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Painting with starlight : optical techniques for the high-contrast imaging of exoplanets

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Citation

Wilby, M. J. (2018, November 27). *Painting with starlight : optical techniques for the high-contrast imaging of exoplanets*. Retrieved from <https://hdl.handle.net/1887/67531>

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Title: Painting with starlight : optical techniques for the high-contrast imaging of exoplanets

Issue Date: 2018-11-27

Bibliography

- Adams, D. 1986, *The Hitch Hiker's Guide to the Galaxy: A Trilogy in Four Parts*, Hitch-hiker's Guide to the Galaxy Series (Heinemann)
- Aime, C. & Soummer, R. 2004, *ApJ*, 612, L85
- Alexander, R. D. & Armitage, P. J. 2007, *Monthly Notices of the Royal Astronomical Society*, 375, 500
- Amara, A. & Quanz, S. P. 2012, *MNRAS*, 427, 948
- Andrews, S. M., Wilner, D. J., Zhu, Z., et al. 2016, *ApJ*, 820, L40
- Anglada-Escudé, G., Amado, P. J., Barnes, J., et al. 2016, *Nature*, 536, 437
- Avenhaus, H., Quanz, S. P., Meyer, M. R., et al. 2014a, *ApJ*, 790, 56
- Avenhaus, H., Quanz, S. P., Schmid, H. M., et al. 2014b, *ApJ*, 781, 87
- Baraffe, I., Chabrier, G., Barman, T. S., Allard, F., & Hauschildt, P. H. 2003, *A&A*, 402, 701
- Barata, J. C. A. & Hussein, M. S. 2012, *Brazilian Journal of Physics*, 42, 146
- Baudoz, P., Dorn, R. J., Lizon, J.-L., et al. 2010, in *Proc. SPIE*, Vol. 7735, *Ground-based and Airborne Instrumentation for Astronomy III*, 77355B
- Baudoz, P., Rabbia, Y., & Gay, J. 2000, *A&AS*, 141, 319
- Benisty, M., Juhasz, A., Boccaletti, A., et al. 2015, *A&A*, 578, L6
- Benisty, M., Stolker, T., Pohl, A., et al. 2017, *A&A*, 597, A42
- Beuzit, J.-L., Feldt, M., Dohlen, K., et al. 2008, in *Proc. SPIE*, Vol. 7014, *Ground-based and Airborne Instrumentation for Astronomy II*, 701418
- Biller, B. A., Close, L. M., Lenzen, R., et al. 2006, in *IAU Colloq. 200: Direct Imaging of Exoplanets: Science and Techniques*, ed. C. Aime & F. Vakili, 571–576
- Biller, B. A., Close, L. M., Masciadri, E., et al. 2007, *ApJS*, 173, 143
- Biller, B. A., Liu, M. C., Rice, K., et al. 2015, *MNRAS*, 450, 4446
- Boehle, A., Glauser, A. M., Kenworthy, M. A., et al. 2018, in *Proc. SPIE*, Vol. 10702, *Ground-based and Airborne Instrumentation for Astronomy VII*, 10702 – 10702 – 8
- Bonnefoy, M., Zurlo, A., Baudino, J. L., et al. 2016, *A&A*, 587, A58
- Booth, M. J. 2003, *Proc. SPIE*, 5162, 79
- Borucki, W. J., Koch, D., Basri, G., et al. 2010, *Science*, 327, 977
- Boss, A. P. 2001, *ApJ*, 563, 367
- Brandl, B. R., Feldt, M., Glasse, A., et al. 2014, in *Proc. SPIE*, Vol. 9147, *Ground-based and Airborne Instrumentation for Astronomy V*, 914721
- Brauer, F., Dullemond, C. P., Johansen, A., et al. 2007, *A&A*, 469, 1169
- Brogi, M., Keller, C. U., de Juan Ovelar, M., et al. 2012a, *A&A*, 545, L5
- Brogi, M., Snellen, I. A. G., de Kok, R. J., et al. 2012b, *Nature*, 486, 502
- Brown, B. R. & Lohmann, A. W. 1969, *IBM Journal of Research and Development*, 13, 160
- Calvet, N., D'Alessio, P., Hartmann, L., et al. 2002, *ApJ*, 568, 1008
- Canovas, H., Ménard, F., Hales, A., et al. 2013, *A&A*, 556, A123

