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Front Matter: Volume 7736

, "Front Matter: Volume 7736," Proc. SPIE 7736, Adaptive Optics Systems II, 773601 (27 August 2010); doi: 10.1117/12.871221

Event: SPIE Astronomical Telescopes + Instrumentation, 2010, San Diego, California, United States

PROCEEDINGS OF SPIE

Adaptive Optics Systems II

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Editors

27 June–2 July 2010
San Diego, California, United States

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Published by
SPIE

Volume 7736
Part One of Three Parts

Proceedings of SPIE, 0277-786X, v. 7736

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Author(s), "Title of Paper," in *Adaptive Optics Systems II*, edited by Brent L. Ellerbroek, Michael Hart, Norbert Hubin, Peter L. Wizinowich, Proceedings of SPIE Vol. 7736 (SPIE, Bellingham, WA, 2010) Article CID Number.

ISSN 0277-786X

ISBN 9780819482266

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

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Contents

Part One

- xxxiii *Conference Committee*
- xxxvii *Unknowns and unknown unknowns: from dark sky to dark matter and dark energy (Plenary Paper) [7733-501]*
Y. Suto, The Univ. of Tokyo (Japan)
- xlix *Optical synoptic telescopes: new science frontiers (Plenary Paper) [7733-502]*
J. A. Tyson, Univ. of California, Davis (United States)

SESSION 1 PROJECT STATUS I

- 7736 02 **The scientific impact of reaching the diffraction limit with ELTs (Invited Paper) [7736-01]**
C. E. Max, Univ. of California, Santa Cruz (United States); E. Barton, Univ. of California, Irvine (United States)
- 7736 04 **First light adaptive optics systems and components for the Thirty Meter Telescope [7736-03]**
B. Ellerbroek, TMT Observatory Corp. (United States); S. Adkins, W. M. Keck Observatory (United States); D. Andersen, J. Atwood, NRC Herzberg Institute of Astrophysics (Canada); S. Browne, The Optical Sciences Co. (United States); C. Boyer, TMT Observatory Corp. (United States); P. Byrnes, K. Caputa, NRC Herzberg Institute of Astrophysics (Canada); R. Conan, Univ. of Victoria (Canada); R. Cousty, CILAS (France); D. Erikson, J. Fitzsimmons, NRC Herzberg Institute of Astrophysics (Canada); F. Gamache, Lyrtech Inc. (Canada); L. Gilles, TMT Observatory Corp. (United States); G. Herriot, NRC Herzberg Institute of Astrophysics (Canada); P. Hickson, The Univ. of British Columbia (Canada); O. Lardier, Univ. of Victoria (Canada); P. Morin, CILAS (France); J. Pazder, NRC Herzberg Institute of Astrophysics (Canada); T. Pfrommer, The Univ. of British Columbia (Canada); D. Quinn, Lyrtech Inc. (Canada); V. Reshetov, S. Roberts, NRC Herzberg Institute of Astrophysics (Canada); J.-C. Siquin, CILAS (France); M. Schoeck, M. Smith, NRC Herzberg Institute of Astrophysics (Canada); G. Tyler, J. Vaughn, The Optical Sciences Co. (United States); J.-P. Veran, NRC Herzberg Institute of Astrophysics (Canada); C. Vogel, Montana State Univ. (United States); L. Wang, TMT Observatory Corp. (United States); I. Wevers, NRC Herzberg Institute of Astrophysics (Canada)
- 7736 05 **The Magellan Telescope Adaptive Secondary AO System: a visible and mid-IR AO facility [7736-04]**
L. M. Close, V. Gasho, D. Kopon, J. Males, K. B. Follette, K. Brulag, Steward Observatory, The Univ. of Arizona (United States); A. Uomoto, T. Hare, Carnegie Observatories (United States)
- 7736 06 **The Gemini MCAO System GeMS: nearing the end of a lab-story [7736-05]**
B. Neichel, F. Rigaut, M. Bec, M. Boccas, F. Daruich, C. D'Orgeville, V. Fesquet, R. Galvez, A. Garcia-Rissmann, G. Gausachs, INAF-Gemini Observatory (Chile); M. Lombini, Osservatorio Astronomica di Bologna (Italy); G. Perez, G. Trancho, V. Upadhy, T. Vucina, INAF-Gemini Observatory (Chile)

- 7736 07 **Latest achievements of the MCAO testbed for the GREGOR Solar Telescope** [7736-06]
D. Schmidt, T. Berkefeld, B. Feger, F. Heidecke, Kiepenheuer-Institut für Sonnenphysik (Germany)
- 7736 08 **The adaptive optics and wavefront correction systems for the Advanced Technology Solar Telescope** [7736-07]
K. Richards, T. Rimmele, S. L. Hegwer, R. S. Upton, F. Woeger, National Solar Observatory (United States); J. Marino, Univ. of Florida (United States); S. Gregory, B. Goodrich, National Solar Observatory (United States)
- 7736 09 **First light AO (FLAO) system for LBT: final integration, acceptance test in Europe, and preliminary on-sky commissioning results** [7736-12]
S. Esposito, A. Riccardi, L. Fini, A. T. Puglisi, E. Pinna, M. Xompero, R. Briguglio, F. Quirós-Pacheco, P. Stefanini, J. C. Guerra, L. Busoni, A. Tozzi, F. Pieralli, G. Agapito, INAF-Osservatorio Astrofisico di Arcetri (Italy); G. Brusa-Zappellini, R. Demers, J. Brynnel, Large Binocular Telescope Observatory (United States); C. Arcidiacono, P. Salinari, INAF-Osservatorio Astrofisico di Arcetri (Italy)

SESSION 2 NEW AO SYSTEM DESIGNS I

- 7736 0A **Scientific potential of ground layer adaptive optics on large telescopes (Invited Paper)** [7736-08]
P. J. McCarthy, Carnegie Observatories (United States) and GMTO, Inc. (United States)
- 7736 0B **NFIRAOS: TMT's facility adaptive optics system** [7736-09]
G. Herriot, D. Andersen, J. Atwood, NRC Herzberg Institute of Astrophysics (Canada); C. Boyer, TMT Observatory Corp. (United States); A. Beauvillier, P. Byrnes, NRC Herzberg Institute of Astrophysics (Canada); R. Conan, Univ. of Victoria (Canada); B. Ellerbroek, TMT Observatory Corp. (United States); J. Fitzsimmons, NRC Herzberg Institute of Astrophysics (Canada); L. Gilles, TMT Observatory Corp. (United States); P. Hickson, The Univ. of British Columbia (Canada); A. Hill, NRC Herzberg Institute of Astrophysics (Canada); K. Jackson, O. Lardiére, Univ. of Victoria (Canada); J. Pazder, NRC Herzberg Institute of Astrophysics (Canada); T. Pfrommer, The Univ. of British Columbia (Canada); V. Reshetov, S. Roberts, J.-P. Véran, NRC Herzberg Institute of Astrophysics (Canada); L. Wang, TMT Observatory Corp. (United States); I. Wevers, NRC Herzberg Institute of Astrophysics (Canada)
- 7736 0C **The GMT adaptive optics system** [7736-10]
P. M. Hinz, Steward Observatory, The Univ. of Arizona (United States); A. Bouchez, M. Johns, GMTO Corp. (United States); S. Shectman, Carnegie Observatories (United States); M. Hart, Steward Observatory, The Univ. of Arizona (United States); B. McLeod, Smithsonian Astrophysical Observatory (United States); P. McGregor, The Australian National Univ. (Australia)
- 7736 0D **ATLAS: the E-ELT laser tomographic adaptive optics system** [7736-11]
T. Fusco, S. Meimon, ONERA (France) and Groupement d'Intérêt Scientifique PHASE (France); Y. Clenet, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); M. Cohen, GEPI, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); H. Schnettler, United Kingdom Astronomy Technology Ctr. (United Kingdom); J. Paufique, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); V. Michau, ONERA (France) and Groupement d'Intérêt

Scientifique PHASE (France); J.-P. Amans, GEPI, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); D. Gratadour, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); C. Petit, C. Robert, ONERA (France) and Groupement d'Intérêt Scientifique PHASE (France); P. Jagourel, GEPI, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); E. Gendron, G. Rousset, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); J.-M. Conan, ONERA (France) and Groupement d'Intérêt Scientifique PHASE (France); N. Hubin, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)

7736 OE

ARGOS: the laser guide star system for the LBT [7736-13]

S. Rabien, N. Ageorges, L. Barl, Max-Planck-Institut für extraterrestrische Physik (Germany); U. Beckmann, Max-Planck-Institut für Radioastronomie (Germany); T. Blümchen, Max-Planck-Institut für Astronomie (Germany); M. Bonaglia, Osservatorio Astrofisico di Arcetri (Italy); J. L. Borelli, Max-Planck-Institut für Astronomie (Germany); J. Brynnel, Large Binocular Telescope Observatory (United States); L. Busoni, L. Carbonaro, Osservatorio Astrofisico di Arcetri (Italy); R. Davies, M. Deysenroth, Max-Planck-Institut für extraterrestrische Physik (Germany); O. Durney, Steward Observatory, The Univ. of Arizona (United States); M. Elberich, Max-Planck-Institut für Radioastronomie (Germany); S. Esposito, Osservatorio Astrofisico di Arcetri (Italy); V. Gasho, The Univ. of Arizona (United States); W. Gässler, Max-Planck-Institut für Astronomie (Germany); H. Gemperlein, R. Genzel, Max-Planck-Institut für extraterrestrische Physik (Germany); R. Green, Large Binocular Telescope Observatory (United States); M. Haug, Max-Planck-Institut für extraterrestrische Physik (Germany); M. L. Hart, P. Hubbard, Steward Observatory, The Univ. of Arizona (United States); S. Kanneganti, Max-Planck-Institut für extraterrestrische Physik (Germany); E. Masciadri, Osservatorio Astrofisico di Arcetri (Italy); J. Noenickx, Steward Observatory, The Univ. of Arizona (United States); G. Orban de Xivry, Max-Planck-Institut für extraterrestrische Physik (Germany); D. Peter, Max-Planck-Institut für Astronomie (Germany); A. Quirrenbach, Landessternwarte Heidelberg (Germany); M. Rademacher, Steward Observatory, The Univ. of Arizona (United States); H. W. Rix, Max-Planck-Institut für Astronomie (Germany); P. Salinari, Osservatorio Astrofisico di Arcetri (Italy); C. Schwab, Landessternwarte Heidelberg (Germany); J. Storm, Astrophysikalisches Institut Potsdam (Germany); L. Strüder, Max-Planck-Institut Halbleiterlabor (Germany); M. Thiel, Max-Planck-Institut für extraterrestrische Physik (Germany); G. Weigelt, Max-Planck-Institut für Radioastronomie (Germany); J. Ziegler, Max-Planck-Institut für extraterrestrische Physik (Germany)

7736 OF

SAXO, the eXtreme Adaptive Optics System of SPHERE: overview and calibration procedure [7736-14]

J.-F. Sauvage, T. Fusco, C. Petit, S. Meimon, ONERA (France); E. Fedrigo, M. Suarez Valles, M. Kasper, N. Hubin, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); J.-L. Beuzit, J. Charton, A. Costille, P. Rabou, D. Mouillet, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); P. Baudoz, T. Buey, A. Sevin, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); F. Wildi, HES-SO (Switzerland); K. Dohlen, LAM, Observatoire Astronomique de Marseille-Provence, CNRS, Univ. of Provence Aix-Marseilles (France)

SESSION 3 MODELING, ANALYSIS, AND SIMULATION TOOLS I

- 7736 OG **Impact of laser guide star fratricide on TMT MCAO system** [7736-16]
L. Wang, A. Ofarola, B. Ellerbroek, Thirty Meter Telescope Project (United States)
- 7736 OH **Monte-Carlo simulation of ELT scale multi-conjugate and multi-object AO systems** [7736-17]
A. Basden, T. Butterley, S. Dimoudi, R. Myers, Durham Univ. (United Kingdom)
- 7736 OI **Tomographic control for wide field AO systems on extremely large telescopes** [7736-18]
C. Petit, J.-M. Conan, T. Fusco, ONERA (France); B. Neichel, Gemini Observatory (Chile)
- 7736 OJ **Impact of Cn2 profile structure on wide-field AO performance** [7736-30]
T. Fusco, ONERA (France); A. Costille, Lab. d'Astrophysique de l'Observatoire de Grenoble (France)

