water dissociation and rotational broadening in the atmosphere of KELT-20 b from high-resolution spectroscopy.” *Astronomical Journal*, in press.

Sappey, B., Konopacky, Q., Do Ó, C. R., Barman, T., Ruffio, J.-B., Wang, J., Theissen, C. A., Finnerty, L.,[†] Xuan, J., Hortsman, K., Mawet, D., Zhang, Y., Inglis, J., Wallack, N. L., Sanghi, A., Baker, A., Bartos, R., Blake, G. A., Bond, C. Z., Calvin, B.,[†] Cetre, S., Delorme, J.-R., Doppmann, G., Echeverri, D., **Fitzgerald, M. P.**, Hsu, C.-C., Jovanovic, N., Liberman, J., Lopez, R. A., Martin, E. C., Morris, E., Pezzato-Rovner, J., Phillips, C. L., Ruane, G., Schofield, T., Skemer, A., Venenciano, T., Wallace, J. K., Wang, J., Wizinowich, P., and Xin, Y. “HD 206893 B at High Spectral Resolution with the Keck Planet Imager and Characterizer (KPIC).” *Astronomical Journal*, in press.

Calvin, B.,[†] **Fitzgerald, M. P.**, and Ragland, S. “The Simultaneous Operation of a Controllable Segmented Primary Mirror and Single Conjugate Adaptive Optics System part 2 - Simulated Operation.” *Journal of Astronomical Telescopes, Instruments, and Systems*, 11 (2025): 019004 (18pp).

Calvin, B.,[†] and **Fitzgerald, M. P.**, “The Simultaneous Operation of a Controllable Segmented Primary Mirror and Single Conjugate Adaptive Optics System part 1 - Design Concept and Sensitivity Analysis.” *Journal of Astronomical Telescopes, Instruments, and Systems*, 11 (2025): 019003 (16pp).

[†]Student under supervision

Jovanovic, N., Echeverri, D., Delorme, J.-R., Finnerty, L.,[†] Schofield, T., Wang, J. J., Xin, Y., Xuan, J., Wallace, J. K., Mawet, D., Sanghi, A., Baker, A., Bartos, R., Bond, C. Z., Calvin, B., Cetre, S., Doppmann, G., **Fitzgerald, M. P.**, Fucik, J., Gao, M., Ge, J., Guthery, C., Horstman, K., Hsu, C.-C., Liberman, J., Leifer, S., Lilley, S., Lopez, R., Marin, E., Martin, E. C., Mennesson, B., Morris, E., Nash, R., Pezzato, J., Porter, M., Roberts, M., Ruane, G., Ruffio, J.-R., Sappey, B., Serabyn, E., Shen, B., Skemer, A., Wang, J., Wetherell, E., Wizinowich, P., Salama, M., Chambouleyron, V., Jensen-Clem, R., and Beichmn, C. “Technical description and performance of the phase II version of the Keck Planet Imager and Characterizer.” *Journal of Astronomical Telescopes, Instruments, and Systems*, 11 (2025): 015005 (28pp).

Finnerty, L.,[†] Xin, Y., Xuan, J. W., Inglis, J., **Fitzgerald, M. P.**, Agrawal, S., Baker, A., Bartos, R., Blake, G. A., Calvin, B., Cetre, S., Delorme, J.-R., Doppmann, G., Echeverri, D., Horstman, K., Hsu, C.-C., Jovanovic, N., Liberman, J., Lopez, R., Martin, E. C., Mawet, D., Morris, E., Pezzato-Rovner, J., Ruffio, J.-B., Sappey, B., Schofield, T., Skemer, A., Venenciano, T., Wallace, J. K., Wallack, N. L., Wang, J. J., and Wang, J. “True mass and atmospheric composition of the non-transiting hot Jupiter HD 143105 b.” *Astronomical Journal*, 169 (2025): 94 (14pp).

Hsu, C.-C., Wang, J. J., Blake, G. A., Xuan, J. W., Zhang, Y., Ruffio, J.-B., Horstman, K., Cronin, J., Sappey, B., Xin, Y., Finnerty, L.,[†] Baker, A., Echeverri, D., Mawet, D., Jovanovic, N., Do O, C. R., Bartos, R., Calvin, B., Cetre, S., Delorme, J.-R., Doppmann, G. W., **Fitzgerald, M. P.**, Liberman, J., Lopez, R. A., Morris, E., Pezzato-Rovner, J., Schofield, T., Skemer, A., Wallace, J. K., and Wang, J. “PDS 70b Shows Stellar-like Carbon-to-Oxygen Ratio.” *Astrophysical Journal Letters*, 977 (2024): L47 (9pp).

