

# Michael P. Fitzgerald

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## CONTACT INFORMATION

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## RESEARCH INTERESTS

Formation and evolution of circumstellar material, particularly extrasolar planets. Indirect and direct techniques for detection of planetary systems. High-contrast imaging of 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

## RESEARCH ACTIVITY HIGHLIGHTS

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|---|------------------------|
| Co-Lead, Keck Institute for Space Studies Workshop, “Exoplanet Imaging and Characterization: Coherent Differential Imaging and Signal Detection Statistics” | <b>Aug., Dec. 2016</b> |
| Co-Principal Investigator, NIRSPEC Upgrade project  | <b>2015 – present</b>  |
| Principal Investigator, OSIRIS Imager Upgrade project   | <b>2013 – present</b>  |
| Lead Co-Investigator, Precision Near-Infrared Radial Velocities with NIRSPEC (concept study)  | <b>2013 – 2015</b>     |
| Co-Investigator, Keck Adaptive Optics Optimization Project  | <b>2011 – present</b>  |
| Lead Co-Investigator, Gemini Planet Imager Exoplanet Survey   | <b>2011 – present</b>  |

## HONORS AND AWARDS

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| UCLA Dept. of Physics & Astronomy Teaching Award (Astro 180) | <b>Spring 2016</b>                  |
| UCLA Dept. of Physics & Astronomy Teaching Award (Astro 283) | <b>Winter 2016</b>                  |
| UCLA Dept. of Physics & Astronomy Teaching Award (Astro 283) | <b>Winter 2014</b>                  |
| 2008–2009 AAAS Newcomb Cleveland Prize                       | <b>2010</b>                         |
| Michelson Postdoctoral Fellow                                | <b>September, 2007 – June, 2010</b> |

## ACADEMIC EXPERIENCE

### University of California, Los Angeles

*Associate Professor*

**July, 2015 – present**

*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)
- Astronomy 283 — Numerical and Statistical Methods in Astronomy (Winter 2012, Winter 2013, Winter 2014, Winter 2016)
- Astronomy 180 — Astrophysics Laboratory (Winter 2011, Fall 2011, Fall 2012, Fall 2013, Fall 2014, Spring 2016, Winter 2017)
- 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), computational and neural systems, applied mathematics, control of dynamical systems.

### **PUBLICATIONS**

MacGregor, M. A., Matra, L., Kalas, P., Wilner, D. J., Pan, M., Kennedy, G. M., Wyatt, M. C., Duchene, G., Hughes, A. M., Rieke, G. H., Clampin, M., **Fitzgerald, M. P.**, Graham, J. R., Holland, W. S., Panic, O., Shannon, A., and Su, K. “A Complete ALMA Map of the Fomalhaut Debris Disk.” *AAS Journals*, in press.

Matrà, L., MacGregor, M. A., Kalas, P., Wyatt, M. C., Kennedy, G. M., Wilner, D. J., Duchene, G., Hughes, A. M., Pan, M., Shannon, A., Clampin, M., **Fitzgerald, M. P.**, Graham, J. R., Holland, W. S., Panić, O., and Su, K. Y. L. “Detection of exocometary CO within the 440 Myr-old Fomalhaut belt: a similar CO+CO<sub>2</sub> ice abundance in exocomets and Solar System comets.” *AAS Journals*, in press.

Rajan, A., Rameau, J., De Rosa, R. J., Marley, M. S., Graham, J. R., Macintosh, B., Marois, C., Morley, C., Patience, J., Pueyo, L., Saumon, D., Ward-Duong, K., Ammons, S. M., Arriaga, P., Bailey, V. P., Barman, T., Bulger, J., Burrows, A. S., Chilcote, J., Cotten, T., Czekala, I., Doyon, R., Duchêne, G., Esposito, T. M., **Fitzgerald, M. P.**, Follette, K. B., Fortney, J. J., Goodsell, S. J., Greenbaum, A. Z., Hibon, P., Hung, L.-W., Ingraham, P., Johnson-Groh, M., Kalas, P., Konopacky, Q., Lafrenière, D., Larkin, J. E., Maire, J., Marchis, F., Metchev, S., Millar-Blanchaer, M. A., Morzinski, K. M., Nielsen, E. L., Oppenheimer, R., Palmer, D., Patel, R. I., Perrin, M., Poyneer, L., Rantakyrö, F. T., Ruffio, J.-B., Savransky, D., Schneider, A. C., Sivaramakrishnan, A., Song, I.,