- Carrano, C. J., Olivier, S. S., Brase, J. M., Macintosh, B. A., & An, J. R. 1998, in *Proc. SPIE*, Vol. 3353, *Adaptive Optical System Technologies*, ed. D. Bonaccini & R. K. Tyson, 658–667
- Chabrier, G., Johansen, A., Janson, M., & Rafikov, R. 2014, *Protostars and Planets VI*, 619
- Chambers, J. E. 2006, *ApJ*, 652, L133
- Changhai, L., Fengjie, X., Shengyang, H., & Zongfu, J. 2011, *Appl. Opt.*, 50, 1631
- Chauvin, G., Lagrange, A.-M., Dumas, C., et al. 2004, *A&A*, 425, L29
- Cheetham, A. C., Girard, J., Lacour, S., et al. 2016, in *Proc. SPIE*, Vol. 9907, *Optical and Infrared Interferometry and Imaging V*, 99072T
- Cheney, E. & Kincaid, D. 2009, *Linear Algebra: Theory and Applications* (Jones and Bartlett Publishers)
- Clarke, C. J., Gendrin, A., & Sotomayor, M. 2001, *MNRAS*, 328, 485
- Codona, J. L. 2013, *Optical Engineering*, 52, 097105
- Codona, J. L. & Kenworthy, M. 2013, *The Astrophysical Journal*, 767, 100
- Codona, J. L., Kenworthy, M. A., Hinz, P. M., Angel, J. R. P., & Woolf, N. J. 2006, in *Proc. SPIE*, Vol. 6269, *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series*, 62691N
- Crepp, J. R., Pueyo, L., Brenner, D., et al. 2011, *ApJ*, 729, 132
- Currie, T., Cloutier, R., Brittain, S., et al. 2015, *ApJ*, 814, L27
- Côté, O., Allain, G., Brousseau, D., et al. 2018, in *Proc. SPIE*, Vol. 10702, *Ground-based and Airborne Instrumentation for Astronomy VII*, 10702 – 10702 – 8
- de Boer, J., Girard, J. H., Canovas, H., et al. 2017, *MNRAS*, 466, L7
- de Boer, J., Salter, G., Benisty, M., et al. 2016, *A&A*, 595, A114
- de Juan Ovelar, M., Pinilla, P., Min, M., Dominik, C., & Birnstiel, T. 2016, *MNRAS*, 459, L85
- de Kok, R. J., Brogi, M., Snellen, I. A. G., et al. 2013, *A&A*, 554, A82
- Doelman, D. S., Snik, F., Warriner, N. Z., & Escuti, M. J. 2017, in *Proc. SPIE*, Vol. 10400, *Techniques and Instrumentation for Detection of Exoplanets VIII*, 10400 – 10400 – 12
- Doelman, D. S., Tuthill, P., Norris, B., et al. 2018, in *Proc. SPIE*, Vol. 10701, *Optical and Infrared Interferometry and Imaging VI*, 10701 – 10701 – 11
- Dohlen, K., Langlois, M., Saisse, M., et al. 2008, in *Proc. SPIE*, Vol. 7014, *Ground-based and Airborne Instrumentation for Astronomy II*, 70143L
- Dohlen, K., Vigan, A., Mouillet, D., et al. 2016, in *Proc. SPIE*, Vol. 9908, *Ground-based and Airborne Instrumentation for Astronomy VI*, 99083D
- Dong, S., Haist, T., Osten, W., Ruppel, T., & Sawodny, O. 2012, *Appl. Opt.*, 51, 1318
- Doucet, C., Habart, E., Pantin, E., et al. 2007, *A&A*, 470, 625
- Draine, B. T. 2006, *ApJ*, 636, 1114
- ESO. 2015, *SPHERE user manual, Period 96, Phase 2 (4th release)*, <https://www.eso.org/sci/facilities/paranal/instruments/sphere/doc.html>, accessed: 2016-06-21
- ESO. 2016, *SPHERE user manual, Period 99, Phase 1 (6th release)*, <https://www.eso.org/sci/facilities/paranal/instruments/sphere/doc.html>, accessed: 2017-02-06
- ESO. 2018, *SPHERE user manual, Period 101, Phase 1 (9th release)*, <https://www.eso.org/sci/facilities/paranal/instruments/sphere/doc.html>, accessed: 2018-04-13
- Fitzgerald, M. P. & Graham, J. R. 2006, *ApJ*, 637, 541