SESSION 4 PROJECT STATUS II

- 7736 OK **W. M. Keck Observatory's next-generation adaptive optics facility** [7736-19]
P. Wizinowich, S. Adkins, W. M. Keck Observatory (United States); R. Dekany, Caltech Optical Observatories (United States); D. Gavel, C. Max, Univ. of California Observatories (United States); R. Bartos, Jet Propulsion Lab. (United States); J. Bell, W. M. Keck Observatory (United States); A. Bouchez, Caltech Optical Observatories (United States); J. Chin, A. Conrad, W. M. Keck Observatory (United States); A. Delacroix Caltech Optical Observatories (United States); E. Johansson, W. M. Keck Observatory (United States); R. Kupke, C. Lockwood, Univ. of California Observatories (United States); J. Lyke, W. M. Keck Observatory (United States); F. Marchis, Univ. of California, Berkeley (United States); E. McGrath, Univ. of California Observatories (United States); D. Medeiros, W. M. Keck Observatory (United States); M. Morris, Univ. of California, Los Angeles (United States); D. Morrison, C. Neyman, S. Panteleev, M. Pollard, W. M. Keck Observatory (United States); M. Reinig, Univ. of California Observatories (United States); T. Stalcup, W. M. Keck Observatory (United States); S. Thomas, Univ. of California Observatories (United States); M. Troy, Jet Propulsion Lab. (United States); K. Tsubota, W. M. Keck Observatory (United States); V. Velur, Caltech Optical Observatories (United States); K. Wallace, Jet Propulsion Lab. (United States); E. Wetherell, W. M. Keck Observatory (United States)
- 7736 OL **Manufacturing of the ESO adaptive optics facility** [7736-20]
R. Arsenault, P.-Y. Madec, N. Hubin, S. Stroebele, J. Paufique, E. Vernet, W. Hackenberg, J.-F. Pirard, L. Jochum, A. Glindemann, A. Jost, R. Conzelmann, M. Kiekebusch, S. Tordo, J.-L. Lizon, R. Donaldson, E. Fedrigo, C. Soenke, M. Duchateau, A. Bruton, B. Delabre, M. Downing, J. Reyes, J. Kolb, C. Bechet, M. Lelouarn, D. Bonaccini Calia, M. Quattri, I. Guidolin, B. Buzzoni, C. Dupuy, R. Guzman, M. Comin, A. Silber, J. Quentin, P. La Penna, A. Manescau, P. Jolley, V. Heinz, P. Duhoux, J. Argomedo, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); D. Gallieni, P. Lazzarini, A.D.S. International S.r.l. (Italy); R. Biasi, M. Andrighettoni, G. Angerer, D. Pescoller, Microgate S.r.l. (Italy); R. Stuik, A. Deep, Huygens Lab., Leiden Univ. (Netherlands)

- 7736 OM **E-ELT M5 field stabilisation unit scale 1 demonstrator design and performances evaluation** [7736-21]
J. M. Casalta, J. Barriga, J. Ariño, J. Mercader, M. San Andrés, J. Serra, NTE-SENER S.A. (Spain); I. Kjelberg, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland); N. Hubin, L. Jochum, E. Vernet, M. Dimmler, M. Müller, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 ON **Commissioning status of Subaru laser guide star adaptive optics system** [7736-22]
Y. Hayano, H. Takami, S. Oya, M. Hattori, Y. Saito, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Watanabe, Hokkaido Univ. (Japan); O. Guyon, Subaru Telescope, National Astronomical Observatory of Japan (United States) and Steward Observatory, The Univ. of Arizona (United States); Y. Minowa, S. E. Egner, M. Ito, V. Garrel, S. Colley, T. Golota, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Iye, National Astronomical Observatory of Japan (Japan)
- 7736 OO **Status of the 6.5m MMT Telescope laser adaptive optics system** [7736-23]
E. A. Bendek, M. Hart, K. B. Powell, N. M. Milton, V. Vaitheeswaran, D. McCarthy, C. Kulesa, Steward Observatory, The Univ. of Arizona (United States); S. Callahan, MMT Observatory (United States); S. M. Ammons, A. G. Rissmann, Steward Observatory, The Univ. of Arizona (United States)
- 7736 OP **Status update of the CANARY on-sky MOAO demonstrator** [7736-24]
E. Gendron, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); T. Morris, Durham Univ. (United Kingdom); Z. Hubert, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); R. Myers, Durham Univ. (United Kingdom); A. Longmore, United Kingdom Astronomy Technology Ctr. (United Kingdom); G. Rousset, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); G. Talbot, Durham Univ. (United Kingdom); F. Vidal, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); N. Dipper, Durham Univ. (United Kingdom); D. Gratadour, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); N. Looker, Durham Univ. (United Kingdom); M. Brangier, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); E. Younger, Durham Univ. (United Kingdom); A. Sevin, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); A. Basden, Durham Univ. (United Kingdom); D. Perret, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); L. Young, Durham Univ. (United Kingdom); D. Atkinson, United Kingdom Astronomy Technology Ctr. (United Kingdom); F. Chemla, GEPI, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); D. Henry, United Kingdom Astronomy Technology Ctr. (United Kingdom); T. Butterley, Durham Univ. (United Kingdom); P. Laporte, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); D. Guzman, Durham Univ. (United Kingdom); M. Marteaud, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); D. Geng, Durham Univ. (United Kingdom); N. Vedrenne, ONERA (France); M. Harrison, Durham Univ. (United Kingdom); T. Fusco, ONERA (France); A. Guesalaga, Pontifica Univ. Catolica de Chile (Chile); C. Dunlop, Durham Univ. (United Kingdom); S. Todd, United Kingdom Astronomy Technology Ctr. (United Kingdom); K. Dee, Engineering and Project Solutions Ltd. (United Kingdom); C. Dickson, United Kingdom Astronomy Technology Ctr. (United Kingdom); A. Greenaway, Heriot-Watt Univ. (United Kingdom); B. Stobie, United Kingdom Astronomy Technology Ctr. (United Kingdom); H. Dalgarno, Heriot-Watt Univ. (United Kingdom); J. Skvarc, Isaac Newton Group of Telescopes (Spain)

- 7736 OR **Conceptual design and performance of the multiconjugate adaptive optics module for the European Extremely Large Telescope** [7736-26]
E. Diolaiti, INAF-Osservatorio Astronomico di Bologna (Italy); J.-M. Conan, ONERA (France); I. Foppiani, INAF-Osservatorio Astronomico di Bologna (Italy) and Univ. degli Studi di Bologna (Italy); E. Marchetti, European Organization for Astronomical Research in the Southern Hemisphere (Germany); A. Baruffolo, INAF-Osservatorio Astronomico di Padova (Italy); M. Bellazzini, G. Bregoli, INAF-Osservatorio Astronomico di Bologna (Italy); C. R. Butler, INAF-Istituto di Astrofisica Spaziale e Fisica Cosmica (Italy); P. Ciliegi, INAF-Osservatorio Astronomico di Bologna (Italy); G. Cosentino, Univ. degli Studi di Bologna (Italy); B. Delabre, European Organization for Astronomical Research in the Southern Hemisphere (Germany); M. Lombini, INAF-Osservatorio Astronomico di Bologna (Italy) and Univ. degli Studi di Bologna (Italy); C. Petit, C. Robert, ONERA (France); P. Rossetti, Tomelleri s.r.l. (Italy); L. Schreiber, Univ. degli Studi di Bologna (Italy); R. Tomelleri, Tomelleri s.r.l. (Italy); V. Biliotti, INAF-Osservatorio Astrofisico di Arcetri (Italy); S. D'Odorico, European Organization for Astronomical Research in the Southern Hemisphere (Germany); T. Fusco, ONERA (France); N. Hubin, European Organization for Astronomical Research in the Southern Hemisphere (Germany); S. Meimon, ONERA (France)
- 7736 OS **EAGLE MOAO system conceptual design and related technologies** [7736-27]
G. Rousset, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); T. Fusco, ONERA (France) and Groupement d'Intérêt Scientifique PHASE (France); F. Assemat, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France), ONERA (France), and Groupement d'Intérêt Scientifique PHASE (France); E. Gendron, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); T. Morris, Durham Univ. (United Kingdom); C. Robert, ONERA (France) and Groupement d'Intérêt Scientifique PHASE (France); R. Myers, Durham Univ. (United Kingdom); M. Cohen, GEPI, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); N. Dipper, Durham Univ. (United Kingdom); C. Evans, United Kingdom Astronomy Technology Ctr. (United Kingdom); D. Gratadour, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); P. Jagourel, P. Laporte, GEPI, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); D. Le Mignant, LAM, CNRS, Univ. de Provence (France); M. Puech, GEPI, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); H. Schnetler, W. Taylor, United Kingdom Astronomy Technology Ctr. (United Kingdom); F. Vidal, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); J.-G. Cuby, LAM, CNRS, Univ. de Provence (France); M. Lehnert, GEPI, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); S. Morris, Durham Univ. (United Kingdom); P. Parr-Burman, United Kingdom Astronomy Technology Ctr. (United Kingdom)
- 7736 OT **Raven: a harbinger of multi-object adaptive optics based instruments at the Subaru Telescope** [7736-28]
R. Conan, C. Bradley, O. Lardire, C. Blain, K. Venn, Univ. of Victoria (Canada); D. Andersen, L. Simard, J.-P. Vran, G. Herriot, D. Loop, NRC Herzberg Institute of Astrophysics (Canada); T. Usuda, S. Oya, Y. Hayano, H. Terada, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Akiyama, Tohoku Univ. (Japan)

- 7736 0U **Adaptive optics and MCAO for the 4-m European Solar Telescope EST** [7736-29]
D. Soltau, T. Berkefeld, Kiepenheuer-Institut für Sonnenphysik (Germany); J. Sánchez Capuchino, M. Collados Vera, Instituto de Astrofísica de Canarias (Spain); D. Del Moro, Univ. degli Studi di Roma Tor Vergata (Italy); M. Löfdahl, G. Scharmer, Institute for Solar Physics (Sweden) and Stockholm Univ. (Sweden)

SESSION 6 MODELING, ANALYSIS, AND SIMULATION TOOLS II

- 7736 0V **Laser guide star return flux simulations based on observed sodium density profiles** [7736-15]
R. Holzlohner, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); S. M. Rochester, Univ. of California, Berkeley (United States); T. Frommer, The Univ. of British Columbia (Canada); D. Bonaccini Calia, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); D. Budker, Univ. of California, Berkeley (United States); J. M. Higbie, Bucknell Univ. (United States); W. Hackenberg, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 0W **Modeling update for the Thirty Meter Telescope laser guide star dual-conjugate adaptive optics system** [7736-31]
L. Gilles, L. Wang, B. Ellerbroek, Thirty Meter Telescope Project (United States)
- 7736 0X **Fractal iterative method for fast atmospheric tomography on extremely large telescopes** [7736-32]
M. Tallon, I. Tallon-Bosc, Univ. de Lyon (France), Observatoire de Lyon, Univ. de Lyon 1 (France), and Ctr. de Recherche Astrophysique de Lyon, CNRS, Ecole Normale Supérieure de Lyon (France); C. Béchet, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); F. Momey, M. Fradin, É. Thiébaud, Univ. de Lyon (France), Observatoire de Lyon, Univ. de Lyon 1 (France), and Ctr. de Recherche Astrophysique de Lyon, CNRS, Ecole Normale Supérieure de Lyon (France)
- 7736 0Y **The hunt for 100% sky coverage** [7736-33]
S. Meimon, T. Fusco, ONERA (France); Y. Clenet, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); J.-M. Conan, ONERA (France); F. Assémat, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); V. Michau, ONERA (France)

SESSION 7 WAVEFRONT SENSORS I

- 7736 0Z **Characterization of OCam and CCD220: the fastest and most sensitive camera to date for AO wavefront sensing** [7736-34]
P. Feautrier, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); J.-L. Gach, P. Balard, Lab. d'Astrophysique de Marseille (France); C. Guillaume, Observatoire de Haute Provence (France); M. Downing, N. Hubin, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); E. Stadler, Y. Magnard, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); M. Skegg, M. Robbins, S. Denney, W. Suske, P. Jorden, P. Wheeler, P. Pool, R. Bell, D. Burt, I. Davies, e2v technologies plc (United Kingdom); J. Reyes, M. Meyer, D. Baade, M. Kasper, R. Arsenault, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); T. Fusco, ONERA (France); J. J. Diaz Garcia, Instituto de Astrofísica de Canarias (Spain)