Soummer, R., Thomas, S., Vasisht, G., Wallace, J. K., Wang, J. J., Wiktorowicz, S., and Wolff, S. “Characterizing 51 Eri b from 1-5  $\mu\text{m}$ : a partly-cloudy exoplanet.” *AAS Journals*, in press.

Ruffio, J.-B., Macintosh, B., Wang, J. J., Pueyo, L., Nielsen, E. L., De Rosa, R. J., Czekala, I., Marley, M. S., Arriaga, P.,<sup>†</sup> Bailey, V. P., Barman, T., Bulger, J., Chilcote, J., Cotten, T., Doyon, R., Duchêne, G., **Fitzgerald, M. P.**, Follette, K. B., Gerard, B. L., Goodsell, S. J., Graham, J. R., Greenbaum, A. Z., Hibon, P., Hung, L.-W., Ingraham, P., Kalas, P., Konopacky, Q., Larkin, J. E., Maire, J., Marchis, F., Marois, C., Metchev, S., Millar-Blanchaer, M. A., Morzinski, K. M., Oppenheimer, R., Palmer, D., Patience, J., Perrin, M., Poyneer, L., Rajan, A., Rameau, J., Rantakyö, F. T., Savransky, D., Schneider, A. C., Sivaramakrishnan, A., Song, I., Soummer, R., Thomas, S., Wallace, J. K., Ward-Duong, K., Wiktorowicz, S., and Wolff, S. “Improving and Assessing Planet Sensitivity of the GPI Exoplanet Survey with a Forward Model Matched Filter.” *AAS Journals*, in press.

Follette, K. B., Rameau, J., Dong, R., Pueyo, L., Close, L. M., Duchêne, G., Fung, J., Leonard, C., Macintosh, B., Males, J. R., Marois, C., Millar-Blanchaer, M. A., Morzinski, K. M., Mullen, W., Perrin, M., Spiro, E., Wang, J., Ammons, S. M., Bailey, V. P., Barman, T., Bulger, J., Chilcote, J., Cotten, T., De Rosa, R. J., Doyon, R., **Fitzgerald, M. P.**, Goodsell, S. J., Graham, J. R., Greenbaum, A. Z., Hibon, P., Hung, L.-W., Ingraham, P., Kalas, P., Konopacky, Q., Larkin, J. E., Maire, J., Marchis, F., Metchev, S., Nielsen, E. L., Oppenheimer, R., Palmer, D., Patience, J., Poyneer, L., Rajan, A., Rantakyö, F. T., Savransky, D., Schneider, A. C., Sivaramakrishnan, A., Song, I., Soummer, R., Thomas, S., Vega, D., Wallace, J. K., Ward-Duong, K., Wiktorowicz, S., and Wolff, S. “Complex Spiral Structure in the HD 100546 Transitional Disk as Revealed by GPI and MagAO.” *AAS Journals*, in press.

Rameau, J., Follette, K. B., Pueyo, L., Marois, C., Macintosh, B., Millar-Blanchaer, M., Wang, J. J., Vega, D., Doyon, R., Lafrenière, D., Nielsen, E. L., Bailey, V., Chilcote, J. K., Close, L. M., Esposito, T. M., Males, J. R., Metchev, S., Morzinski, K. M., Ruffio, J.-B., Wolff, S. G., Ammons, S. M., Barman, T. S., Bulger, J., Cotten, T., De Rosa, R. J., Duchêne, G., **Fitzgerald, M. P.**, Goodsell, S., Graham, J. R., Greenbaum, A. Z., Hibon, P., Hung, L.-W., Ingraham, P., Kalas, P., Konopacky, Q., Larkin, J. E., Maire, J., Marchis, F., Oppenheimer, R., Palmer, D., Patience, J., Perrin, M. D., Poyneer, L., Rajan, A., Rantakyö, F. T., Marley, M. S., Savransky, D., Schneider, A. C., Sivaramakrishnan, A., Song, I., Soummer, R., Thomas, S., Wallace, J. K., Ward-Duong, K., and Wiktorowicz, S. “An Optical/Near-infrared Investigation of HD 100546 b with the Gemini Planet Imager and MagAO.” *Astronomical Journal*, 153 (2017): 244 (9pp).

