

# PROCEEDINGS OF SPIE

## ***Adaptive Optics Systems IV***

**Enrico Marchetti**  
**Laird M. Close**  
**Jean-Pierre Véran**  
*Editors*

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Y. Clénet, T. Buey, G. Rousset, LESIA, Observatoire de Paris, CNRS, Univ. Paris Diderot (France); M. Cohen, GEPI, Observatoire de Paris, CNRS, Univ. Paris Diderot (France); P. Feautrier, IPAG, Univ. Joseph Fourier, CNRS (France); E. Gendron, Z. Hubert, LESIA, Observatoire de Paris, CNRS, Univ. Paris Diderot (France); F. Chemla, GEPI, Observatoire de Paris, CNRS, Univ. Paris Diderot (France); D. Gratadour, P. Baudoz, S. Lacour, A. Boccaletti, A. Sevin, F. Vidal, R. Galicher, D. Perret, B. Le Ruyet, F. Chapron, LESIA, Observatoire de Paris, CNRS, Univ. Paris Diderot (France); E. Stadler, P. Rabou, L. Jocou, S. Rochat, G. Chauvin, IPAG, Univ. Joseph Fourier, CNRS (France); R. Davies, Max-Planck-Institut für extraterrestrische Physik (Germany)

9148 10 **NFIRAOS: first facility AO system for the Thirty Meter Telescope** [9148-35]

G. Herriot, D. Andersen, J. Atwood, National Research Council Canada (Canada); C. Boyer, Thirty Meter Telescope Observatory Corp. (United States); P. Byrnes, K. Caputa, National Research Council Canada (Canada); B. Ellerbroek, L. Gilles, Thirty Meter Telescope Observatory Corp. (United States); A. Hill, Z. Ljusic, J. Pazder, M. Rosensteiner, M. Smith, P. Spano, K. Szeto, J.-P. Véran, I. Wevers, National Research Council Canada (Canada); L. Wang, Thirty Meter Telescope Observatory Corp. (United States); R. Wooff, National Research Council Canada (Canada)

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**SESSION 9 NEW PROPOSED AO SYSTEMS AND CONCEPTS FOR LARGE TELESCOPES AND ELTS**

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9148 11 **Pushing the limits of NGSs solely AO: GMCAO and beyond (Invited Paper)** [9148-36]

R. Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy)

9148 12 **Second generation Robo-AO instruments and systems** [9148-37]

C. Baranec, Institute for Astronomy, Univ. of Hawai'i (United States); R. Riddle, California Institute of Technology (United States); N. M. Law, The Univ. of North Carolina at Chapel Hill (United States); M. R. Chun, J. R. Lu, M. S. Connelley, D. Hall, D. Atkinson, S. Jacobson, Institute for Astronomy, Univ. of Hawai'i (United States)

9148 13 **Wide field adaptive optics correction for the GMT using natural guide stars** [9148-38]

M. A. van Dam, Flat Wavefronts (New Zealand); A. H. Bouchez, Giant Magellan Telescope Corp. (United States); B. A. McLeod, Smithsonian Astrophysical Observatory (United States)

9148 14 **TMT-AGE: wide field of regard multi-object adaptive optics for TMT** [9148-39]

M. Akiyama, Tohoku Univ. (Japan); S. Oya, Subaru Telescope, National Astronomical Observatory of Japan (United States); Y. H. Ono, Tohoku Univ. (Japan) and Subaru Telescope, National Astronomical Observatory of Japan (United States); H. Takami, S. Ozaki, National Astronomical Observatory of Japan (Japan); Y. Hayano, I. Iwata, Subaru Telescope, National Astronomical Observatory of Japan (United States); K. Hane, T. Wu, Tohoku Univ. (Japan); T. Yamamuro, OptCraft (Japan); Y. Ikeda, Photocoding, Inc. (Japan)