- 7736 10 **Adaptive optics wavefront sensors based on photon-counting detector arrays** [7736-35]
B. F. Aull, D. R. Schuette, R. K. Reich, MIT Lincoln Lab. (United States); R. L. Johnson, Air Force Research Lab. (United States)
- 7736 11 **A focal plane sensor for low-order sensing on laser tomographic systems: LIFT** [7736-93]
S. Meimon, T. Fusco, F. Cassaing, ONERA (France)
- 7736 12 **The Subaru Coronagraphic Extreme AO (SCEXAO) system: implementation and performances of the Coronagraphic Low Order WaveFront Sensor** [7736-37]
F. Vogt, Subaru Telescope, National Astronomical Observatory of Japan (United States) and Lab. d'Astrophysique, Ecole Polytechnique Fédérale de Lausanne (Switzerland);
F. Martinache, O. Guyon, Subaru Telescope, National Astronomical Observatory of Japan (United States); T. Yoshikawa, Subaru Telescope, National Astronomical Observatory of Japan (United States) and Univ. of Tokyo (Japan); K. Yokochi, Subaru Telescope, National Astronomical Observatory of Japan (United States) and Tokyo Univ. of Agriculture and Technology (Japan); V. Garrel, T. Matsuo, Subaru Telescope, National Astronomical Observatory of Japan (United States)

SESSION 8 REAL-TIME CONTROL I

- 7736 13 **Advances in real-time control algorithms (Invited Paper)** [7736-38]
R. Conan, Univ. of Victoria (Canada); J.-P. Veran, NRC Herzberg Institute of Astrophysics (Canada)
- 7736 14 **Optimal AO control with NGS/LGS wavefront sensors: the multirate case** [7736-39]
C. Kulcsár, H.-F. Raynaud, Institut Galilée, Univ. Paris 13 (France); C. Petit, J.-M. Conan, ONERA (France)
- 7736 15 **An optimized controller for ARGOS: using multiple wavefront sensor signals for homogeneous correction over the field** [7736-40]
D. Peter, Max-Planck-Institut für Astronomie (Germany)
- 7736 16 **Wavefront control algorithms for the Keck next-generation adaptive optics system** [7736-41]
D. Gavel, M. Reinig, Univ. of California Observatories (United States)
- 7736 17 **Modeling and prediction of turbulence-induced wavefront distortions** [7736-162]
R. Fraanje, Technische Univ. Delft (Netherlands) and TNO (Netherlands); N. Doelman, TNO (Netherlands)

SESSION 9 MODELING, ANALYSIS, AND SIMULATION TOOLS III

- 7736 18 **Progress and prospects in AO simulation capabilities (Invited Paper)** [7736-43]
M. Le Louarn, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)

- 7736 19 **Results from the laboratory demonstration of the nonlinear curvature wavefront sensor** [7736-201]
M. Mateen, College of Optical Sciences, The Univ. of Arizona (United States); V. Garrel, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Hart, Steward Observatory, The Univ. of Arizona (United States); O. Guyon, Subaru Telescope, National Astronomical Observatory of Japan (United States) and Steward Observatory, The Univ. of Arizona (United States)
- 7736 1A **Comparing centroiding methods for Shack-Hartmann wavefront sensing with laser guide stars on an ELT** [7736-45]
D. Gratadour, E. Gendron, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris-Diderot (France); T. Fusco, ONERA (France); G. Rousset, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris-Diderot (France); S. Meimon, ONERA (France)
- 7736 1B **Active control of a large deformable mirror for future E-ELT** [7736-46]
R. Gasmi, GEPI, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); D. Le Bihan, ONERA (France); J. L. Dournaux, GEPI, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); J. C. Siquin, CILAS (France); P. Jagourel, GEPI, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France)
- 7736 1C **Deformable mirror models for open-loop adaptive optics using non-parametric estimation techniques** [7736-47]
D. Guzmán, Pontificia Univ. Católica (Chile) and Durham Univ. (United Kingdom); F. J. De Cos Juez, Univ. de Oviedo (Spain); R. Myers, Durham Univ. (United Kingdom); F. Sánchez Lasheras, TecniProject S.L. (Spain); L. K. Young, Durham Univ. (United Kingdom); A. Guesalaga, Pontificia Univ. Católica (Chile)
- 7736 1D **ĪMAKA: a Lagrange invariant of ELTs** [7736-48]
O. Lai, Canada-France-Hawaii Telescope Corp. (United States); M. R. Chun, Univ. of Hawai'i at Hilo (United States); J. Pazder, J.-P. Véran, NRC Herzberg Institute of Astrophysics (Canada); L. Jolissaint, aquilAOptics (Switzerland); D. Andersen, NRC Herzberg Institute of Astrophysics (Canada); D. Salmon, J.-C. Cuillandre, Canada-France-Hawaii Telescope Corp. (United States)
- 7736 1E **Optimal method for exoplanet detection by spectral and angular differential imaging** [7736-49]
A. Cornia, ONERA (France) and LESIA, CNRS, Observatoire de Paris (France); L. M. Mugnier, ONERA (France); D. Mouillet, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); A. Vigan, Observatoire Astronomique de Marseille-Provence (France); A. Eggenberger, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); G. Rousset, A. Boccaletti, LESIA, CNRS, Observatoire de Paris (France); M. Carbillet, Univ. de Nice Sophia Antipolis (France); K. Dohlen, Observatoire Astronomique de Marseille-Provence (France); T. Fusco, ONERA (France); J. Carson, MPIA (Germany) and College of Charleston (United States); G. Montagnier, European Organisation for Astronomical Research in the Southern Hemisphere (Chile)
- 7736 1F **Adaptive optics point spread function reconstruction: lessons learned from on-sky experiment on Altair/Gemini and pathway for future systems** [7736-50]
L. Jolissaint, aquilAOptics (Switzerland); J. Christou, Gemini Observatory (United States); P. Wizinowich, W. M. Keck Observatory (United States); E. Tolstoy, Kapteyn Astronomical Institute, Univ. of Groningen (Netherlands)

SESSION 10 QUANTITATIVE ASTRONOMY

- 7736 1G **Dissecting galaxies with adaptive optics** [7736-51]
R. Davies, H. Engel, Max-Planck-Institut für extraterrestrische Physik (Germany); E. Hicks, Univ. of Washington (United States); N. M. Förster Schreiber, R. Genzel, L. J. Tacconi, F. Eisenhauer, S. Rabien, Max-Planck-Institut für extraterrestrische Physik (Germany)
- 7736 1H **Novel multi-frame approach to photometry of exoplanets** [7736-52]
S. Gladysz, N. Yaitskova, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); J. C. Christou, Gemini Observatory (United States)
- 7736 1I **Recent results and perspectives for precision astrometry and photometry with adaptive optics (Invited Paper)** [7736-53]
J. R. Lu, California Institute of Technology (United States); A. M. Ghez, S. Yelda, T. Do, W. Clarkson, Univ. of California, Los Angeles (United States); N. McCrady, Univ. of Montana (United States); M. Morris, Univ. of California, Los Angeles (United States)
- 7736 1J **Exoplanet imaging with LOCI processing: photometry and astrometry with the new SOSIE pipeline** [7736-54]
C. Marois, NRC Herzberg Institute of Astrophysics (Canada); B. Macintosh, Lawrence Livermore National Lab. (United States); J.-P. Véran, NRC Herzberg Institute of Astrophysics (Canada)

SESSION 11 EXOPLANET INSTRUMENTS

- 7736 1K **The Gemini NICI Planet-Finding Campaign** [7736-55]
M. C. Liu, Z. Wahhaj, B. A. Biller, Institute for Astronomy, Univ. of Hawai'i (United States); E. L. Nielsen, Steward Observatory, The Univ. of Arizona (United States); M. Chun, Institute for Astronomy, Univ. of Hawai'i (United States); L. M. Close, Steward Observatory, The Univ. of Arizona (United States); C. Ftaclas, Institute for Astronomy, Univ. of Hawai'i (United States); M. Hartung, T. L. Hayward, Gemini Observatory (Chile); F. Clarke, Univ. of Oxford (United Kingdom); I. N. Reid, Space Telescope Science Institute (United States); E. L. Shkolnik, Carnegie Institution of Washington (United States); M. Tecza, N. Thatte, Univ. of Oxford (United Kingdom); S. Alencar, Univ. Federal de Minas Gerais (Brazil); P. Artymowicz, Univ. of Toronto Scarborough (Canada); A. Boss, Space Telescope Science Institute (United States); A. Burrows, Princeton Univ. (United States); E. de Gouveia Dal Pino, J. Gregorio-Hetem, Univ. de São Paulo (Brazil); S. Ida, Tokyo Institute of Technology (Japan); M. J. Kuchner, NASA Goddard Space Flight Ctr. (United States); D. Lin, Univ. of California, Santa Cruz (United States); D. Toomey, Mauna Kea Infrared LLC (United States)
- 7736 1L **Extreme adaptive optics coronagraphy with the high-order test bench in the context of the SPHERE instrument** [7736-56]
P. Martinez, E. Aller Carpentier, M. Kasper, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 1N **System study of EPICS: the exoplanets imager for the E-ELT** [7736-58]
C. Verinaud, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); M. Kasper, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); J.-L. Beuzit, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); R. G. Gratton, D. Mesa, Osservatorio Astronomico di Padova (Italy); E. Aller-Carpentier, E. Fedrigo, European Organisation for Astronomical Research in the Southern Hemisphere (Germany);

L. Abe, Univ. de Nice Sophia Antipolis (France); P. Baudoz, A. Boccaletti, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); M. Bonavita, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); K. Dohlen, Lab. d'Astrophysique de Marseille (France); N. Hubin, F. Kerber, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); V. Korkiakoski, J. Antichi, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); P. Martinez, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); P. Rabou, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); R. Roelfsema, ASTRON (Netherlands); H. M. Schmid, ETH Institute of Astronomy, ETH Zurich (Switzerland); N. Thatte, G. Salter, M. Tecza, Univ. of Oxford (United Kingdom); L. Venema, H. Hanenburg, R. Jager, ASTRON (Netherlands); N. Yaitskova, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); O. Preis, M. Orecchia, E. Stadler, Lab. d'Astrophysique de l'Observatoire de Grenoble (France)

SESSION 12 NEW AO SYSTEM DESIGNS III

- 7736 1O **Performance of MEMS-based visible-light adaptive optics at Lick Observatory: closed- and open-loop control** [7736-59]
K. Morzinski, L. C. Johnson, D. T. Gavel, Univ. of California, Santa Cruz (United States); B. Grigsby, Univ. of California Observatories (United States); D. Dillon, M. Reinig, Univ. of California, Santa Cruz (United States); B. A. Macintosh, Univ. of California, Santa Cruz (United States) and Lawrence Livermore National Lab. (United States)
- 7736 1P **GRAAL: a seeing enhancer for the NIR wide-field imager Hawk-I** [7736-60]
J. Paufigue, A. Bruton, A. Glindemann, A. Jost, J. Kolb, L. Jochum, M. Le Louarn, M. Kiekebusch, N. Hubin, P.-Y. Madec, R. Conzelmann, R. Siebenmorgen, R. Donaldson, R. Arsenault, S. Tordo, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 1Q **Status of the PALM-3000 high-order adaptive optics system** [7736-61]
A. H. Bouchez, R. G. Dekany, Caltech Optical Observatories (United States); J. E. Roberts, J. R. Angione, Jet Propulsion Lab. (United States); C. Baranec, K. Bui, Caltech Optical Observatories (United States); R. S. Burruss, Jet Propulsion Lab. (United States); E. E. Croner, Caltech Optical Observatories (United States); S. R. Guiwits, Jet Propulsion Lab. (United States); D. D. S. Hale, Caltech Optical Observatories (United States); J. R. Henning, Palomar Observatory, California Institute of Technology (United States); D. Palmer, J. C. Shelton, M. Troy, T. N. Truong, J. K. Wallace, Jet Propulsion Lab. (United States); J. Zolkower, Palomar Observatory, California Institute of Technology (United States)
- 7736 1R **ALTAIR performance and updates at Gemini North** [7736-62]
J. C. Christou, Gemini Observatory (United States); B. Neichel, F. Rigaut, Gemini Observatory (Chile); M. Sheehan, R. M. McDermid, Gemini Observatory (United States); G. Tranco, Gemini Observatory (Chile); C. Trujillo, B. Walls, Gemini Observatory (United States)