Johnson-Groh, M., Marois, C., De Rosa, R. J., Nielsen, E. L., Rameau, J., Blunt, S., Vargas, J., Ammons, S. M., Bailey, V. P., Barman, T. S., Bulger, J., Chilcote, J. K., Cotten, T., Doyon, R., Duchêne, G., **Fitzgerald, M. P.**, Follette, K. B., Goodsell, S., Graham, J. R., Greenbaum, A. Z., Hibon, P., Hung, L.-W.,<sup>†</sup> Ingraham, P., Kalas, P., Konopacky, Q. M., Larkin, J. E., Macintosh, B., Maire, J., Marchis, F., Marley, M. S., Metchev, S., Millar-Blanchaer, M. A., Oppenheimer, R., Palmer, D. W., Patience, J., Perrin, M., Poyneer, L. A., Pueyo, L., Rajan, A., Rantakyö, F., Savransky, D., Schneider, A. C., Sivaramakrishnan, A., Song, I., Soummer, R., Thomas, S., Vega, D., Wallace, J. K., Wang, J. J., Ward-Duong, K., Wiktorowicz, S. J., and Wolff, S. G. “Integral Field Spectroscopy of the Substellar Companion HD 984 B with the Gemini Planet Imager.” *Astronomical Journal*, 153 (2017): 190 (13pp).

Chilcote, J., Pueyo, L., De Rosa, R. J., Vargas, J., Macintosh, B., Bailey, V. P., Barman, T., Bauman, B., Bruzzone, S., Bulger, J., Burrows, A. S., Cardwell, A., Chen, C. H., Cotten, T., Dillon, D., Doyon, R., Draper, Z. H., Duchêne, G., Dunn, J., Erikson, D., **Fitzgerald, M. P.**, Follette, K. B., Gavel, D., Goodsell, S. J., Graham, J. R., Greenbaum, A. Z., Hartung, M., Hibon, P., Hung, L.-W., Ingraham, P., Kalas, P., Konopacky, Q., Larkin, J. E., Maire, J., Marchis, F., Marley,

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<sup>†</sup>Student under supervision

M. S., Marois, C., Metchev, S., Millar-Blanchaer, M. A., Morzinski, K. M., Nielsen, E. L., Norton, A., Oppenheimer, R., Palmer, D., Patience, J., Perrin, M., Poyneer, L., Rajan, A., Rameau, J., Rantakyro, F. T., Sadakuni, N., Saddlemeyer, L., Savransky, D., Schneider, A. C., Serio, A., Sivaramakrishnan, A., Song, I., Soummer, R., Thomas, S., Wallace, J. K., Wang, J. J., Ward-Duong, K., Wiktorowicz, S., and Wolff, S. “1 to 2.4 Micron Near-IR Spectrum of the Giant Planet  $\beta$  Pictoris b Obtained with the Gemini Planet Imager.” *Astronomical Journal*, 153 (2017): 182 (15pp).

Nesvold, E. R., Naoz, S., and **Fitzgerald, M. P.** “HD 106906: A Case Study for External Perturbations of a Debris Disk.” *Astrophysical Journal Letters*, 837 (2017): L6 (7pp).