- Fortney, J. J., Marley, M. S., Saumon, D., & Lodders, K. 2008, *ApJ*, 683, 1104
- Fressin, F., Torres, G., Charbonneau, D., et al. 2013, *ApJ*, 766, 81
- Fusco, T., Petit, C., Rousset, G., et al. 2006, in *Proc. SPIE*, Vol. 6272, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 62720K
- Fusco, T., Sauvage, J.-F., Mouillet, D., et al. 2016, in *Proc. SPIE*, Vol. 9909, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 99090U
- Fusco, T., Sauvage, J.-F., Petit, C., et al. 2014, in *Proc. SPIE*, Vol. 9148, Adaptive Optics Systems IV, 91481U
- Gaia Collaboration, Brown, A. G. A., Vallenari, A., et al. 2016a, *A&A*, 595, A2
- Gaia Collaboration, Prusti, T., de Bruijne, J. H. J., et al. 2016b, *A&A*, 595, A1
- Garufi, A., Quanz, S. P., Avenhaus, H., et al. 2013, *A&A*, 560, A105
- Ginski, C., Benisty, M., van Holstein, R. G., et al. 2018, *A&A*, 616, A79
- Ginski, C., Stolker, T., Pinilla, P., et al. 2016, *A&A*, 595, A112
- Giorgini, J. et al. 2015, NASA JPL Horizons On-Line Ephemeris System, <https://ssd.jpl.nasa.gov/horizons.cgi>, last accessed: 2018-04-11
- Give'on, A., Belikov, R., Shaklan, S., & Kasdin, J. 2007, *Opt. Express*, 15, 12338
- Give'on, A., Kasdin, N. J., Vanderbei, R. J., & Avitzour, Y. 2006, *J. Opt. Soc. Am. A*, 23, 1063
- Gonsalves, R. A. 1982, *Optical Engineering*, 21, 215829
- Gonsalves, R. A. 2001, *Opt. Lett.*, 26, 684
- Gonsalves, R. A. 2002, in *European Southern Observatory Conference and Workshop Proceedings*, Vol. 58, European Southern Observatory Conference and Workshop Proceedings, ed. E. Vernet, R. Ragazzoni, S. Esposito, & N. Hubin, 121
- Gould, A., Udalski, A., Shin, I.-G., et al. 2014, *Science*, 345, 46
- Grady, C. A., Muto, T., Hashimoto, J., et al. 2013, *ApJ*, 762, 48
- Guerri, G., Daban, J.-B., Robbe-Dubois, S., et al. 2011, *Experimental Astronomy*, 30, 59
- Guyon, O. 2003, *A&A*, 404, 379
- Guyon, O., Martinache, F., Cady, E. J., et al. 2012, in *Proc. SPIE*, Vol. 8447, Adaptive Optics Systems III, 84471X
- Haffert, S. Y., Por, E. H., Keller, C. U., et al. 2018a, *ArXiv e-prints* [arXiv:1803.10693]
- Haffert, S. Y., Wilby, M. J., Keller, C. U., & Snellen, I. A. G. 2016, in *Proc. SPIE*, Vol. 9908, Ground-based and Airborne Instrumentation for Astronomy VI, 990867
- Haffert, S. Y., Wilby, M. J., Keller, C. U., et al. 2018b, in *Proc. SPIE*, Vol. 10703, Adaptive Optics Systems VI, 10703 – 10703 – 11
- Heap, S. R., Lindler, D. J., Lanz, T. M., et al. 2000, *The Astrophysical Journal*, 539, 435
- Herbig, G. H. 1960, *ApJS*, 4, 337
- Hoeijmakers, H. J., Schwarz, H., Snellen, I. A. G., et al. 2018, *A&A*, 617, A144
- Howard, A. W., Marcy, G. W., Johnson, J. A., et al. 2010, *Science*, 330, 653
- Howard, A. W., Sanchis-Ojeda, R., Marcy, G. W., et al. 2013, *Nature*, 503, 381
- Hubickyj, O., Bodenheimer, P., & Lissauer, J. J. 2005, *AGU Fall Meeting Abstracts*, P42A
- Jovanovic, N., Absil, O., Baudoz, P., et al. 2018, 10703, 107031U
- Jovanovic, N., Martinache, F., Guyon, O., et al. 2015, *PASP*, 127, 890