- 7736 1S **The MCAO systems within LINC-NIRVANA: control aspects in addition to wavefront correction** [7736-63]
 T. Bertram, Max-Planck-Institut für Astronomie (Germany); C. Arcidiacono, INAF-Osservatorio Astrofisico di Firenze (Italy); J. Berwein, P. Bizenberger, F. Briegel, Max-Planck-Institut für Astronomie (Germany); E. Diolaiti, INAF-Osservatorio Astronomico di Bologna (Italy); J. Farinato, INAF-Osservatorio Astronomico di Padova (Italy); W. Gässler, T. M. Herbst, R. Hofferbert, F. Kittmann, M. Kürster, Max-Planck-Institut für Astronomie (Germany); R. Ragazzoni, INAF-Osservatorio Astronomico di Padova (Italy); L. Schreiber, Univ. degli studi di Bologna (Italy); J. Trowitzsch, Max-Planck-Institut für Astronomie (Germany); V. Viotto, INAF-Osservatorio Astronomico di Padova (Italy)

SESSION 13 LASER SYSTEMS

- 7736 1U **PM fiber lasers at 589nm: a 20W transportable laser system for LGS return flux studies** [7736-65]
 D. Bonaccini Calia, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); A. Friedenauer, TOPTICA Photonics AG (Germany); V. Protopopov, MPB Communications Inc. (Canada); I. Guidolin, L. R. Taylor, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); V. I. Karpov, MPB Communications Inc. (Canada); M. Hager, TOPTICA Photonics AG (Germany); W. R. L. Clements, MPB Communications Inc. (Canada); B. Ernstberger, TOPTICA Photonics AG (Germany); S. Lewis, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); W. G. Kaenders, TOPTICA Photonics AG (Germany)
- 7736 1V **Keck I laser guide star AO system integration** [7736-66]
 J. C. Y. Chin, T. Stalcup, P. Wizinowich, S. Panteleev, C. Neyman, K. Tsubota, D. Summers, P. Stomski, D. Medeiros, C. Nance, K. Grace, A. Cooper, E. Wetherell, S. Doyle, W. M. Keck Observatory (United States)

Part Two

- 7736 1W **Setting up ELP-OA: the polychromatic laser guide star demonstrator** [7736-90]
 N. Meilard, Univ. de Lyon (France), Observatoire de Lyon, Univ. de Lyon 1 (France), and Ctr. de Recherche Astrophysique de Lyon, CNRS, Ecole Normale Supérieure de Lyon (France); R. Foy, Univ. de Lyon (France), Observatoire de Lyon, Univ. de Lyon 1 (France), Ctr. de Recherche Astrophysique de Lyon, CNRS, Ecole Normale Supérieure de Lyon (France), and Observatoire de Haute-Provence (France); M. Langlois, M. Tallon, E. Thiébaud, Univ. de Lyon (France), Observatoire de Lyon, Univ. de Lyon 1 (France), and Ctr. de Recherche Astrophysique de Lyon, CNRS, Ecole Normale Supérieure de Lyon (France); A. Petit, Commissariat à l'Énergie Atomique (France); A. Blazit, Observatoire de la Côte d'Azur (France); P.-E. Blanc, J. Chombar, O. Fouche, A. Laloge, A. Le Van Suu, X. Regal, J. Schmitt, M. Boër, Observatoire de Haute-Provence, CNRS (France)
- 7736 1X **A bright pulsed guide star laser for very large telescopes** [7736-68]
 J. Munch, M. Hamilton, D. Hosken, N. Simakov, P. Veitch, The Univ. of Adelaide (Australia)

- 7736 1Y **System overview of 30 W and 55 W sodium guide star laser systems** [7736-69]
N. Sawruk, I. Lee, M. Jalali, Z. Prezkuta, K. Groff, J. Roush, N. Rogers, B. Tiemann, S. Hannon, J. Alford, Lockheed Martin Coherent Technologies (United States); C. d'Orgeville, V. Fesquet, Gemini South Observatory (Chile); R. Oram, Gemini North Observatory (United States); S. M. Adkins, K. Grace, W. M. Keck Observatory (United States)

SESSION 14 **ATMOSPHERIC CHARACTERIZATION**

- 7736 1Z **Open questions in site characterization and turbulence parameter measurements (Invited Paper)** [7736-70]
M. Schöck, Thirty Meter Telescope Project (United States) and NRC Herzberg Institute of Astrophysics (Canada); S. Els, European Space Astronomy Ctr. (Spain) and Cerro Tololo Inter-American Observatory (Chile); A. Otárola, Thirty Meter Telescope Project (United States); R. Riddle, Caltech Optical Observatories (United States); W. Skidmore, T. Travouillon, Thirty Meter Telescope Project (United States)
- 7736 20 **High-resolution mesospheric sodium observations for extremely large telescopes** [7736-71]
T. Frommer, P. Hickson, The Univ. of British Columbia (Canada)
- 7736 21 **Diode-seeded fiber-based sodium laser guide stars ready for deployment** [7736-232]
W. G. Kaenders, A. Friedenauer, TOPTICA Photonics AG (Germany); V. Karpov, V. Protopopov, W. R. L. Clements, MPB Communications Inc. (Canada); L. R. Taylor, Y. Feng, D. Bonaccini Calia, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); B. Ernstberger, TOPTICA Photonics AG (Germany)

SESSION 15 **INNOVATIVE AO CONCEPTS**

- 7736 22 **Recent progress and perspectives for GLAO and MOAO (Invited Paper)** [7736-72]
R. M. Myers, Durham Univ. (United Kingdom)
- 7736 23 **Adaptive optics with solely natural guide stars for an extremely large telescope** [7736-73]
R. Ragazzoni, INAF-Osservatorio Astronomico di Padova (Italy); C. Arcidiacono, INAF-Osservatorio Astronomico di Arcetri (Italy); M. Dima, J. Farinato, D. Magrin, INAF-Osservatorio Astronomico di Padova (Italy); V. Viotto, INAF-Osservatorio Astronomico di Padova (Italy) and Univ. of Padova (Italy)
- 7736 24 **The Subaru coronagraphic extreme AO (SCEXAO) system: wavefront control and detection of exoplanets with coherent light modulation in the focal plane** [7736-74]
O. Guyon, F. Martinache, V. Garrel, F. Vogt, K. Yokochi, T. Yoshikawa, Subaru Telescope, National Astronomical Observatory of Japan (United States)
- 7736 25 **Optimal LGS pointing with faint tip-tilt NGS** [7736-75]
R. Dekany, Caltech Optical Observatories (United States)
- 7736 26 **Experimental demonstration of laser tomographic adaptive optics on a 30-meter telescope at 800 nm** [7736-76]
S. M. Ammons, Steward Observatory, The Univ. of Arizona (United States); L. Johnson, R. Kupke, D. T. Gavel, C. E. Max, Univ. of California, Santa Cruz (United States)

SESSION 16 WAVEFRONT SENSORS II

- 7736 27 **Compared performance of different centroiding algorithms for high-pass filtered laser guide star Shack-Hartmann wavefront sensors** [7736-77]
O. Lardire, R. Conan, Univ. of Victoria (Canada); R. Clare, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); C. Bradley, Univ. of Victoria (Canada); N. Hubin, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 28 **Wavefront sensing with laser guide stars on the ELTs** [7736-78]
N. Muller, V. Michau, T. Fusco, C. Robert, ONERA (France) and Groupement d'Intrt Scientifique PHASE (France); S. J. Thomas, Univ. of California Observatories (United States); G. Rousset, LESIA, CNRS, Observatoire de Paris Meudon, Univ. Paris Diderot (France) and Groupement d'Intrt Scientifique PHASE (France)
- 7736 29 **A simple and efficient model for polychromatic focal plane wave-front sensor** [7736-79]
S. Dandy, J.-F. Sauvage, T. Fusco, L. Mugnier, ONERA (France)
- 7736 2A **Advanced static speckle calibration for exoplanet imaging** [7736-80]
L. Pueyo, K. Wallace, M. Troy, R. Burruss, Jet Propulsion Lab. (United States); B. Macintosh, Lawrence Livermore National Lab. (United States); R. Soummer, Space Telescope Science Institute (United States)

SESSION 17 WAVEFRONT CORRECTORS

- 7736 2B **Contactless thin adaptive mirror technology: past, present, and future** [7736-81]
R. Biasi, Microgate S.r.l. (Italy); D. Gallieni, A.D.S. International S.r.l. (Italy); P. Salinari, A. Riccardi, Osservatorio Astrofisico di Arcetri (Italy); P. Mantegazza, Politecnico di Milano (Italy)
- 7736 2C **The adaptive secondary mirror for the Large Binocular Telescope: optical acceptance test and preliminary on-sky commissioning results** [7736-82]
A. Riccardi, M. Xompero, R. Briguglio, F. Quirs-Pacheco, L. Busoni, L. Fini, A. Puglisi, S. Esposito, C. Arcidiacono, E. Pinna, P. Ranfagni, P. Salinari, INAF-Osservatorio Astrofisico di Arcetri (Italy); G. Brusa, R. Demers, Large Binocular Telescope Observatory, The Univ. of Arizona (United States); R. Biasi, Microgate s.r.l. (Italy); D. Gallieni, A.D.S. International s.r.l. (Italy)
- 7736 2D **MEMS deformable mirrors for astronomical adaptive optics** [7736-83]
S. A. Cornelissen, A. L. Hartzell, J. B. Stewart, Boston Micromachines Corp. (United States); T. G. Bifano, Boston Micromachines Corp. (United States) and Boston Univ. (United States); P. A. Bierden, Boston Micromachines Corp. (United States)
- 7736 2E **Optical characterization of the PALM-3000 3388-actuator deformable mirror** [7736-84]
J. Roberts, Jet Propulsion Lab. (United States); A. H. Bouchez, Caltech Optical Observatories (United States); R. S. Burruss, Jet Propulsion Lab. (United States); R. G. Dekany, Caltech Optical Observatories (United States); S. R. Guiwits, M. Troy, Jet Propulsion Lab. (United States)

- 7736 2F **Last progress concerning the design of the piezo-stack M4 adaptive unit of the E-ELT** [7736-85]
 B. Crepy, CILAS (France); S. Chaillot, BOOSTEC S.A. (France); J. M. Conan, ONERA (France); R. Cousty, CILAS (France); C. Delrez, AMOS Ltd. (Belgium); M. Dimmler, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); J. L. Dournaux, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); S. De Zotti, EADS Astrium (France); E. Gabriel, AMOS Ltd. (Belgium); R. Gasmi, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); R. Grasser, CILAS (France); N. Hubin, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); P. Jagourel, Observatoire de Paris à Meudon (France); L. Jochum, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); F. Locre, CILAS (France); P.-Y. Madec, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); P. Morin, CILAS (France); M. Mueller, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); G. Petit, ONERA (France); D. Petitgas, CILAS (France); M. Pierard, AMOS Ltd. (Belgium); J. J. Roland, J. C. Sinquin, CILAS (France); E. Vernet, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)

SESSION 18 REAL-TIME CONTROL II

- 7736 2H **MYST: a comprehensive high-level AO control tool for GeMS** [7736-87]
 F. Rigaut, B. Neichel, M. Bec, Gemini Observatory (Chile); A. Garcia-Rissman, Steward Observatory, The Univ. of Arizona (United States)
- 7736 2I **SPARTA for the VLT: status and plans** [7736-88]
 E. Fedrigo, R. Bourtembourg, R. Donaldson, C. Soenke, M. Suarez Valles, S. Zampieri, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 2J **Wavefront sensing and wavefront reconstruction for the 4m European Solar Telescope EST** [7736-89]
 T. Berkefeld, D. Soltau, Kiepenheuer-Institut für Sonnenphysik (Germany); D. del Moro, Univ. degli Studi di Roma Tor Vergata (Italy); M. Löfdahl, Institute for Solar Physics (Sweden)