Lewis, B. L.,[†] Li, Y., Gibbs, A.,[†] **Fitzgerald, M. P.**, Brandt, T., Bardalez Gagliuffi, D., An, Q., Chen, M., Bowens-Rubin, R., Salama, M., Lozi, J., Jensen-Clem, R., and Mazin, B. “SCEXAO/CHARIS Spectroscopic Characterization of Cloudy L/T Transition Companion Brown Dwarf HIP 93398 B.” *Astrophysical Journal*, 977 (2024): 247 (15pp).

Lin, J.,[†] and **Fitzgerald, M. P.** “Nonlinear techniques for few-mode wavefront sensors.” *Applied Optics*, 63 (2024): 8738 (10pp).

Vievard, S., Lallement, M., Leon-Saval, S., Guyon, O., Jovanovic, N., Huby, E., Lacour, S., Lozi, J., Deo, V., Ahn, K., Lucas, M., Sallum, S., Norris, B., Betters, C., Amezcua-Correa, R., Yerolatsitis, S., **Fitzgerald, M. P.**, Lin, J.,[†] Kim, Y. J.,[†] Gatkine, P., Kotani, T., Tamura, M., Currie, T., Kenchington, H.-D. Martin, G., and Perrin, G. “Spectroscopy using a visible photonic lantern at the Subaru telescope: Laboratory characterization and first on-sky demonstration on Ikiiki (α Leo) and ‘Aua (α Ori).” *Astronomy & Astrophysics* 691 (2024): A140 (14pp).

Kim, Y. J.,[†] **Fitzgerald, M. P.**, Lin, J.,[†] Lozi, J., Vievard, S., Xin, Y., Levinstein, D., Jovanovic, N., Leon-Saval, S., Betters, C., Guyon, O., Norris, B., and Sallum, S. “Spectral characterization of a 3-port photonic lantern for application to spectroastrometry.” *Journal of Astronomical Telescopes, Instruments, and Systems* 10 (2024): 45004 (16pp).

Gibbs, A. B.,[†] Lewis, B. L.,[†] **Fitzgerald, M. P.**, Brandt, T. D., Chen, M., Li, Y., Bowens-Rubin, R., Jensen-Clem, R., and Mazin, B. A. “Subaru/CHARIS High-Resolution Mode Spectroscopy of the Brown Dwarf Companion HD 33632 Ab.” *Astrophysical Journal* 973 (2024): 119 (12pp).

Horstman, K., Ruffio, J.-B., Batygin, K., Mawet, D., Baker, A., Hsu, C.-C., Wang, J. J., Wang, J., Blunt, S., Xuan, J. W., Xin, Y., Liverman, J., Agrawal, S., Konopacky, Q. M., Blake, G. A., Do Ó, C. R., Bartos, R., Bond, Z. Z., Calvin, B., Cetre, S., Delorme, J.-R., Doppmann, G., Echeverri, D., Finnerty, L.,[†] **Fitzgerald, M. P.**, Jovanovic, N., López, R. A., Martin, E. C., Morris, E., Pezzato, J., Ruane, G., Sappey, B., Schofield, T., Skemer, A., Venenciano, T., Wallace, J. K., Wallack, N. L., and Wizinowich, P. “RV measurements of directly imaged brown dwarf GQ Lup B to search for

exo-satellites.” *Astronomical Journal* 168 (2024): 175 (10pp).

Kim, Y. J.,[†] **Fitzgerald, M. P.**, Lin, J.,[†] Xin, Y., Levinstein, D., Sallum, S., Jovanovic, N., Leon-Saval, S., “On the Potential of Spectroastrometry with Photonic Lanterns.” *Journal of Astronomical Telescopes, Instruments, and Systems* 10 (2024): 045001 (18pp).

Morris, E. C., Wang, J. J., Hsu, C.-C., Ruffio, J.-B., Xuan, J. W., Delorme, J.-R., Hood, C., Bryan, M. L., Martin, E. C., Pezzato, J., Mawet, D., Skemer, A., Baker, A., Bartos, R., Calvin, B.,[†] Cetre, S., Doppmann, G., Echeverri, D., Finnerty, L.,[†] **Fitzgerald, M. P.**, Jovanovic, N., Liberman, J., Lopez, R., Sappey, B., Schofield, T., Wallace, J. K., and Wang, J. “ κ And B is a Fast Rotator from KPIC High Resolution Spectroscopy.” *Astronomical Journal* 168 (2024): 144 (11pp).