Nielsen, E. L., De Rosa, R. J., Wang, J., Rameau, J., Song, I., Graham, J. R., Macintosh, B., Ammons, M., Bailey, V. P., Barman, T. S., Bulger, J., Chilcote, J. K., Cotten, T., Doyon, R., Duchêne, G., **Fitzgerald, M. P.**, Follette, K. B., Greenbaum, A. Z., Hibon, P., Hung, L.-W.,<sup>†</sup> Ingraham, P., Kalas, P., Konopacky, Q. M., Larkin, J. E., Maire, J., Marchis, F., Marley, M. S., Marois, C., Metchev, S., Millar-Blanchaer, M. A., Oppenheimer, R., Palmer, D. W., Patience, J., Perrin, M. D., Poyneer, L. A., Pueyo, L., Rajan, A., Rantakyro, F. T., Savransky, D., Schneider, A. C., Sivaramakrishnan, A., Soummer, R., Thomas, S., Wallace, J. K., Ward-Duong, K., Wiktorowicz, S. J., and Wolff, S. G. “Dynamical Mass Measurement of the Young Spectroscopic Binary V343 Normae AaAb Resolved with the Gemini Planet Imager.” *Astronomical Journal*, 152 (2016): 175 (11pp).

Millar-Blanchaer, M. A., Wang, J., Kalas, P., Graham, J. R., Duchêne, G., Nielsen, E. L., Perrin, M., Moon, D.-S., Padgett, D., Metchev, S., Ammons, S. M., Bailey, V. P., Barman, T., Bruzzone, S., Bulger, J., Chen, C. H., Chilcote, J., Cotten, T., De Rosa, R. J., Doyon, R., Draper, Z. H., Esposito, T. M., **Fitzgerald, M. P.**, Gerard, B., Greenbaum, A. Z., Hung, L.-W.,<sup>†</sup> Ingraham, P., Johnson-Groh, M., Konopacky, Q., Larkin, J. E., Macintosh, B., Maire, J., Marchis, F., Marley, M. S., Marois, C., Matthews, B. C., Oppenheimer, R., Palmer, D., Patience, J., Poyneer, L., Pueyo, L., Rajan, A., Rameau, J., Rantakyro, F. T., Savransky, D., Schneider, A. C., Sivaramakrishnan, A., Song, I., Soummer, R., Thomas, S., Vega, D., Wallace, J. K., Ward-Duong, K., Wiktorowicz, S., and Wolff, S. “Imaging an 80 AU Radius Dust Ring around the F5V Star HD 157587.” *Astronomical Journal*, 152 (2016): 128 (12pp).

Wang, J. J., Graham, J. R., Pueyo, L., Kalas, P., Millar-Blanchaer, M. A., Ruffio, J.-B., De Rosa, R. J., Ammons, S. M., Arriaga, P.,<sup>†</sup> Bailey, V. P., Barman, T. S., Bulger, J., Burrows, A. S., Cardwell, A., Chen, C. H., Chilcote, J. K., Cotten, T., **Fitzgerald, M. P.**, Follette, K. B., Doyon, R., Duchêne, G., Greenbaum, A. Z., Hibon, P., Hung, L.-W.,<sup>†</sup> Ingraham, P., Konopacky, Q. M., Larkin, J. E., Macintosh, B., Maire, J., Marchis, F., Marley, M. S., Marois, C., Metchev, S., Nielsen, E. L., Oppenheimer, R., Palmer, D. W., Patel, R., Patience, J., Perrin, M. D., Poyneer, L. A., Rajan, A., Rameau, J., Rantakyro, F. T., Savransky, D., Sivaramakrishnan, A., Song, I., Soummer, R., Thomas, S., Vasisht, G., Vega, D., Wallace, J. K., Ward-Duong, K., Wiktorowicz, S. J., and Wolff, S. G. “The Orbit and Transit Prospects for  $\beta$  Pictoris b constrained with One Milliarcsecond Astrometry.” *Astronomical Journal*, 152 (2016): 97 (16pp).

Esposito, T. M.,<sup>†</sup> **Fitzgerald, M. P.**, Graham, J. R., Kalas, P., Lee, E. J., Chiang, E., Duchêne, G., Wang, J., Millar-Blanchaer, M. A., Nielsen, E., Ammons, S. M., Bruzzone, S., De Rosa, R. J., Draper, Z. H., Macintosh, B., Marchis, F., Metchev, S. A., Perrin, M., Pueyo, L., Rajan, A., Rantakyro, F. T., Vega, D., and Wolff, S. “Bringing ‘The Moth’ to Light: A Planet-Sculpting Scenario for the HD 61005 Debris Disk.” *Astronomical Journal*, 152 (2016): 85 (16pp).