POSTER SESSION

- 7736 2K **Maintenance and operation of the adaptive optics module for NICI, the high-contrast coronagraphic imager of GEMINI observatory** [7736-91]
 M. Hartung, T. L. Hayward, Gemini Observatory (Chile); M. Chun, A. Kellerer, Institute for Astronomy, Univ. of Hawai'i (United States)
- 7736 2L **MOAO activities in Tohoku University** [7736-92]
 M. Akiyama, Astronomical Institute, Tohoku Univ. (Japan); S. Oya, Subaru Telescope, National Astronomical Observatory of Japan (United States); K. Hane, T. Wu, Tohoku Univ. (Japan); C. Tohoku, Astronomical Institute, Tohoku Univ. (Japan)

- 7736 2M **A compact design of a WFS for a natural guide star-based ELT adaptive optics system** [7736-94]
J. Farinato, INAF-Osservatorio Astronomico di Padova (Italy); V. Viotto, INAF-Osservatorio Astronomico di Padova (Italy) and Univ. degli Studi di Padova (Italy); R. Ragazzoni, INAF-Osservatorio Astronomico di Padova (Italy); C. Arcidiacono, INAF-Osservatorio Astrofisico di Arcetri (Italy); A. Baruffolo, M. Dima, G. Gentile, D. Magrin, INAF-Osservatorio Astronomico di Padova (Italy); P. Rossetini, Tomelleri s.r.l. (Italy)
- 7736 2N **Status and new operation modes of the versatile VLT/NaCo** [7736-95]
J. H. V. Girard, European Organisation for Astronomical Research in the Southern Hemisphere (Chile); M. Kasper, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); S. P. Quanz, ETH Zurich (Switzerland); M. A. Kenworthy, Leiden Observatory, Leiden Univ. (Netherlands); S. Rengaswamy, European Organisation for Astronomical Research in the Southern Hemisphere (Chile); R. Schödel, Instituto de Astrofísica de Andalucía (Spain); A. Gallenne, European Organisation for Astronomical Research in the Southern Hemisphere (Chile); S. Gillessen, Max-Planck-Institut für extraterrestrische Physik (Germany); N. Huerta, European Organisation for Astronomical Research in the Southern Hemisphere (Chile); P. Kervella, LESIA, CNRS, Observatoire de Paris, Univ. Paris Diderot (France); N. Kornweibel, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); R. Lenzen, Max-Planck-Institut für Astronomie (Germany); A. Mérand, G. Montagnier, J. O'Neal, European Organisation for Astronomical Research in the Southern Hemisphere (Chile); G. Zins, LAOG, CNRS, Univ. Joseph Fourier (France)
- 7736 2O **Fast autonomous holographic adaptive optics** [7736-96]
G. Andersen, Air Force Academy (United States)
- 7736 2Q **Residual tip-tilt motion of LGS in monostatic scheme** [7736-98]
L. A. Bolbasova, V. P. Lukin, V.E. Zuev Institute of Atmospheric Optics (Russian Federation) and Tomsk State Univ. (Russian Federation); V. V. Nosov, V.E. Zuev Institute of Atmospheric Optics (Russian Federation)
- 7736 2R **Online wind estimation and prediction for a two-layer frozen flow atmosphere** [7736-100]
L. C. Johnson, D. T. Gavel, D. M. Wiberg, Univ. of California, Santa Cruz (United States)
- 7736 2S **Laboratory demonstration of an anti-halo reconstructor for closed-loop adaptive halo suppression** [7736-101]
E. Salçin, College of Optical Sciences, The Univ. of Arizona (United States); J. L. Codona, Steward Observatory, The Univ. of Arizona (United States)
- 7736 2T **Reducing PSF halo with adaptive pupil masking** [7736-102]
J. Osborn, R. M. Myers, G. D. Love, Durham Univ. (United Kingdom)
- 7736 2U **Ferrofluid deformable mirrors: recent advances and results** [7736-103]
D. Brousseau, E. F. Borra, Univ. Laval (Canada)
- 7736 2V **The Magellan Adaptive Secondary VisAO Camera: diffraction-limited broadband visible imaging and 20mas fiber array IFU** [7736-105]
D. Kopon, L. M. Close, J. Males, V. Gasho, K. Follette, Steward Observatory, The Univ. of Arizona (United States)

- 7736 2W **Diffraction limited operation with ARGOS: a hybrid AO system** [7736-106]
M. Bonaglia, L. Busoni, F. Quirós-Pacheco, S. Esposito, INAF-Osservatorio Astrofisico di Arcetri (Italy)
- 7736 2Y **New method of fabricating phase screens for simulated atmospheric turbulence** [7736-108]
R. Rampy, Univ. of California, Santa Cruz (United States); D. Gavel, Univ. of California Observatories (United States); D. Dillon, Univ. of California, Santa Cruz (United States); S. Thomas, Univ. of California Observatories (United States)
- 7736 2Z **System overview of the Multi conjugated Adaptive Optics Relay for the E-ELT** [7736-109]
I. Foppiani, Univ. degli Studi di Bologna (Italy); E. Diolaiti, INAF-Osservatorio Astronomico di Bologna (Italy); A. Baruffolo, INAF-Osservatorio Astronomico di Padova (Italy); V. Biliotti, INAF-Osservatorio Astrofisico di Arcetri (Italy); G. Bregoli, INAF-Osservatorio Astronomico di Bologna (Italy); G. Cosentino, Univ. degli Studi di Bologna (Italy); B. Delabre, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); M. Lombini, INAF-Osservatorio Astronomico di Bologna (Italy); E. Marchetti, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); P. Rossettini, Tomelleri srl (Italy); L. Schreiber, Univ. degli Studi di Bologna (Italy); R. Tomelleri, Tomelleri srl (Italy); J.-M. Conan, ONERA (USA); S. D'Odorico, N. Hubin, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 30 **Calibration strategy and optics for ARGOS at the LBT** [7736-110]
C. Schwab, Univ. of Heidelberg (Germany); D. Peter, Max-Planck-Institut für Astronomie (Germany); S. Aigner, Dioptric GmbH (Germany)
- 7736 31 **Solar multiconjugate adaptive optics at the Dunn Solar Telescope** [7736-111]
T. Rimmele, F. Woeger, National Solar Observatory (United States); J. Marino, Univ. of Florida (United States); K. Richards, S. Hegwer, National Solar Observatory (United States); T. Berkefeld, D. Soltau, D. Schmidt, T. Waldmann, Kiepenheuer-Institut für Sonnenphysik (Germany)
- 7736 32 **The optical tests for the E-ELT adaptive mirror demonstration prototype** [7736-112]
E. Molinari, INAF-TNG (Spain); D. Tresoldi, G. Toso, P. Spanò, R. Mazzoleni, M. Riva, A. Riccardi, INAF-Osservatorio Astronomico di Brera (Italy); R. Biasi, M. Andrichetoni, G. Angherer, Microgate S.r.l. (Italy); D. Gallieni, M. Tintori, A.D.S. International S.r.l. (Italy); G. Marque, Sagem Défense Sécurité (France)
- 7736 33 **Adaptive optics systems for HARMONI: a visible and near-infrared integral field spectrograph for the E-ELT** [7736-113]
T. Fusco, ONERA (France); N. Thatte, Univ. of Oxford (France); S. Meimon, ONERA (France); M. Tecza, F. Clarke, Univ. of Oxford (United Kingdom); M. Swinbank, Durham Univ. (United Kingdom)
- 7736 34 **Diffraction-limited upgrade to ARGOS: the LBT's ground-layer adaptive optics system** [7736-114]
M. Hart, Ctr. for Astronomical Adaptive Optics, The Univ. of Arizona (United States); L. Busoni, INAF-Osservatorio Astrofisico di Arcetri (Italy); O. Durney, Ctr. for Astronomical Adaptive Optics, The Univ. of Arizona (United States); S. Esposito, INAF-Osservatorio Astrofisico di Arcetri (Italy); W. Gässler, Max-Planck-Institut für Astronomie (Germany); V. Gasho, Ctr. for Astronomical Adaptive Optics, The Univ. of Arizona (United States); S. Rabien, Max-Planck-Institut für extraterrestrische Physik (Germany); M. Rademacher, Ctr. for Astronomical Adaptive Optics, The Univ. of Arizona (United States)

- 7736 35 **Is ESO's adaptive optics facility suited for MCAO?** [7736-115]
E. Marchetti, P. Amico, E. Fedrigo, A. Glindemann, N. Hubin, P. La Penna, M. Le Louarn, P.-Y. Madec, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 36 **Implementation and on-sky results of an optimal wavefront controller for the MMT NGS adaptive optics system** [7736-116]
K. B. Powell, MMT Observatory, The Univ. of Arizona (United States); V. Vaitheeswaran, Steward Observatory, The Univ. of Arizona (United States)
- 7736 37 **Closed-loop tomographic control on HOMER wide-field AO bench: experimental results and identification issues** [7736-117]
A. Parisot, ONERA (France); A. Costille, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); C. Petit, T. Fusco, ONERA (France)
- 7736 38 **Development and performance of the EAGLE active optics LGS WFS refocusing system** [7736-119]
F. Madec, D. Le Mignant, E. Chardin, E. Hugot, S. Mazzanti, J.-L. Gimenez, M. Ferrari, G. Moreaux, S. Vives, J.-G. Cuby, Lab. d'Astrophysique de Marseille, CNRS/INSU, Univ. de Provence Aix-Marseille I (France)
- 7736 39 **FFREE: a Fresnel-FRee Experiment for EPICS, the EELT planets imager** [7736-120]
J. Antichi, C. Véronaud, O. Preis, A. Delboulbé, G. Zins, P. Rabou, J.-L. Beuzit, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); S. Dandy, J.-F. Sauvage, T. Fusco, Office National d'Etudes et Recherches Aéropatiales (France); E. Aller-Carpentier, M. Kasper, N. Hubin, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 3A **Vrala: designing and prototyping a novel high-efficiency actuator for large adaptive mirrors** [7736-121]
C. Del Vecchio, INAF-Osservatorio Astrofisico di Arcetri (Italy); F. Marignetti, Univ. degli Studi di Cassino (Italy); G. Agapito, INAF-Osservatorio Astrofisico di Arcetri (Italy); G. Tomassi, Univ. degli Studi di Cassino (Italy); A. Riccardi, INAF-Osservatorio Astrofisico di Arcetri (Italy)
- 7736 3B **Simulations for diffraction limited near-infrared adaptive optics systems for the AOF** [7736-122]
M. Le Louarn, A. Glindemann, N. Hubin, E. Marchetti, P.-Y. Madec, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 3C **Optical designs with wide field-of-view adaptive optics for IMAKA of CFHT** [7736-123]
M. Wang, M. Doucet, J. Gauvin, F. Châteauneuf, Institut National d'Optique (Canada); D. Salmon, Canada-France-Hawaii Telescope Corp. (United States)
- 7736 3D **An update of the on-sky performance of the layer-oriented wave-front sensor for MAD** [7736-124]
C. Arcidiacono, INAF-Osservatorio Astrofisico di Arcetri (Italy) and INAF-Osservatorio Astronomico di Padova (Italy); M. Lombini, Osservatorio Astronomico di Bologna (Italy); A. Moretti, R. Ragazzoni, J. Farinato, R. Falomo, M. Gullieuszk, INAF-Osservatorio Astronomico di Padova (Italy); G. Piotto, Univ. degli Studi di Padova (Italy)