Lewis, B.,[†] **Fitzgerald, M. P.**, Esposito, T. M., Arriaga, P., López, R. A., Crotts, K. A., Duchêne, G., Follette, K. B., Hom, J., Kalas, P., Matthews, B. C., Millar-Blanchaer, M., Wilner, D. J., Mazoyer, J., and Macintosh, B. “Gemini Planet Imager Observations of a Resolved Low-Inclination Debris Disk Around HD 156623.” *Astronomical Journal* 168 (2024): 142 (14pp).

Li, Y., Brandt, T. D., An, Q., Franson, K., Currie, T., Chen, M., Wang, L., Dupuy, T. J., Bowens-Rubin, R., Salama, M., Lewis, B. L.,[†] Gibbs, A.,[†] Bowler, B. P., Jensen-Clem, R., Faherty, J., **Fitzgerald, M. P.**, Mazin, B. A., and Millar-Blanchaer, M. “The Keck-HGCA Accelerating Stars Pilot Survey II: Direct Imaging Discovery of HD 63754 B, a ~ 20 au Massive Companion Near the Hydrogen Burning Limit.” *Monthly Notices of the Royal Astronomical Society* 533 (2024): 3501 (16pp).

Zhang, Y., Xuan, J. W., Mawet, D., Wang, J., Hsu, C.-C., Ruffio, J.-B., Knutson, H. A., Inglis, J., Blake, G. A., Chachan, Y., Horstman, K., Baker, A., Bartos, R., Calvin, B., Cetre, S., Delorme, J.-R., Doppmann, G., Echeverri, D., Finnerty, L.,[†] **Fitzgerald, M. P.**, Jovanovic, N., Liberman, J., López, R. A., Morris, E., Pezzato, J., Sappey, B., Schofield, T., Skemer, A., Wallace, J. K., Wang, J., and Do Ó, C. R. “Atmospheric characterization of the super-Jupiter HIP 99770 b with KPIC.” *Astronomical Journal* 168 (2024): 131 (14pp).

Levinstein, D. M., Sallum, S., Kim, Y. J.,[†] Lin, J.,[†] Jovanovic, N., **Fitzgerald, M. P.**, Xin, Y., Guyon, O., Norris, B., Betters, C., Leon-Saval, S., Deo, V., Lozi, J., Vievard, S., and Ahn, H. “Identifying embedded accreting protoplanets at and within the diffraction limit using photonic lantern spectro-astrometry.” *Proceedings of the SPIE* 13095 (2024): 130952M (8pp).

Xin, Y., Echeverri, D., Jovanovic, N., Mawet, D., Leon-Saval, S., Amezcua-Correa, R., Yerolatsitis, S., **Fitzgerald, M. P.**, Gatkine, P., Kim, Y. J.,[†] Lin, J.,[†] Norris, B., Ruane, G., and Sallum, S. “Wavefront sensing and control for a photonic lantern nuller for exoplanet characterization.” *Proceedings of the SPIE* 13095 (2024): 1309505 (9pp).

Norris, B. R. M., Leon-Saval, S. G., Wei, J., Betters, C. H., Taras, A., Lin, J.,[†] Xin, Y., Kim, Y. J.,[†] **Fitzgerald, M.**, Sallum, S., Sengupta, A., Gatkine, P., Jovanovic, N., Mawet, D., Lozi, J., Vievard, S., Deo, V., Lallement, M., Levinstein, D., and Guyon, O. “The photonic lantern wavefront sensor and imager: focal plane wavefront sensing and optimal imaging at the diffraction limit and beyond.” *Proceedings of the SPIE* 13097 (2024): 130971I (9pp).

Kotani, T., Jovanovic, N., Sukegawa, T., Fucik, J., Kress, E., Baker, A., Gibson, R., Fitzgerald, M., Mawet, D., Takahashi, A., and Tamura, M. “Development of diffraction-limited, high-throughput Germanium echelle grating.” *Proceedings of the SPIE* 13100 (2024): 131005T (8pp).

Hsu, C.-C., Wang, J. J., Xuan, J. W., Ruffio, J.-B., Morris, E., Echeverri, D., Xin, Y., Liberman, J., Finnerty, L.,[†] Hortsman, K., Sappey, B., Doppmann, G. W., Mawet, D., Jovanovic, N., **Fitzgerald, M. P.**, Delorme, J.-R., Wallace, J. K., Baker, A., Bartos, R., Blake, G. A., Calvin, B., Cetre, S.,

López, R. A.,[†] Pezzato, J., Schofield, T., Skemer, A., and Wang, J. “Rotation and Abundances of the Benchmark Brown Dwarf HD 33632 Ab from Keck/KPIC High-resolution Spectroscopy.” *Astrophysical Journal* 971 (2024): 9 (26pp).