- Kasdin, N. J., Vanderbei, R. J., Littman, M. G., Carr, M., & Spergel, D. N. 2004, in *Proc. SPIE*, Vol. 5487, *Optical, Infrared, and Millimeter Space Telescopes*, ed. J. C. Mather, 1312–1321
- Kasper, M., Beuzit, J.-L., Verinaud, C., et al. 2010, *Proc. SPIE*, 7735, 77352E
- Käufel, H.-U., Ballester, P., Biereichel, P., et al. 2004, in *Proc. SPIE*, Vol. 5492, *Ground-based Instrumentation for Astronomy*, ed. A. F. M. Moorwood & M. Iye, 1218–1227
- Keller, C. U. 2016, in *Proc. SPIE*, Vol. 9908, *Ground-based and Airborne Instrumentation for Astronomy VI*, 99089V
- Keller, C. U., Korkiakoski, V., Doelman, N., et al. 2012, in *Proc. SPIE*, Vol. 8447, *Adaptive Optics Systems III*, 844721
- Keller, C. U., Schmid, H. M., Venema, L. B., et al. 2010, in *Ground-based and Airborne Instrumentation for Astronomy III*, Vol. 7735, 77356G–77356G–13
- Kenworthy, M. A., Codona, J. L., Hinz, P. M., et al. 2007, *ApJ*, 660, 762
- Kenworthy, M. A., Hinz, P. M., Codona, J. L., et al. 2010a, in *Proc. SPIE*, Vol. 7734, *Optical and Infrared Interferometry II*, 77342P
- Kenworthy, M. A., Quanz, S., Meyer, M., et al. 2010b, *The Messenger*, 141, 2
- Kenworthy, M. A., Quanz, S. P., Meyer, M. R., et al. 2010c, in *Proc. SPIE*, Vol. 7735, *Ground-based and Airborne Instrumentation for Astronomy III*, 773532
- Keppler, M., Benisty, M., Müller, A., et al. 2018, *A&A*, 617, A44
- Kipping, D. M. 2009a, *MNRAS*, 392, 181
- Kipping, D. M. 2009b, *MNRAS*, 396, 1797
- Knutson, H. A., Charbonneau, D., Allen, L. E., et al. 2007, *Nature*, 447, 183
- Komanduri, R. K., Lawler, K. F., & Escuti, M. J. 2013, *Opt. Express*, 21, 404
- Korkiakoski, V., Doelman, N., Codona, J., et al. 2013, *Appl. Opt.*, 52, 7554
- Korkiakoski, V., Keller, C. U., Doelman, N., et al. 2012, in *Proc. SPIE*, Vol. 8447, *Adaptive Optics Systems III*, 84475Z
- Korkiakoski, V., Keller, C. U., Doelman, N., et al. 2014, *Appl. Opt.*, 53, 4565
- Kraus, A. L. & Ireland, M. J. 2012, *ApJ*, 745, 5
- Krist, J. E., Balasubramanian, K., Beichman, C. A., et al. 2009, in *Proc. SPIE*, Vol. 7440, *Techniques and Instrumentation for Detection of Exoplanets IV*, 74400W
- Krist, J. E., Stapelfeldt, K. R., Bryden, G., et al. 2010, *AJ*, 140, 1051
- Kuhn, J. R., Potter, D., & Parise, B. 2001, *ApJ*, 553, L189
- Lafrenière, D., Marois, C., Doyon, R., Nadeau, D., & Artigau, É. 2007, *ApJ*, 660, 770
- Lagrange, A.-M., Bonnefoy, M., Chauvin, G., et al. 2010, *Science*, 329, 57
- Lamb, M., Correia, C., Sauvage, J.-F., et al. 2016, in *Proc. SPIE*, Vol. 9909, *Adaptive Optics Systems V*, 99096D
- Lawson, P. R., Poyneer, L., Barrett, H., et al. 2012, in *Proc. SPIE*, Vol. 8447, *Adaptive Optics Systems III*, 844722
- Lenzen, R., Hartung, M., Brandner, W., et al. 2003, in *Proc. SPIE*, Vol. 4841, *Instrument Design and Performance for Optical/Infrared Ground-based Telescopes*, ed. M. Iye & A. F. M. Moorwood, 944–952
- Lovis, C., Snellen, I., Mouillet, D., et al. 2017, *A&A*, 599, A16
- Lozi, J., Guyon, O., Jovanovic, N., et al. 2018, in *Proc. SPIE*, Vol. 10703, *Adaptive Optics Systems VI*, 10703 – 10703 – 12
- Lucy, L. B. 1974, *AJ*, 79, 745