- 7736 3E **Analysis of adaptive optics control for the Advanced Technology Solar Telescope** [7736-125]
J. Marino, Univ. of Florida (United States); F. Wöger, T. Rimmele, National Solar Observatory (United States)
- 7736 3G **The METIS AO system: bringing extreme adaptive optics to the mid-IR** [7736-127]
R. Stuik, Leiden Observatory, Leiden Univ. (Netherlands); L. Jolissaint, aquilA Optics (Switzerland); S. Kendrew, Leiden Observatory, Leiden Univ. (Netherlands); S. Hippler, Max-Planck-Institut für Astronomie (Germany); B. Brandl, Leiden Observatory, Leiden Univ. (Netherlands); L. Venema, NOVA/ASTRON (Netherlands); R. Lenzen, Max-Planck-Institut für Astronomie (Germany); E. Pantin, CE Saclay (France); J. Blommaert, Instituut voor Sterrenkunde, Katholieke Univ. Leuven (Belgium); A. Glasse, United Kingdom Astronomy Technology Ctr. (United Kingdom)
- 7736 3H **First light AO (FLAO) system for LBT: performance analysis and optimization** [7736-128]
F. Quirós-Pacheco, L. Busoni, G. Agapito, S. Esposito, E. Pinna, A. Puglisi, A. Riccardi, INAF-Osservatorio Astrofisico di Arcetri (Italy)
- 7736 3I **Demonstration of a robust curved carbon fiber reinforced polymer deformable mirror with low surface error** [7736-129]
B. Coughenour, College of Optical Sciences, The Univ. of Arizona (United States); S. M. Ammons, M. Hart, Steward Observatory, The Univ. of Arizona (United States); R. Romeo, R. Martin, Composite Mirror Applications, Inc. (United States); M. Rademacher, H. Bailey, Steward Observatory, The Univ. of Arizona (United States)
- 7736 3J **Real-time control for Keck Observatory next-generation adaptive optics** [7736-130]
M. Reinig, D. Gavel, Univ. of California Observatories (United States); E. Ardestani, J. Renau, Univ. of California, Santa Cruz (United States)
- 7736 3K **Adaptive optics system for the IRSOL solar observatory** [7736-131]
R. Ramelli, Istituto Ricerche Solari Locarno (Switzerland); R. Bucher, Scuola Univ. Professionale della Svizzera Italiana (Switzerland); L. Rossini, Istituto Ricerche Solari Locarno (Switzerland), Scuola Univ. Professionale della Svizzera Italiana (Switzerland), and Swiss Ctr. for Electronics and Microtechnology, Neuchâtel (Switzerland); M. Bianda, Istituto Ricerche Solari Locarno (Switzerland); S. Balemi, Scuola Univ. Professionale della Svizzera Italiana (Switzerland)
- 7736 3L **SAM sees the light** [7736-132]
A. Tokovinin, R. Tighe, P. Schurter, R. Cantarutti, N. van der Bliek, M. Martinez, E. Mondaca, A. Montané, W. Naudy Cortés, Cerro Tololo Inter-American Observatory (Chile)
- 7736 3M **Testing the VLT AO facility with ASSIST** [7736-133]
R. Stuik, Leiden Observatory, Leiden Univ. (Netherlands); R. Arsenault, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); W. Boland, NOVA (Netherlands); A. Deep, Leiden Observatory, Leiden Univ. (Netherlands); B. Delabre, N. Hubin, J. Kolb, P. La Penna, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); F. Molster, NOVA (Netherlands); E. Wieggers, Leiden Observatory, Leiden Univ. (Netherlands)

- 7736 3N **Performance of Subaru adaptive optics system AO188** [7736-134]
Y. Minowa, Y. Hayano, S. Oya, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Watanabe, Hokkaido Univ. (Japan); M. Hattori, O. Guyon, S. Egner, Y. Saito, M. Ito, H. Takami, V. Garrel, S. Colley, T. Golota, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Iye, National Astronomical Observatory of Japan (Japan)
- 7736 3O **GMT adaptive secondary design** [7736-135]
R. Biasi, D. Veronese, M. Andrighettoni, G. Angerer, Microgate S.r.l. (Italy); D. Gallieni, M. Mantegazza, M. Tintori, P. Lazzarini, A.D.S. International S.r.l. (Italy); M. Manetti, Politecnico di Milano (Italy); M. W. Johns, P. M. Hinz, J. Kern, GMTO Corp. (United States)
- 7736 3P **A portable solar adaptive optics system: software and laboratory developments** [7736-136]
D. Ren, California State Univ., Northridge (United States); M. Penn, C. Plymate, National Solar Observatory (United States); H. Wang, New Jersey Institute of Technology (United States); X. Zhang, B. Dong, N. Brown, A. Denio, California State Univ., Northridge (United States)
- 7736 3Q **SAMI: the SCAO module for the E-ELT adaptive optics imaging camera MICADO** [7736-137]
Y. Clénet, P. Bernardi, F. Chapron, E. Gendron, G. Rousset, Z. Hubert, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); R. Davies, M. Thiel, Max-Planck-Institut für extraterrestrische Physik (Germany); N. Tromp, ASTRON (Netherlands); R. Genzel, Max-Planck-Institut für extraterrestrische Physik (Germany)
- 7736 3S **Visible and infrared multispectral illumination concept based on Galilean collimation systems: IACATS illumination source** [7736-139]
G. Ramos Zapata, T. Belenguer Dávila, C. Pastor Santos, R. Restrepo Gómez, C. González Alvarado, H. Laguna Hernández, A. Astolfi Carbonell, Instituto Nacional de Técnica Aeroespacial (Spain); J. Moreno Raso, H. Argelaguet, J. Serrano, LIDAX (Spain)
- 7736 3T **IACATS AIV: AIV process for a versatile turbulence simulator** [7736-140]
G. Ramos Zapata, T. Belenguer-Dávila, C. Pastor Santos, A. Sánchez Rodríguez, Instituto Nacional de Técnica Aeroespacial (Spain); J. Moreno Raso, H. Argelaguet, J. Serrano, LIDAX (Spain)
- 7736 3U **Tip/tilt offload of Subaru AO188 by telescope secondary mirror** [7736-141]
S. Oya, M. Hattori, Y. Minowa, S. Negishi, D. Tomono, H. Terada, T.-S. Pyo, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Watanabe, Hokkaido Univ. (Japan); M. Ito, Y. Saito, S. Egner, Y. Hayano, H. Takami, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Iye, National Astronomical Observatory of Japan (Japan); O. Guyon, V. Garrel, S. Colley, T. Golota, Subaru Telescope, National Astronomical Observatory of Japan (United States)
- 7736 3V **Design and expected performances of the SCAO-WFS module of SIMPLE, the high-resolution near-infrared spectrometer for E-ELT** [7736-142]
A. Tozzi, E. Oliva, INAF-Osservatorio Astrofisico di Arcetri (Italy); M. Le Louarn, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); L. Origlia, INAF-Osservatorio Astronomico di Bologna (Italy)

- 7736 3W **Experimental validation of a numerical model for non-contact massively actuated, deformable adaptive mirrors** [7736-144]
M. Manetti, M. Morandini, P. Mantegazza, Politecnico di Milano (Italy); R. Biasi, Microgate S.r.l. (Italy); D. Gallieni, A.D.S. International S.r.l. (Italy); A. Riccardi, INAF-Osservatorio Astrofisico di Arcetri (Italy)

Part Three

- 7736 3X **Lucky imaging and adaptive optics on 10-m class telescopes: a real promise for diffraction limited imaging in the visible?** [7736-145]
B. Femenía Castellá, L. Labadie, Instituto de Astrofísica de Canarias (Spain) and Univ. de La Laguna (Spain); R. Rebolo López, Instituto de Astrofísica de Canarias (Spain) and Consejo Superior de Investigaciones Científicas (Spain); J. A. Pérez Prieto, Instituto de Astrofísica de Canarias (Spain) and Univ. de La Laguna (Spain); A. Pérez Garrido, A. Díaz Sánchez, I. Villo Pérez, Univ. Politécnica de Cartagena (Spain)
- 7736 3Y **Adaptive optics simulation with mechanically motivated basis functions** [7736-146]
T. Ruppel, W. Osten, O. Sawodny, Univ. Stuttgart (Germany)
- 7736 3Z **Multilayered temporally evolving phase screens based on statistical interpolation** [7736-147]
M. B. Roopashree, Indian Institute of Astrophysics (India); A. Vyas, Indian Institute of Astrophysics (India) and Indian Institute of Science (India); B. Raghavendra Prasad, Indian Institute of Astrophysics (India)
- 7736 40 **Optimizing the modal index of Zernike polynomials for regulated phase screen simulation** [7736-148]
A. Vyas, Indian Institute of Astrophysics (India) and Indian Institute of Science (India); M. B. Roopashree, B. Raghavendra Prasad, Indian Institute of Astrophysics (India)
- 7736 41 **Multiconjugate adaptive optics with plenoptic cameras and the Fourier transform reconstructor** [7736-149]
I. Montilla, M. Reyes, B. Femenía, Instituto de Astrofísica de Canarias (Spain); J. M. Rodríguez-Ramos, Univ. de La Laguna (Spain)
- 7736 42 **Modeling the adaptive optics systems on the Giant Magellan Telescope** [7736-150]
M. A. van Dam, Flat Wavefronts, Ltd. (New Zealand); P. M. Hinz, J. L. Codona, M. Hart, A. Garcia-Rissmann, Steward Observatory, The Univ. of Arizona (United States); M. W. Johns, S. A. Shectman, A. H. Bouchez, Carnegie Observatories (United States); B. A. McLeod, Harvard-Smithsonian Ctr. for Astrophysics (United States); F. Rigaut, Gemini Observatory (Chile)
- 7736 43 **Simulations of the extreme adaptive optics system for EPICS** [7736-151]
V. Korkiakoski, Utrecht Univ. (Netherlands); C. Verinaud, Lab. d'Astrophysique de l'Observatoire de Grenoble (France)

- 7736 44 **The CAOS problem-solving environment: recent developments** [7736-152]
M. Carbillet, Lab. Fizeau, CNRS, Univ. de Nice Sophia Antipolis, Observatoire de la Côte d'Azur (France); G. Desiderà, Univ. degli Studi di Genova (Italy); E. Augier, Lab. Fizeau, CNRS, Univ. de Nice Sophia Antipolis (France); A. La Camera, Univ. degli Studi di Genova (Italy); A. Riccardi, Osservatorio Astrofisico di Arcetri (Italy); A. Boccaletti, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); L. Jolissaint, aquilAOptics (Switzerland); D. Ab Kabir, Lab. Fizeau, CNRS, Univ. de Nice Sophia Antipolis, Observatoire de la Côte d'Azur (France)
- 7736 45 **Modeling adaptive optics for the segmented aperture of the GMT** [7736-153]
R. P. Knox, P. M. Hinz, J. L. Codona, Steward Observatory, The Univ. of Arizona (United States)
- 7736 46 **An atmospheric turbulence generator for dynamic tests with LINC-NIRVANA's adaptive optics system** [7736-154]
D. Meschke, P. Bizenberger, W. Gaessler, X. Zhang, L. Mohr, H. Baumeister, Max-Planck-Institut für Astronomie (Germany); E. Diolaiti, Osservatorio Astronomico di Bologna (Italy)
- 7736 47 **Simulation of low-order AO performance on LAMOST** [7736-155]
H. Bai, X. Yuan, Nanjing Institute of Astronomical Optics & Technology (China)
- 7736 48 **Performance evaluation of a SCAO system for a 42-m telescope using the pyramid wavefront sensor** [7736-156]
A. Garcia-Rissmann, Steward Observatory, The Univ. of Arizona (United States); M. Le Louarn, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 49 **Modeling the spatial PSF at the VLT focal plane for MUSE WFM data analysis purpose** [7736-157]
D. Serre, Leiden Observatory, Leiden Univ. (Netherlands); E. Villeneuve, H. Carfantan, Lab. d'Astrophysique de Toulouse-Tarbes, CNRS, Univ. de Toulouse (France); L. Jolissaint, Leiden Observatory, Leiden Univ. (Netherlands) and aquilAOptics (Switzerland); V. Mazet, LSII, CNRS, Univ. de Strasbourg (France); S. Bourguignon, Observatoire de la Cte d'Azur, Univ. de Nice Sophia Antipolis (France); A. Jarno, Univ. de Lyon (France)
- 7736 4A **Dimensioning the Gravity adaptive optics wavefront sensor** [7736-158]
Y. Clénet, E. Gendron, G. Rousset, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); S. Hippler, Max-Planck-Institut für Astronomie (Germany); F. Eisenhauer, S. Gillessen, Max-Planck-Institut für extraterrestrische Physik (Germany); G. Perrin, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); A. Amorim, Univ. de Lisboa (Portugal); W. Brandner, Max-Planck-Institut für Astronomie (Germany); K. Perraut, Lab. d'Astrophysique de Grenoble, CNRS, Univ. Joseph-Fourier (France); C. Straubmeier, Univ. zu Köln (Germany)
- 7736 4B **Atmosphere and telescope simulator for new adaptive optics methods development** [7736-159]
J. Moreno Raso, J. Serrano, H. Argelaguet, M. Lamensans, J. González, A. Martín, LIDAX (Spain); C. Pastor, G. Ramos, T. Belenguer, A. Sánchez, Instituto Nacional de Técnica Aeroespacial (Spain); L. F. Rodríguez-Ramos, Instituto de Astrofísica de Canarias (Spain)