Heptonstall, A., Andersen, D., Taheri Nieh, M., Warad, K., **Fitzgerald, M.**, Konopacky, Q., Larkin, J., Mawet, D., Peng, E., Steidel, C., Suzuki, R., and Wright, S. “The First-Light Instrument Suite at TMT: capabilities and status update.” *Proceedings of the SPIE* 13096 (2024): 130960V (11pp).

Wiley, J., Brown, A., Kupke, R., Cosens, M., Wright, S. A., Maire, J., Magnone, K., Kress, E., Wang, E., Johnson, C., Larkin, J. E., **Fitzgerald, M. P.**, Kassis, M., and Jones, T. “Liger at W.M. Keck Observatory: imager structural analysis, fabrication, and characterization plan.” *Proceedings of the SPIE* 13096 (2024): 130967B (12pp).

Vievard, S., Lallement, M., Leon-Saval, S., Guyon, O., Jovanovic, N., Huby, E., Lacour, S., Lozi, J., Deo, V., Ahn, K., Lucas, M., Currie, T., Sallum, S., **Fitzgerald, M. P.**, Betters, C., Norris, B., Amezcua-Correa, R., Yerolatsitis, S., Lin, J.,[†] Kim, Y. J.,[†] Gatkin, P., Kotani, T., Tamura, M., Martin, G., Kenchington Goldsmith, H. D., and Perrin, G. “Visible photonic lantern integration, characterization, and on-sky testing on Subaru/SCEXAO.” *Proceedings of the SPIE* 13096 (2024): 130960P (12pp).

Sappey, B., Konopacky, Q., Maire, J., Baker, A., Jovanovic, N., Halverson, S., Gibson, R., Leifer, S., Ferrara, J., Bertz, R., Mawet, D., **Fitzgerald, M.**, Kassis, M., Bailey III, J. I., Fucik, J., Neill, D., Johnson, C., and Magnone, K. “Calibration unit design for Keck/High-Resolution Infrared Spectrograph for Exoplanet Characterization (HISPEC).” *Proceedings of the SPIE* 13096 (2024): 130966K (16pp).

Jovanovic, N., Sercel, G., Kotani, T., Bailey III, J. I., Baker, A., Soda, S., Takahashi, A., Lin, J.,[†] Kim, Y. J.,[†] **Fitzgerald, M. P.**, Vievard, S., Betters, C., Leon-Saval, S., Ferrara, J., Wold, T., Steiner, J., Thorne, J., Kassis, M., Tamura, M., and Mawet, D. “Overview and status of the fiber delivery subsystem (FIB) of Keck/HISPEC, the diffraction-limited y-K band spectrograph for exoplanet characterization.” *Proceedings of the SPIE* 13096 (2024): 130966I (17pp).

Brown, A. M., Wright, S. A., Wiley, J., Nash, R. B., Weber, B., Kress, E., Kupke, R., Larkin, J. E., Cosens, C., **Fitzgerald, M. P.**, Kassis, M., Johnson, C., Jones, T., Magnone, K., McGurk, R., Wang, E., Warad, K., and Yeh, S. “Liger at W.M. Keck Observatory: assembly, integration, and testing.” *Proceedings of the SPIE* 13096 (2024): 130967I (23pp).

Wright, S. A., Jones, T., Larkin, J., Kupke, R., Kassis, M., Brown, A., Andersen, D., Armus, L., Cale, B., Cosens, M., Chu, D., Do, T., Fassnacht, C., Fisher, D., **Fitzgerald, M.**, Ghez, A., Greene, J., Hayashi, T., Hees, A., Hirtenstein, J., Johnson, C., Keane, J., Kelly, P., Kirby, E., Karalidi, T., Konopacky, Q., Kress, E., Lu, J., Lyke, J., Magnone, K., Maire, J., McGurk, R., Medling, A., Millar-Blanchaer, M., Minor, Q., Nash, R., Nierenberg, A., Reddy, N., Rich, M., Ruffio, J.-B., Rundquist, N.-E., Sabhlok, S., Sand, D., Sanders, R., Sandstrom, K., Shapley, A., Sohn, J. M., Surya, A., Treu, T., Wang, E., Warad, K., Weber, R., Wiley, J., Wizinowich, P., Wong, M. H., and Yeh, S. “Liger at W.M. Keck Observatory: overall design and science drivers.” *Proceedings of the SPIE* 13096 (2024): 130960G (38pp).

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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, bazaar, 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*
Supervised a community college student.

Summer, 2006