- Lyot, B. 1939, *MNRAS*, 99, 580
- Macintosh, B. A., Graham, J. R., Barman, T., et al. 2015, *Science*, 350, 64
- Macintosh, B. A., Graham, J. R., Ingraham, P., et al. 2014, *Proceedings of the National Academy of Science*, 111, 12661
- Macintosh, B. A., Graham, J. R., Palmer, D. W., et al. 2008, in *Proc. SPIE*, Vol. 7015, *Adaptive Optics Systems*, 701518
- Maire, A.-L., Bonnefoy, M., Ginski, C., et al. 2016, *A&A*, 587, A56
- Marino, S., Casassus, S., Perez, S., et al. 2015, *ApJ*, 813, 76
- Marley, M. S., Saumon, D., Cushing, M., et al. 2012, *ApJ*, 754, 135
- Marois, C., Lafrenière, D., Doyon, R., Macintosh, B., & Nadeau, D. 2006, *The Astrophysical Journal*, 641, 556
- Marois, C., Macintosh, B., Barman, T., et al. 2008, *Science*, 322, 1348
- Marois, C., Macintosh, B., & Véran, J.-P. 2010a, in *Adaptive Optics Systems II*, Vol. 7736, 77361J–77361J–12
- Marois, C., Zuckerman, B., Konopacky, Q. M., Macintosh, B., & Barman, T. 2010b, *Nature*, 468, 1080
- Martín, E. L. & Zapatero Osorio, M. R. 2003, *ApJ*, 593, L113
- Martinache, F., Guyon, O., Jovanovic, N., et al. 2014, *PASP*, 126, 565
- Martinez, P., Boccaletti, A., Kasper, M., Baudoz, P., & Cavarroc, C. 2007, *A&A*, 474, 671
- Martinez, P., Kasper, M., Costille, A., et al. 2013, *A&A*, 554, A41
- Martinez, P., Loose, C., Aller Carpentier, E., & Kasper, M. 2012, *A&A*, 541, A136
- Masuda, K. 2014, *ApJ*, 783, 53
- Mawet, D., Pueyo, L., Lawson, P., et al. 2012, in *Proc. SPIE*, Vol. 8442, *Space Telescopes and Instrumentation 2012: Optical, Infrared, and Millimeter Wave*, 844204
- Mawet, D., Serabyn, E., Liewer, K., et al. 2010, *ApJ*, 709, 53
- Mayer, L., Quinn, T., Wadsley, J., & Stadel, J. 2002, *Science*, 298, 1756
- Mayer, L., Wadsley, J., Quinn, T., & Stadel, J. 2005, *MNRAS*, 363, 641
- Mayor, M. & Queloz, D. 1995, *Nature*, 378, 355
- Meheut, H., Meliani, Z., Varniere, P., & Benz, W. 2012, *A&A*, 545, A134
- Merín, B., Brown, J. M., Oliveira, I., et al. 2010, *ApJ*, 718, 1200
- Miller, K., Males, J. R., Guyon, O., et al. 2018, in *Proc. SPIE*, Vol. 10703, *Adaptive Optics Systems VI*, 10703 – 10703 – 17
- Milli, J., Mawet, D., Mouillet, D., Kasper, M., & Girard, J. H. 2016, in *Astrophysics and Space Science Library*, Vol. 439, *Astronomy at High Angular Resolution*, ed. H. M. J. Boffin, G. Hussain, J.-P. Berger, & L. Schmidtbreich, 17
- Milli, J., Mouillet, D., Lagrange, A.-M., et al. 2012, *A&A*, 545, A111
- Miskiewicz, M. N. & Escuti, M. J. 2014, *Opt. Express*, 22, 12691
- Molnár, L., Plachy, E., Juhász, Á. L., & Rimoldini, L. 2018, *ArXiv e-prints* [arXiv:1805.11395]
- Monnier, J. D., Kraus, S., Buscher, D., et al. 2014, in *Proc. SPIE*, Vol. 9146, *Optical and Infrared Interferometry IV*, 914610
- Mordasini, C., Alibert, Y., Benz, W., & Naef, D. 2009, *A&A*, 501, 1161
- Morzinski, K. M., Close, L. M., Males, J. R., et al. 2014, in *Proc. SPIE*, Vol. 9148, *Adaptive Optics Systems IV*, 914804