**SESSION 10 WAVEFRONT SENSING I**

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- 9148 16 **Review of the latest developments in fast low noise detectors for wavefront sensing in the visible (Invited Paper)** [9148-41]  
S. M. Adkins, W. M. Keck Observatory (United States)
- 9148 17 **SAPHIRA detector for infrared wavefront sensing (Invited Paper)** [9148-42]  
G. Finger, European Southern Observatory (Germany); I. Baker, SELEX ES Ltd. (United Kingdom); D. Alvarez, D. Ives, L. Mehrgan, M. Meyer, J. Stegmeier, European Southern Observatory (Germany); H. J. Weller, SELEX ES Ltd. (United Kingdom)
- 9148 18 **Revolutionary visible and infrared sensor detectors for the most advanced astronomical AO systems** [9148-43]  
P. Feautrier, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS, Univ. Grenoble Alpes (France) and First Light Imaging S.A.S. (France); J.-L. Gach, First Light Imaging SAS (France) and Lab. d'Astrophysique de Marseille (France); S. Guieu, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS, Univ. Grenoble Alpes (France); M. Downing, European Southern Observatory (Germany); P. Jorden, e2v technologies Ltd. (United Kingdom); J. Rothman, E. de Borniol, CEA-Leti (France); P. Balard, First Light Imaging S.A.S. (France) and Lab. d'Astrophysique de Marseille, CNRS, Technopôle de Château-Gombert (France); E. Stadler, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS, Univ. Grenoble Alpes (France) and First Light Imaging S.A.S. (France); C. Guillaume, Observatoire de Haute-Provence, CNRS (France); D. Boutolleau, First Light Imaging S.A.S. (France); J. Coussement, SOFRADIR (France); J. Kolb, N. Hubin, European Southern Observatory (Germany); S. Derelle, C. Robert, ONERA (France); J. Tanchon, T. Trollier, A. Ravex, Absolut Systems S.A.S. (France); G. Zins, P. Kern, T. Moulin, S. Rochat, A. Delpoulbé, J.-B. Lebouqun, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS, Univ. Grenoble Alpes (France)
- 9148 19 **OCAM2S: an integral shutter ultrafast and low noise wavefront sensor camera for laser guide stars adaptive optics systems** [9148-44]  
J.-L. Gach, Lab. d'Astrophysique de Marseille, CNRS, Aix Marseille Univ. (France) and First Light Imaging S.A.S. (France); P. Feautrier, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS (France) and First Light Imaging S.A.S. (France); P. Balard, Lab. d'Astrophysique de Marseille, CNRS, Aix Marseille Univ. (France) and First Light Imaging S.A.S. (France); C. Guillaume, Observatoire de Haute-Provence, CNRS (France) and First Light Imaging S.A.S. (France); E. Stadler, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS (France) and First Light Imaging S.A.S. (France)
- 9148 1A **Very low noise Shack-Hartmann wavefront sensor for adaptive optics in the near-IR** [9148-45]  
S. Gousset, C. Robert, ONERA (France); T. Fusco, ONERA (France) and Lab. d'Astrophysique de Marseille, CNRS, Univ. d'Aix-Marseille (France); V. Michau, C. Petit, S. Derelle, J. Deschamps, ONERA (France); P. Feautrier, E. Stadler, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS (France); E. D. de Borniol, J. Rothman, MINATEC (France); J. Coussement, SOFRADIR (France)

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**SESSION 11 LASER GUIDE STAR SYSTEMS II**

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- 9148 1B **Status of the ARGOS project (Invited Paper) [9148-46]**  
S. Rabien, L. Barl, Max-Planck-Institut für extraterrestrische Physik (Germany); U. Beckmann, Max-Planck-Institut für Radioastronomie (Germany); M. Bonaglia, INAF - Osservatorio Astrofisico di Arcetri (Italy); J. L. Borelli, Max-Planck-Institut für Astronomie (Germany); J. Brynnel, Large Binocular Telescope Observatory (United States); P. Buschkamp, Max-Planck-Institut für extraterrestrische Physik (Germany); L. Busoni, INAF - Osservatorio Astrofisico di Arcetri (Italy); J. Christou, Large Binocular Telescope Observatory (United States); C. Connot, Max-Planck-Institut für Radioastronomie (Germany); R. Davies, M. Deysenroth, Max-Planck-Institut für extraterrestrische Physik (Germany); S. Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy); W. Gässler, Max-Planck-Institut für Astronomie (Germany); H. Gemperlein, Max-Planck-Institut für extraterrestrische Physik (Germany); M. Hart, The Univ. of Arizona (United States); M. Kulas, Max-Planck-Institut für Astronomie (Germany); M. Lefebvre, Large Binocular Telescope Observatory (United States); M. Lehmitz, Max-Planck-Institut für Astronomie (Germany); T. Mazzone, INAF - Osservatorio Astrofisico di Arcetri (Italy); E. Nussbaum, Max-Planck-Institut für Radioastronomie (Germany); G. Orban de Xivry, Max-Planck-Institut für extraterrestrische Physik (Germany); D. Peter, Max-Planck-Institut für Astronomie (Germany); A. Quirrenbach, Landessternwarte Heidelberg (Germany); W. Raab, Max-Planck-Institut für extraterrestrische Physik (Germany); G. Rahmer, Large Binocular Telescope Observatory (United States); J. Storm, Leibniz-Institut für Astrophysik Potsdam (Germany); J. Ziegler, Max-Planck-Institut für extraterrestrische Physik (Germany)
- 9148 1C **Laser guidestar uplink correction using a MEMS deformable mirror: on-sky test results and implications for future AO systems [9148-47]**  
A. P. Norton, D. T. Gavel, UC Observatory Lab. For Adaptive Optics (United States); M. Helmbrecht, C. Kempf, Iris AO, Inc. (United States); E. Gates, K. Chloros, D. Redel, Lick Observatory (United States); R. Kupke, D. Dillon, UC Observatory Lab. For Adaptive Optics (United States)
- 9148 1D **PULSE: The Palomar Ultraviolet Laser for the Study of Exoplanets [9148-126]**  
C. Baranec, Institute for Astronomy, Univ. of Hawai'i (United States); R. G. Dekany, California Institute of Technology (United States); R. S. Burruss, Jet Propulsion Lab. (United States); B. P. Bowler, California Institute of Technology (United States); M. van Dam, Flat Wavefronts (New Zealand); R. Riddle, California Institute of Technology (United States); J. C. Shelton, T. Truong, J. Roberts, Jet Propulsion Lab. (United States); J. Milburn, California Institute of Technology (United States); J. Tesch, Jet Propulsion Lab. (United States)