- 7736 4C **Adaptive optics for satellite-to-ground laser communication at the 1m Telescope of the ESA Optical Ground Station, Tenerife, Spain** [7736-160]
T. Berkefeld, D. Soltau, Kiepenheuer Institut für Sonnenphysik (Germany); R. Czichy, E. Fischer, B. Wandernoth, Synopta GmbH (Switzerland); Z. Sodnik, European Space Research and Technology Ctr. (Netherlands)
- 7736 4D **ARGOS: a laser star constellation for the LBT** [7736-161]
S. Kanneganti, S. Rabien, M. Deysenroth, J. Ziegler, H. Gemperlein, M. Haug, Max-Planck-Institut für extraterrestrische Physik (Germany)
- 7736 4E **Noise reduction in the centroiding of laser guide star spot pattern using thresholded Zernike reconstructor** [7736-163]
A. Vyas, Indian Institute of Astrophysics (India) and Indian Institute of Science (India); M. B. Roopashree, B. Raghavendra Prasad, Indian Institute of Astrophysics (India)
- 7736 4F **Classical adaptive optics: disturbance rejection control** [7736-164]
J.-P. Folcher, A. Abelli, A. Ferrari, M. Carbillet, Lab. Fizeau, CNRS, Univ. de Nice Sophia Antipolis (France)
- 7736 4G **Simulation of wavefront measurement and tomography for Extremely Large Telescope** [7736-165]
M. Chebbo, B. Le Roux, Lab. d'Astrophysique de Marseille, CNRS, Univ. de Provence (France); J. F. Sauvage, T. Fusco, ONERA (France)
- 7736 4H **Multiple field-of-view MCAO for a Large Solar Telescope: LOST simulations** [7736-166]
M. Stangalini, F. Berrilli, D. Del Moro, R. Piazzesi, Univ. degli Studi di Roma Tor Vergata (Italy)
- 7736 4I **Implementation of type-II tip-tilt control in NFIRAOS with woofer-tweeter and vibration cancellation** [7736-167]
J.-P. Véran, National Research Council Canada (Canada); C. Irving, A. Beauvillier, Univ. of Victoria (Canada); G. Herriot, National Research Council Canada (Canada)
- 7736 4J **Numerical control matrix rotation for the LINC-NIRVANA multiconjugate adaptive optics system** [7736-168]
C. Arcidiacono, INAF-Osservatorio Astrofisico di Arcetri (Italy) and INAF, Osservatorio Astronomico di Padova (Italy); T. Bertram, Max-Planck-Institut für Astronomie (Germany); R. Ragazzoni, J. Farinato, INAF, Osservatorio Astronomico di Padova (Italy); S. Esposito, A. Riccardi, E. Pinna, A. Puglisi, L. Fini, M. Xompero, L. Busoni, F. Quiros-Pacheco, R. Briguglio, INAF, Osservatorio Astrofisico di Arcetri (Italy)
- 7736 4K **Experimental validation of type-II tip-tilt control in a woofer-tweeter adaptive optics system** [7736-169]
K. Jackson, R. Conan, Univ. of Victoria (Canada); J.-P. Veran, National Research Council Canada (Canada)
- 7736 4L **Real-time open-loop control of a 1024-actuator MEMS deformable mirror** [7736-170]
C. Blain, R. Conan, C. Bradley, Univ. of Victoria (Canada); O. Guyon, Subaru Telescope, National Astronomical Observatory of Japan (United States); D. Gamroth, R. Nash, Univ. of Victoria (Canada)

- 7736 4M **Recent development in real-time control system of Subaru adaptive optics including laser guide star mode** [7736-171]
M. Hattori, S. Colley, V. Garrel, S. Egner, T. Golota, O. Guyon, M. Ito, Y. Minowa, S. Oya, Y. Saito, M. Watanabe, Y. Hayano, H. Takami, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Iye, National Astronomical Observatory of Japan (Japan)
- 7736 4N **A COTS high-performance real-time control system for adaptive optics** [7736-172]
A. Basden, N. Dipper, R. Myers, Durham Univ. (United Kingdom)
- 7736 4O **SPARTA roadmap and future challenges** [7736-173]
E. Fedrigo, R. Donaldson, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 4P **The real-time control system for the CANARY multi-object adaptive optics on-sky demonstrator** [7736-174]
N. A. Dipper, A. Basden, N. E. Looker, Durham Univ. (United Kingdom); E. Gendron, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); D. Geng, Durham Univ. (United Kingdom); D. Gratadour, Z. Hubert, F. Vidal, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); R. M. Myers, Durham Univ. (United Kingdom); G. Rousset, A. Sevin, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); E. J. Younger, Durham Univ. (United Kingdom)
- 7736 4Q **Control system of a dispersed fringe type sensing system of active optics** [7736-176]
Y. Zhang, Nanjing Institute of Astronomical Optics & Technology (China) and Graduate Univ. of Chinese Academy of Sciences (China); Z. Zhang, Nanjing Institute of Astronomical Optics & Technology (China); Y. Zhang, Nanjing Institute of Astronomical Optics & Technology (China) and Graduate Univ. of Chinese Academy of Sciences (China)
- 7736 4R **Point-spread function reconstruction for the ground layer adaptive optics system ARGOS** [7736-177]
D. Peter, Max-Planck-Institut für Astronomie (Germany)
- 7736 4T **Anisoplanatism across wide fields at high-frame rates** [7736-179]
T. D. Staley, C. D. Mackay, D. King, F. Suess, K. Weller, Univ. of Cambridge (United Kingdom)
- 7736 4U **Making a robust, reliable, and a highly available DIMM seeing monitor** [7736-180]
J. M. Delgado, D. Jiménez Mejías, L. F. Rodríguez Ramos, H. Vázquez Ramió, Instituto de Astrofísica de Canarias (Spain)
- 7736 4V **Atmospheric dispersion correction for the Subaru AO system** [7736-181]
S. Egner, Subaru Telescope, National Astronomical Observatory of Japan (United States); Y. Ikeda, Photocoding (Japan); M. Watanabe, Hokkaido Univ. (Japan); Y. Hayano, T. Golota, M. Hattori, M. Ito, Y. Minowa, S. Oya, Y. Saito, H. Takami, National Astronomical Observatory of Japan/Subaru Telescope (United States); M. Iye, National Astronomical Observatory of Japan (Japan)
- 7736 4X **Laser guide star facility at La Silla Paranal Observatory: latest upgrades, operation, and performance** [7736-183]
J. L. Alvarez, J. Beltran, I. Munoz, G. Valdes, F. Gutierrez, M. Tapia, C. Ramirez, European Organisation for Astronomical Research in the Southern Hemisphere (Chile)

- 7736 4Y **Gemini North Laser Guide Star System: operations and maintenance review** [7736-185]
R. J. Oram, Gemini Observatory (United States); V. Fesquet, Gemini Observatory (Chile);
R. Wyman, Gemini Observatory (United States); C. d'Orgeville, Gemini Observatory (Chile)
- 7736 4Z **A pulsed guide star laser can be the brightest** [7736-186]
N. Simakov, M. Hamilton, P. J. Veitch, J. Munch, The Univ. of Adelaide (Australia)
- 7736 50 **Characterizing site specific considerations for protecting aircraft during LGS operations at W. M. Keck Observatory** [7736-187]
P. J. Stomski, Jr., R. Campbell, K. McCann, S. Shimko, W. M. Keck Observatory (United States)
- 7736 51 **The characteristics of laser-transmission and guide star's brightness for Subaru LGS/AO188 system** [7736-188]
M. Ito, Y. Hayano, Y. Saito, H. Takami, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Iye, National Astronomical Observatory of Japan (United States); M. Hattori, S. Oya, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Watanabe, Hokkaido Univ. (Japan); K. Akagawa, Single-mode Co., Ltd. (Japan); S. A. Colley, T. I. Golota, O. Guyon, Subaru Telescope, National Astronomical Observatory of Japan (United States)
- 7736 52 **Gemini North r' band imaging of the Keck II Laser** [7736-189]
D. M. Coulson, K. C. Roth, Gemini Observatory (United States)
- 7736 53 **The performance of the laser guide star system for the Subaru Telescope** [7736-190]
Y. Saito, Y. Hayano, M. Ito, Y. Minowa, S. Egner, S. Oya, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Watanabe, Hokkaido Univ. (Japan); M. Hattori, V. Garrel, Subaru Telescope, National Astronomical Observatory of Japan (United States); K. Akagawa, SINGLE-MODE Co., Ltd. (Japan); O. Guyon, S. Colley, T. Golota, Subaru Telescope, National Astronomical Observatory of Japan (United States); N. Saito, The Institute of Physical and Chemical-RIKEN (Japan); A. Takazawa, M. Ito, Megaopto Co., Ltd. (Japan); H. Takami, Subaru Telescope, National Astronomical Observatory of Japan (United States); S. Wada, The Institute of Physical and Chemical-RIKEN (Japan) and Megaopto Co., Ltd. (Japan); M. Iye, National Astronomical Observatory of Japan (Japan) and Graduate Univ. for Advanced Studies (Japan)
- 7736 54 **Optical setup and wavefront sensor for solar adaptive optics at the Domeless Solar Telescope, Hida Observatory** [7736-191]
N. Miura, F. Yokoyama, M. Nefu, S. Kuwamura, Kitami Institute of Technology (Japan); N. Baba, Hokkaido Univ. (Japan); Y. Hanaoka, National Astronomical Observatory of Japan (Japan); S. Ueno, Y. Nakatani, S. Nagata, R. Kitai, K. Ichimoto, Kyoto Univ. (Japan); H. Takami, Subaru Telescope, National Astronomical Observatory of Japan (United States)
- 7736 56 **Symmetrically weighted center of gravity for Shack-Hartmann wavefront sensing on a laser guide star** [7736-193]
D. Gratadour, E. Gendron, G. Rousset, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris-Diderot (France)
- 7736 57 **Pyramid wavefront sensing with a laser guide star for an ELT** [7736-194]
B. Le Roux, Observatoire Astronomique de Marseille-Provence, Univ. d'Aix-Marseille I (France)

- 7736 58 **Error propagation in curvature sensors** [7736-195]
A. Kellerer, M. Chun, C. Ftaclas, Univ. of Hawai'i (United States)
- 7736 59 **Wavefront sensors and algorithms for adaptive optical systems** [7736-196]
V. P. Lukin, N. N. Botygina, O. N. Emaleev, P. A. Konyaev, Institute of Atmospheric Optics (Russian Federation)
- 7736 5B **The laser guide stars wavefront sensor prototype for the E-ELT: test results** [7736-198]
L. Schreiber, Univ. degli Studi di Bologna (Italy); M. Lombini, E. Diolaiti, INAF, Osservatorio Astronomico di Bologna (Italy); C. Robert, ONERA (France); I. Foppiani, INAF, Osservatorio Astronomico di Bologna (Italy); G. Cosentino, Univ. degli Studi di Bologna (Italy); G. Bregoli, INAF, Osservatorio Astronomico di Bologna (Italy); E. Marchetti, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 5C **Wide-field AO correction: the large wavefront sensor detector of ARGOS** [7736-199]
G. Orban de Xivry, S. Rabien, L. Barl, Max-Planck-Institut für extraterrestrische Physik (Germany); S. Esposito, Osservatorio Astrofisico di Arcetri (Italy); W. Gaessler, Max-Planck-Institut für Astronomie (Germany); M. Hart, Steward Observatory, The Univ. of Arizona (United States); M. Deysenroth, H. Gemperlein, Max-Planck-Institut für extraterrestrische Physik (Germany); L. Strüder, Max-Planck-Institut Halbleiterlabor (Germany); J. Ziegler, Max-Planck-Institut für extraterrestrische Physik (Germany)
- 7736 5D **The Gemini Planet Imager calibration wavefront sensor instrument** [7736-200]
J. K. Wallace, R. S. Burruss, R. D. Bartos, T. Q. Trinh, L. A. Pueyo, S. F. Fregoso, J. R. Angione, J. C. Shelton, Jet Propulsion Lab. (United States)
- 7736 5E **Prototype of a laser guide stars wavefront sensor for E-ELT: design and integration** [7736-202]
M. Lombini, G. Bregoli, INAF, Osservatorio Astronomico di Bologna (Italy); G. Cosentino, Univ. degli Studi di Bologna (Italy); L. Schreiber, E. Diolaiti, I. Foppiani, INAF, Osservatorio Astronomico di Bologna (Italy)
- 7736 5F **Performance of a Shack-Hartmann wavefront sensor using real sodium laser data** [7736-203]
S. J. Thomas, D. Gavel, Univ. of California Observatories/Lick Observatory (United States); N. Muller, V. Michau, T. Fusco, ONERA (France)
- 7736 5G **Characterization of synthetic reconstructors for the pyramid wavefront sensor unit of LBT** [7736-204]
V. Bailey, V. Vaitheeswaran, J. Codona, P. Hinz, O. Durney, The Univ. of Arizona (United States); S. Esposito, E. Pinna, A. Puglisi, Osservatorio Astrofisico di Arcetri (Italy)
- 7736 5H **Visible low-order wavefront sensor for the Subaru LGS AO system** [7736-205]
M. Watanabe, Hokkaido Univ. (Japan); M. Ito, S. Oya, Y. Hayano, Y. Minowa, M. Hattori, Y. Saito, S. Egner, H. Takami, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Iye, National Astronomical Observatory of Japan (Japan); O. Guyon, V. Garrel, S. Colley, T. Golota, Subaru Telescope, National Astronomical Observatory of Japan (United States)