- Mosleh, A., Langlois, J. M. P., & Green, P. 2014, in *Computer Vision – ECCV 2014*, ed. D. Fleet, T. Pajdla, B. Schiele, & T. Tuytelaars (Cham: Springer International Publishing), 247–262
- Mulders, G. D., Min, M., Dominik, C., Debes, J. H., & Schneider, G. 2013, *A&A*, 549, A112
- Muro-Arena, G. A., Dominik, C., Waters, L. B. F. M., et al. 2018, *A&A*, 614, A24
- Muto, T., Grady, C. A., Hashimoto, J., et al. 2012, *ApJ*, 748, L22
- N'Diaye, M., Dohlen, K., Caillat, A., et al. 2014, *Proc. SPIE*, 9148, 91485H
- N'Diaye, M., Dohlen, K., Tisserand, S., et al. 2011, in *Proc. SPIE*, Vol. 8169, *Optical Fabrication, Testing, and Metrology IV*, 81690G
- N'Diaye, M., Martinache, F., Jovanovic, N., et al. 2018, *A&A*, 610, A18
- N'Diaye, M., Vigan, A., Dohlen, K., et al. 2016, *A&A*, 592, A79
- Neil, M. A. A., Booth, M. J., & Wilson, T. 2000, *J. Opt. Soc. Am. A*, 17, 1098
- Nielsen, E. L., Close, L. M., Biller, B. A., Masciadri, E., & Lenzen, R. 2008, *ApJ*, 674, 466
- Noll, R. J. 1976, *J. Opt. Soc. Am.*, 66, 207
- Otten, G. P. P. L. 2016, *Suppressing a Sea of Starlight : enabling technology for the direct imaging of exoplanets* (PhD thesis) (Leiden University)
- Otten, G. P. P. L., Snik, F., Kenworthy, M. A., et al. 2017, *ApJ*, 834, 175
- Otten, G. P. P. L., Snik, F., Kenworthy, M. A., Miskiewicz, M. N., & Escuti, M. J. 2014a, *Opt. Express*, 22, 30287
- Otten, G. P. P. L., Snik, F., Kenworthy, M. A., et al. 2014b, in *Proc. SPIE*, Vol. 9151, *Advances in Optical and Mechanical Technologies for Telescopes and Instrumentation*, 9151 – 9151 – 10
- Paul, B., Sauvage, J.-F., Mugnier, L. M., et al. 2014a, in *Proc. SPIE*, Vol. 9147, *Ground-based and Airborne Instrumentation for Astronomy V*, 91479O
- Paul, B., Sauvage, J.-F., Mugnier, L. M., et al. 2014b, *A&A*, 572, A32
- Perrin, M. D., Duchene, G., Millar-Blanchaer, M., et al. 2015, *ApJ*, 799, 182
- Perrot, C., Boccaletti, A., Pantin, E., et al. 2016, *A&A*, 590, L7
- Petigura, E. A., Howard, A. W., & Marcy, G. W. 2013, *Proceedings of the National Academy of Science*, 110, 19273
- Petit, C., Sauvage, J.-F., Fusco, T., et al. 2016, *Journal of Astronomical Telescopes, Instruments, and Systems*, 2, 2
- Pinilla, P., de Boer, J., Benisty, M., et al. 2015, *A&A*, 584, L4
- Pinte, C., Harries, T. J., Min, M., et al. 2009, *A&A*, 498, 967
- Pollack, J. B., Hubickyj, O., Bodenheimer, P., et al. 1996, *Icarus*, 124, 62
- Polo, A., Haber, A., Pereira, S. F., Verhaegen, M., & Urbach, H. P. 2013, *Journal of the European Optical Society*, 8
- Por, E. H. 2017, in *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series*, Vol. 10400, *Techniques and Instrumentation for Detection of Exoplanets VIII*, 104000V
- Por, E. H. & Haffert, S. Y. 2018, *ArXiv e-prints* [arXiv:1803.10691]
- Por, E. H. & Keller, C. U. 2016, in *Proc. SPIE*, Vol. 9909, *Adaptive Optics Systems V*, 990959
- Qi, C., Ho, P. T. P., Wilner, D. J., et al. 2004, *ApJ*, 616, L11
- Quanz, S. P., Amara, A., Meyer, M. R., et al. 2015, *ApJ*, 807, 64

- Quanz, S. P., Amara, A., Meyer, M. R., et al. 2013a, *ApJ*, 766, L1
- Quanz, S. P., Avenhaus, H., Buenzli, E., et al. 2013b, *ApJ*, 766, L2
- Quanz, S. P., Meyer, M. R., Kenworthy, M. A., et al. 2010, *ApJ*, 722, L49
- Rappaport, S., Levine, A., Chiang, E., et al. 2012, *ApJ*, 752, 1
- Rice, W. K. M. & Armitage, P. J. 2003, *ApJ*, 598, L55
- Richardson, W. H. 1972, *Journal of the Optical Society of America* (1917-1983), 62, 55
- Ridden-Harper, A. R., Snellen, I. A. G., Keller, C. U., et al. 2016, *A&A*, 593, A129
- Roberts, Jr., L. C., Perrin, M. D., Marchis, F., et al. 2004, in *Proc. SPIE*, Vol. 5490, *Advancements in Adaptive Optics*, ed. D. Bonaccini Calia, B. L. Ellerbroek, & R. Ragazzoni, 504–515
- Roddier, F. & Roddier, C. 1997, *PASP*, 109, 815
- Rodenhuis, M., Canovas, H., Jeffers, S., & Keller, C. 2011, in *Astronomical Society of the Pacific Conference Series*, Vol. 449, *Astronomical Polarimetry 2008: Science from Small to Large Telescopes*, ed. P. Bastien, N. Manset, D. P. Clemens, & N. St-Louis, 33
- Roelfsema, R., Bazzon, A., Schmid, H. M., et al. 2016, in *Proc. SPIE*, Vol. 9909, *Adaptive Optics Systems V*, 990927
- Ros, K. & Johansen, A. 2013, *A&A*, 552, A137
- Sallum, S., Follette, K. B., Eisner, J. A., et al. 2015, *Nature*, 527, 342
- Sauvage, J.-F., Fusco, T., Guesalaga, A., et al. 2015, in *Adaptive Optics for Extremely Large Telescopes 4 – Conference Proceedings*
- Sauvage, J.-F., Fusco, T., Lamb, M., et al. 2016, in *Proc. SPIE*, Vol. 9909, *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series*, 990916
- Sauvage, J.-F., Fusco, T., LeMignant, D., et al. 2011, in *Second International Conference on Adaptive Optics for Extremely Large Telescopes*, 48
- Sauvage, J.-F., Fusco, T., Petit, C., et al. 2010, in *Adaptive Optics Systems II*, Vol. 7736, 77360F–77360F–10
- Sauvage, J.-F., Fusco, T., Petit, C., et al. 2014, in *Adaptive Optics Systems IV*, Vol. 9148, 9148 – 9148 – 10
- Sauvage, J.-F., Fusco, T., Rousset, G., & Petit, C. 2007, *Journal of the Optical Society of America A*, 24, 2334
- Schwarz, H. 2017, *Spinning worlds* (PhD thesis) (Leiden University)
- Schwarz, H., Ginski, C., de Kok, R. J., et al. 2016a, *A&A*, 593, A74
- Schwarz, K. R., Bergin, E. A., Cleeves, L. I., et al. 2016b, *ApJ*, 823, 91
- Shvartzvald, Y., Yee, J. C., Calchi Novati, S., et al. 2017, *ApJ*, 840, L3
- Smith, W. H. 1987, *PASP*, 99, 1344
- Snellen, I. A. G., Brandl, B. R., de Kok, R. J., et al. 2014, *Nature*, 509, 63
- Snellen, I. A. G., de Kok, R., Birkby, J. L., et al. 2015, *A&A*, 576, A59
- Snellen, I. A. G., de Kok, R. J., de Mooij, E. J. W., & Albrecht, S. 2010, *Nature*, 465, 1049
- Snik, F., Otten, G., Kenworthy, M., et al. 2012, in *Proc. SPIE*, Vol. 8450, *Modern Technologies in Space- and Ground-based Telescopes and Instrumentation II*, 84500M
- Sokal, K. R., Deen, C. P., Mace, G. N., et al. 2018, *ApJ*, 853, 120
- Soummer, R., Ferrari, A., Aime, C., & Jolissaint, L. 2007a, *ApJ*, 669, 642
- Soummer, R., Pueyo, L., & Larkin, J. 2012, *ApJ*, 755, L28