Konopacky, Q. M., Rameau, J., Duchêne, G., Filippazzo, J. C., Giorla Godfrey, P. A., Marois, C., Nielsen, E. L., Pueyo, L., Rafikov, R. R., Rice, E. L., Wang, J. J., Ammons, S. M., Bailey, V. P., Barman, T. S., Bulger, J., Bruzzone, S., Chilcote, J. K., Cotten, T., Dawson, R. I., De Rosa, R. J., Doyon, R., Esposito, T. M., **Fitzgerald, M. P.**, Follette, K. B., Goodsell, S., Graham, J. R., Hibon, P., Hung, L.-W.,<sup>†</sup> Ingraham, P., Kalas, P., Lafrenière, D., Larkin, J. E., Macintosh,

B. A., Maire, J., Marchis, F., Marley, M. S., Matthews, B. C., Metchev, S., Millar-Blanchaer, M. A., Oppenheimer, R., Palmer, D. W., Patience, J., Perrin, M. D., Poyneer, L. A., Rajan, A., Rantakyro, F. T., Savransky, D., Schneider, A. C., Sivaramakrishnan, A., Song, I., Soummer, R., Thomas, S., Wallace, J. K., Ward-Duong, K., Wiktorowicz, S. J., and Wolff, S. G. “Discovery of a Substellar Companion to the Nearby Debris Disk Host HR 2562.” *Astrophysical Journal Letters*, 829 (2016): L4 (7pp).

Ragland, S., Jolissaint, L., van Dam, M. A., Chock, J., Kwok, S., Mader, J., Witzel, G., Do, T., **Fitzgerald, M.**, Ghez, A., Lu, J., Martinez, G., Morris, M. R., and Sitarski, B. “Point Spread Function Determination for Keck Adaptive Optics.” *Proceedings of the SPIE*, 9909 (2016): 99091P-1 (18pp).

Witzel, G., Lu, J. R., Ghez, A. M., Martinez, G. D., **Fitzgerald, M. P.**, Britton, M., Sitarski, B. N., Do, T., Campbell, R. D., Service, M., Matthews, K., Morris, M. R., Becklin, E. E., Wizinowich, P. L., Ragland, S., Doppmann, G., Neyman, C., Lyke, J., Kassis, M., Rizzi, L., Lilley, S., and Rampy, R. “The AIROPA software package – Milestones for testing general relativity in the strong gravity regime with AO.” *Proceedings of the SPIE*, 9909 (2016): 99091O-1 (13pp).

Mawet, D., Wizinowich, P., Dekany, R., Chun, M., Hall, D., Cetre, S., Guyon, O., Wallace, J. K., Bowler, B., Liu, M., Ruane, G., Serabyn, E., Bartos, R., Wang, J., Vasisht, G., **Fitzgerald, M.**, Skemer, A., Ireland, M., Fucik, J., Fortney, J., Crossfield, I., Hu, R., Benneke, B., Absil, O., and the EU vortex team. “Keck Planet Imager and Characterizer: concept and phased implementation.” *Proceedings of the SPIE*, 9909 (2016): 99090D-1 (7pp).

Hung, L.-W.,<sup>†</sup> Bruzzone, S., Millar-Blanchaer, M. A., Wang, J. J., Arriaga, P.,<sup>†</sup> Metchev, S., **Fitzgerald, M. P.**, Sivaramakrishnan, A., Perrin, M., and the GPIES team. “Gemini Planet Imager Observational Calibration XII: Photometric Calibration in the Polarimetry Mode.” *Proceedings of the SPIE*, 9908 (2016): 99083A-1 (13pp).