- 7736 5I **Handling complex adaptive optics concepts including the third and fourth dimensions** [7736-206]
M. Dima, INAF, Osservatorio Astronomico di Padova (Italy); V. Viotto, INAF, Osservatorio Astronomico di Padova (Italy) and Univ. degli Studi di Padova (Italy); C. Arcidiacono, INAF, Osservatorio Astrofisico di Arcetri (Italy); M. Bergomi, A. Brunelli, Univ. degli Studi di Padova (Italy); J. Farinato, G. Gentile, D. Magrin, R. Ragazzoni, A. Satta, INAF, Osservatorio Astronomico di Padova (Italy)
- 7736 5J **Integration and alignment of adaptive optics systems: 10 years of experience at the VLT** [7736-207]
S. Tordo, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 7736 5K **Final design of the wavefront sensor unit for ARGOS, the LBT's LGS facility** [7736-208]
L. Busoni, M. Bonaglia, S. Esposito, L. Carbonaro, Osservatorio Astrofisico di Arcetri (Italy); S. Rabien, Max-Planck-Institut für extraterrestrische Physik (Germany)
- 7736 5L **Laboratory test of application of electric field conjugation image-sharpening to ground-based adaptive optics** [7736-211]
S. J. Thomas, Univ. of California Observatories/Lick Observatory, Univ. of California, Santa Cruz (United States); A. A. Give'on, Jet Propulsion Lab. (United States); D. Dillon, Univ. of California Observatories/Lick Observatory, Univ. of California, Santa Cruz (United States); B. Macintosh, Univ. of California Observatories/Lick Observatory, Univ. of California, Santa Cruz (United States) and Lawrence Livermore National Lab. (United States); D. Gavel, Univ. of California Observatories/Lick Observatory, Univ. of California, Santa Cruz (United States); R. Soummer, Space Telescope Science Institute (United States)
- 7736 5M **Integrated dual-stage deformable mirrors** [7736-212]
M. Griffith, L. Laycock, N. Archer, BAE Systems (United Kingdom); R. Myers, A. Kirby, Durham Univ. (United Kingdom); P. Doel, D. Brooks, Univ. College London (United Kingdom)
- 7736 5N **Progress in developing a low-cost deformable mirror** [7736-213]
R. Heimsten, Lund Observatory (Sweden); D. G. MacMynowski, California Institute of Technology (United States); T. Andersen, Lund Observatory (Sweden)
- 7736 5O **High-power visible laser effect on a Boston Micromachines' MEMS deformable mirror** [7736-214]
A. Norton, D. Gavel, D. Dillon, Univ. of California Observatories/Lick Observatory, Univ. of California, Santa Cruz (United States); S. Cornelissen, Boston Micromachines Corp. (United States)
- 7736 5P **Demonstration prototype and breadboards of the piezo stack M4 adaptive unit of the E-ELT** [7736-215]
B. Crepy, CILAS (France); S. Chaillot, BOOSTEC S.A. (France); M. Cola, AMOS Ltd. (Belgium); J. M. Conan, ONERA (France); R. Cousty, CILAS (France); M. Dimmler, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); J. L. Dournaux, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); S. De Zotti, ASTRIUM (France); E. Gabriel, AMOS Ltd. (Belgium); R. Gasmi, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); R. Grasser, CILAS (France); N. Hubin, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); P. Jagourel, Observatoire de Paris à Meudon, Univ. Paris Diderot (France); L. Jochum, European Organisation for Astronomical Research in the Southern Hemisphere (Germany);

F. Locre, CILAS (France); P.-Y. Madec, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); P. Morin, CILAS (France); M. Mueller, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); G. Petit, ONERA (France); D. Petitgas, J. J. Roland, J. C. Siquin, CILAS (France); E. Vernet, European Organisation for Astronomical Research in the Southern Hemisphere (Germany)

- 7736 5R **Imaging polarimetry with the Gemini Planet Imager** [7736-218]
M. D. Perrin, Univ. of California, Los Angeles (United States); J. R. Graham, Univ. of California, Berkeley (United States); J. E. Larkin, Univ. of California, Los Angeles (United States); S. Wiktorowicz, Univ. of California, Berkeley (United States); J. Maire, Univ. de Montréal (Canada); S. Thibault, ImmerVision (Canada); M. P. Fitzgerald, Univ. of California, Los Angeles (United States) and Lawrence Livermore National Lab. (United States); R. Doyon, Univ. de Montréal (Canada); B. A. Macintosh, Lawrence Livermore National Lab. (United States); D. T. Gavel, Univ. of California, Santa Cruz (United States); B. R. Oppenheimer, American Museum of Natural History (United States); D. W. Palmer, Lawrence Livermore National Lab. (United States); L. Saddlemyer, National Research Council Canada (Canada); J. K. Wallace, Jet Propulsion Lab. (United States)
- 7736 5S **Focal plane wavefront sensor sensitivity for ELT planet finder** [7736-219]
P. Baudoz, M. Mas, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); R. Galicher, LUTH, Observatoire de Paris à Meudon (France); G. Rousset, LESIA, CNRS, Observatoire de Paris à Meudon, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France)
- 7736 5U **Application of wavelength diversity for astronomical adaptive optics imaging** [7736-221]
D. Burke, N. Devaney, National Univ. of Ireland, Galway (Ireland); J. Christou, Gemini Observatory (United States); M. Hartung, Gemini Observatory (Chile)
- 7736 5V **The Subaru coronagraphic extreme AO (SCEXAO) system: visible imaging mode** [7736-222]
V. Garrel, Subaru Telescope, National Astronomical Observatory of Japan (United States) and LESIA, CNRS, Observatoire de Paris, Univ. Paris Diderot (France); O. Guyon, Subaru Telescope, National Astronomical Observatory of Japan (United States); P. Baudoz, LESIA, CNRS, Observatoire de Paris, Univ. Paris Diderot (France); F. Martinache, F. Vogt, Y. Takashi, Y. Kaito, F. Cantalloube, Subaru Telescope, National Astronomical Observatory of Japan (United States)
- 7736 5W **Weighing black holes using open-loop focus corrections for LGS-AO observations of galaxy nuclei at Gemini Observatory** [7736-223]
R. M. McDermid, Gemini Observatory (United States); D. Krajnovic, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); M. Cappellari, Univ. of Oxford (United Kingdom); C. Trujillo, J. Christou, Gemini Observatory (United States); R. L. Davies, Univ. of Oxford (United Kingdom)
- 7736 5X **Demonstration of on sky contrast improvement using the modified Gerchberg-Saxton algorithm at the Palomar Observatory** [7736-224]
R. S. Burruss, E. Serabyn, D. P. Mawet, J. E. Roberts, Jet Propulsion Lab. (United States); J. P. Hickey, K. Rykoski, California Institute of Technology (United States); S. Bikkannavar, Jet Propulsion Lab. (United States); J. R. Crepp, California Institute of Technology (United States)
- 7736 60 **Frame selection techniques for the Magellan adaptive optics VisAO camera** [7736-227]
J. R. Males, L. M. Close, D. Kopon, V. Gasho, K. Follette, Steward Observatory, The Univ. of Arizona (United States)

- 7736 61 **Novel technologies for small deformable mirrors** [7736-228]
M. Strachan, United Kingdom Astronomy Technology Ctr. (United Kingdom); R. Myers, Durham Univ. (United Kingdom); K. Cooke, J. Hampshire, Teer Coatings Ltd. (United Kingdom); J. Hough, S. Rowan, M. van Veggel, Univ. of Glasgow (United Kingdom); K. Kirk, D. Hutson, E. Uzgur, S.-S. Kim, Univ. of the West of Scotland (United Kingdom)
- 7736 62 **The LSST camera corner raft conceptual design: a front-end for guiding and wavefront sensing** [7736-229]
K. Arndt, Purdue Univ. (United States); V. Riot, Lawrence Livermore National Lab. (United States); E. Alagoz, A. Biccum, A. Bohn, J. Clampitt, T. Coiro, W. Cui, L. Hoffman, A. Lichti, D. Skaggs, I. Shipsey, M. Triano, B. Xin, K. Ziegler, Purdue Univ. (United States); J. Oliver, Harvard Univ. (United States); R. Van Berg, Univ. of Pennsylvania (United States); G. Haller, L. Sapozhnikov, Stanford Linear Accelerator Ctr. (United States); S. Olivier, Lawrence Livermore National Lab. (United States)
- 7736 63 **New techniques for the live update of gain tables in NGS and LGS WFS operation** [7736-230]
M. Olier, D. Roskey, SAIC (United States)
- 7736 64 **Novel technologies for large deformable mirrors** [7736-231]
M. Strachan, D. Montgomery, United Kingdom Astronomy Technology Ctr. (United Kingdom); R. Myers, Durham Univ. (United Kingdom); K. Cooke, J. Hampshire, Teer Coatings Ltd. (United Kingdom); M. Kroedel, ECM Ingenieur-Unternehmen für Energie- und Umwelttechnik GmbH (Germany); J. Hough, S. Rowan, M. van Veggel, Univ. of Glasgow (United Kingdom); K. Kirk, E. Uzgur, S.-S. Kim, Univ. of the West of Scotland (United Kingdom); M. Strangwood, The Univ. of Birmingham (United Kingdom)

Author Index

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Session Chairs

- 1 Project Status I
Richard M. Myers, Durham University (United Kingdom)
- 2 New AO System Designs I
Brent Ellerbroek, Thirty Meter Telescope Project (United States)
- 3 Modeling, Analysis, and Simulation Tools I
Michael Hart, Steward Observatory, The University of Arizona (United States)
- 4 Project Status II
Norbert Hubin, ESO—European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 5 New AO System Designs II
Peter L. Wizinowich, W. M. Keck Observatory (United States)
- 6 Modeling, Analysis, and Simulation Tools II
Benoit Neichel, Gemini Observatory (Chile)
- 7 Wavefront Sensors I
Norbert Hubin, ESO—European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 8 Real-Time Control I
Thierry Fusco, ONERA (France)
- 9 Modeling, Analysis, and Simulation Tools III
Rodolphe Conan, University of Victoria (Canada)
- 10 Quantitative Astronomy
Laird M. Close, Steward Observatory, The University of Arizona (United States)
- 11 Exoplanet Instruments
Jean-Luc Beuzit, Laboratoire d'Astrophysique de l'Observatoire de Grenoble (France)

- 12 New AO System Designs III
Philip M. Hinz, Steward Observatory, The University of Arizona (United States)
- 13 Laser Systems
Céline d'Orgeville, Gemini Observatory (Chile)
- 14 Atmospheric Characterization
Andrei A. Tokovinin, National Optical Astronomy Observatory (United States)
- 15 Innovative AO Concepts
Emiliano Diolaiti, INAF-Osservatorio Astronomico di Bologna (Italy)
- 16 Wavefront Sensors II
Simone Esposito, INAF-Osservatorio Astrofisico di Arcetri (Italy)
- 17 Wavefront Correctors
Enrico Marchetti, ESO—European Organisation for Astronomical Research in the Southern Hemisphere (Germany)
- 18 Real-Time Control II
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