- Soummer, R., Pueyo, L., Sivaramakrishnan, A., & Vanderbei, R. J. 2007b, *Opt. Express*, 15, 15935
- Spangenberg, D.-M., Dudley, A., Neethling, P. H., Rohwer, E. G., & Forbes, A. 2014, *Opt. Express*, 22, 13870
- Spiegel, D. S., Burrows, A., & Milsom, J. A. 2011, *ApJ*, 727, 57
- Stam, D. M., Hovenier, J. W., & Waters, L. B. F. M. 2004, *A&A*, 428, 663
- Stevenson, K. B., Désert, J.-M., Line, M. R., et al. 2014, *Science*, 346, 838
- Stolker, T., Min, M., Stam, D. M., et al. 2017, *A&A*, 607, A42
- Strom, K. M., Strom, S. E., Edwards, S., Cabrit, S., & Skrutskie, M. F. 1989, *AJ*, 97, 1451
- Stuik, R., Bailey, J. I., Dorval, P., et al. 2017, *A&A*, 607, A45
- Thalmann, C., Schmid, H. M., Boccaletti, A., et al. 2008, in *Proc. SPIE*, Vol. 7014, Ground-based and Airborne Instrumentation for Astronomy II, 70143F
- Tuthill, P., Lacour, S., Amico, P., et al. 2010, in *Proc. SPIE*, Vol. 7735, Ground-based and Airborne Instrumentation for Astronomy III, 77351O
- van Boekel, R., Henning, T., Menu, J., et al. 2017, *ApJ*, 837, 132
- van Holstein, R. 2016, Master's Thesis, TU Delft
- van Holstein, R. G., Snik, F., Girard, J. H., et al. 2017, in *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series*, Vol. 10400, Techniques and Instrumentation for Detection of Exoplanets VIII, 1040015
- Vigan, A., Bonnefoy, M., Ginski, C., et al. 2016a, *A&A*, 587, A55
- Vigan, A., Postnikova, M., Caillat, A., et al. 2016b, in *Proc. SPIE*, Vol. 9909, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 99093F
- Wagner, K., Apai, D., Kasper, M., & Robberto, M. 2015, *ApJ*, 813, L2
- Wang, J. J., Graham, J. R., Pueyo, L., et al. 2016, *AJ*, 152, 97
- Weidenschilling, S. J. & Marzari, F. 1996, *Nature*, 384, 619
- Wilby, M. J., Keller, C. U., Haffert, S., et al. 2016a, in *Proc. SPIE*, Vol. 9909, Adaptive Optics Systems V, 990921
- Wilby, M. J., Keller, C. U., Sauvage, J.-F., et al. 2016b, in *Proc. SPIE*, Vol. 9909, Adaptive Optics Systems V, 99096C
- Williams, J. P. & Cieza, L. A. 2011, *ARA&A*, 49, 67
- Winn, J. N. & Fabrycky, D. C. 2015, *ARA&A*, 53, 409
- Wolszczan, A. & Frail, D. A. 1992, *Nature*, 355, 145
- Wyatt, M. C. 2008, *Annual Review of Astronomy and Astrophysics*, 46, 339
- Zurlo, A., Vigan, A., Galicher, R., et al. 2016, *A&A*, 587, A57