Perrin, M. D., Ingraham, P., Follette, K. B., Maire, J., Wang, J. J., Savransky, D., Arriaga, P.,<sup>†</sup> Bailey, V. P., Bruzzone, S., Chilcote, J. K., De Rosa, R. J., Draper, Z. H., **Fitzgerald, M. P.**, Greenbaum, A. Z., Hung, L.-W.,<sup>†</sup> Konopacky, Q., Macintosh, B., Marchis, F., Marois, C., Millar-Blanchaer, M. A., Nielsen, E. L., Rajan, A., Rameau, J., Rantakyro, F. T., Ruffio, J.-B., Ward-Duong, K., Wolff, S. G., and Zalesky, J. “Gemini Planet Imager Observational Calibrations XI: Pipeline Improvements and Enhanced Calibrations after Two Years on Sky.” *Proceedings of the SPIE*, 9908 (2016): 990837-1 (13pp).

Millar-Blanchaer, M. A., Perrin, M. D., Hung, L.-W.,<sup>†</sup> **Fitzgerald, M. P.**, and the GPIES team. “Gemini Planet Imager Observational Calibrations XIV: Polarimetric Contrasts and New Data Reduction Techniques.” *Proceedings of the SPIE*, 9908 (2016): 990836-1 (17pp).

Arriaga, P.,<sup>†</sup> **Fitzgerald, M. P.**, Lyke, J. E., Campbell, R. D., Wizinowich, P. L., and Adkins, S. M. “Modeling the transmission and thermal emission in a pupil image behind the Keck II adaptive optics system.” *Proceedings of the SPIE*, 9908 (2016): 990835-1 (6pp).

Martin, E. C.,<sup>†</sup> **Fitzgerald, M. P.**, McLean, I. S., Kress, E., and Wang, E. “Optical Design of the Slit-Viewing Camera for the NIRSPEC Upgrade.” *Proceedings of the SPIE*, 9908 (2016): 99082R-1 (6pp).

Boehle, A., Larkin, J. E., Adkins, S. M., Aliado, T., **Fitzgerald, M. P.**, Johnson, C. A., Lyke, J. E., Magnone, K. G., Sohn, J. M., Wang, E., and Weiss, J. L. “Upgrade of the detector in the integral field spectrograph OSIRIS at the W. M. Keck Observatory.” *Proceedings of the SPIE*, 9908 (2016): 99082Q-1 (13pp).

Adkins, S. M., McLean, I. S., **Fitzgerald, M. P.**, Larkin, J. E., Lewis, H. A., Martin, C., Mawet, D., Prochaska, J. X., and Wizinowich, P. “New developments in instrumentation at W. M. Keck Observatory.” *Proceedings of the SPIE*, 9908 (2016): 990805-1 (9pp).

Draper, Z. H., Duchêne, G., Millar-Blanchaer, M. A., Matthews, B. C., Wang, J. J., Kalas, P., Graham, J. R., Padgett, D., Ammons, S. M., Bulger, J., Chen, C., Chilcote, J. K., Doyon, R., **Fitzgerald, M. P.**, Follette, K. B., Gerard, B., Greenbaum, A. Z., Hibon, P., Hinkley, S., Macintosh, B., Ingraham, P., Lafrenière, D., Marchis, F., Marois, C., Nielsen, E. L., Oppenheimer, R., Patel, R., Patience, J., Perrin, M., Pueyo, L., Rajan, A., Rameau, J., Sivaramakrishnan, A., Vega, D., Ward-Duong, K., and Wolff, S. G. “The Peculiar Debris Disk of HD 111520 as Resolved by the Gemini Planet Imager.” *Astrophysical Journal*, 826 (2016): 147 (9pp).

Jensen-Clem, R., Millar-Blanchaer, M., Mawet, D., Graham, J. R., Wallace, J. K., Macintosh, B., Hinkley, S., Wiktorowicz, S. J., Perrin, M. D., Marley, M. S., **Fitzgerald, M. P.**, Oppenheimer, R., Ammons, S. M., Rantakyö, F. T., and Marchis, F. “Point Source Polarimetry with the Gemini Planet Imager. I. Sensitivity Characterization with T5.5 Dwarf Companion HD 19467 B.” *Astrophysical Journal*, 820 (2016): 111 (7pp).

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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. “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  $\beta$  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<sup>A</sup>T<sub>E</sub>X, 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.