List of Abbreviations

ADI	Angular Differential Imaging
ADU	Analog-to-Digital Unit
ALMA	Atacama Large Millimeter Array
A(P)LC	Apodised (Pupil) Lyot Coronagraph
APP	Apodising Phase Plate
AU	Astronomical Unit
CCD	Charge Coupled Device
cMWS	coronagraphic Modal Wavefront Sensor
CO	Carbon Monoxide
COFFEE	COronagraphic Focal-plane wave-Front Estimation for Exoplanet detection
CRIRES	CRyogenic high-resolution InfraRed Echelle Spectrograph
DL	Diffraction-Limited
DM	Deformable Mirror
dOTF	differential Optical Transfer Function
DPI	Dual-band Polarimetric Imaging
DTTS	Differential Tip-Tilt Sensor
EFC	Electric Field Conjugation
ELT	Extremely Large Telescope
EPICS	ExoPlanet Imaging Camera and Spectrograph
ERIS	Enhanced Resolution Imager and Spectrograph
ESO	European Southern Observatory
F&F	Fast & Furious
FF-GS	Fast & Furious Gerchberg-Saxton
FFT	Fast Fourier Transform
FoV	Field of View
FP	Focal Plane
FWHM	Full Width at Half Maximum
GMC	Giant Molecular Cloud
GPI	Gemini Planet Imager
GUI	Graphical User Interface
HAM	Holographic Aperture Masking
HCI	High-Contrast Imaging
HDS	High-Dispersion Spectroscopy
HMWS	Holographic Modal Wavefront Sensor
HRS	High-Resolution Spectroscopy

HST	Hubble Space Telescope
IFS	Integral Field Spectrograph
IFU	Integral Field Unit
IRDIS	Infra-Red Dual-beam Imager and Spectrograph
IWA	Inner-Working Angle
JWST	James Webb Space Telescope
LAM	Laboratoire d'Astrophysique de Marseille
LBT	Large Binocular Telescope
LCOS-SLM	Liquid Crystal on Silicon Spatial Light Modulator
LEXI	Leiden EXoplanet Instrument
LO	Low Order
LOCI	Locally-Optimised Combination of Images
LWE	Low-Wind Effect
M_{Earth}	Earth Masses
M_{jup}	Jupiter Masses
M2	Secondary Mirror
MagAO	Magellan Adaptive Optics
METIS	Mid-infrared E-ELT Imager and Spectrograph
MITHIC	Marseille Imaging Testbed for HIgh Contrast
NACO	NAOS-CONICA: Nasmyth Adaptive Optics System (NAOS) Near-Infrared Imager and Spectrograph (CONICA)
NCP	Non-Common Path
NCPA	Non-Common Path Aberrations
NCPE	Non-Common Path Errors
NIR	Near-InfraRed
NIRC2	Near-InfraRed Camera 2
NOVA	Nederlandse Onderzoekschool Voor Astronomie
PCA	Principal Component Analysis
PFI	Planet Formation Imager
PI	Polarised Intensity
PIAA	Phase-Induced Amplitude Apodisation
PP	Pupil Plane
PPD	ProtoPlanetary Disk
PSF	Point-Spread Function
PTT	Piston-Tip-Tilt
PVE	Peak-to-Valley Error
QSS	Quasi-Static Speckles
RDI	Reference Differential Imaging
RMS	Root-Mean-Square
RT	Radiative Transfer
RV	Radial Velocity
SAM	Sparse Aperture Masking

SAXO	Sphere Adaptive optics for eXoplanet Observation
SCAR	Single-mode Complex Amplitude Retrieval coronagraph
ScExAO	Subaru coronagraphic Extreme Adaptive Optics
SDI	Simultaneous/Spectral Differential Imaging
SED	Spectral Energy Distribution
SH-WFS	Shack-Hartmann WaveFront Sensor
SLM	Spatial Light Modulator
S/N	Signal-to-Noise Ratio
SNR	Signal-to-Noise Ratio
SPHERE	Spectro-Polarimetric High-contrast Exoplanet REsearch instrument
SR	Strehl Ratio
TMT	Thirty-Meter Telescope
TTV	Transit Timing Variation
UV	Ultra-Violet
vAPP	vector Apodising Phase Plate
VLT	Very Large Telescope
WHT	William Herschel Telescope
WFS	WaveFront Sensor
XAO	eXtreme Adaptive Optics
ZELDA	Zernike sensor for Extremely Low-level Differential Aberrations
ZIMPOL	Zurich IMaging POLarimeter