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**SESSION 12 PATHFINDERS TO ENABLE AO ON ELTS AND NEW AO CONCEPTS I**

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- 9148 1F **Adaptive optics for space debris tracking (Invited Paper) [9148-51]**  
F. Bennet, C. D'Orgeville, The Australian National Univ. (Australia); Y. Gao, EOS Space Systems Pty. Ltd. (Australia); W. Gardhouse, N. Paulin, I. Price, F. Rigaut, The Australian National Univ. (Australia); I. Ritchie, C. Smith, EOS Space Systems Pty. Ltd. (Australia); K. Uhlendorf, The Australian National Univ. (Australia); Y. Wang, EOS Space Systems Pty. Ltd. (Australia)

- 9148 1G **Multi-object adaptive optics on-sky results with RAVEN (Invited Paper)** [9148-50]  
O. Lardière, Univ. of Victoria (Canada); D. Andersen, NRC - Herzburg Institute of Astrophysics (Canada); C. Blain, C. Bradley, D. Gamroth, K. Jackson, P. Lach, R. Nash, K. Venn, Univ. of Victoria (Canada); J.-P. Véran, National Research Council Canada (Canada); C. Correia, Univ. do Porto (Portugal); S. Oya, Y. Hayano, H. Terada, Subaru Telescope, National Astronomical Observatory of Japan (United States); Y. Ono, Subaru Telescope, National Astronomical Observatory of Japan (United States) and Tohoku Univ. (Japan); M. Akiyama, Tohoku Univ. (Japan)

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**SESSION 13 PATHFINDERS TO ENABLE AO ON ELTS AND NEW AO CONCEPTS II**

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- 9148 1I **CANARY phase B: on-sky open-loop tomographic LGS AO results** [9148-52]  
T. Morris, Durham Univ. (United Kingdom); E. Gendron, LESIA, CNRS, Observatoire de Paris (France); A. Basden, Durham Univ. (United Kingdom); O. Martin, LESIA, CNRS, Observatoire de Paris (France); J. Osborn, Durham Univ. (United Kingdom); D. Henry, UK Astronomy Technology Ctr. (United Kingdom); Z. Hubert, LESIA, CNRS, Observatoire de Paris (France); G. Sivo, Lab. Charles Fabry, CNRS, Institut d'Optique Graduate School (France) and ONERA (France); D. Gratadour, F. Chemla, A. Sevin, M. Cohen, LESIA, CNRS, Observatoire de Paris (France); E. Younger, Durham Univ. (United Kingdom); F. Vidal, LESIA, CNRS, Observatoire de Paris (France); R. Wilson, T. Butterley, U. Bitenc, A. Reeves, N. Bharmal, Durham Univ. (United Kingdom); H.-F. Raynaud, C. Kulcsar, Lab. Charles Fabry, CNRS, Institut d'Optique Graduate School (France); J.-M. Conan, ONERA (France); J.-M. Huet, D. Perret, LESIA, CNRS, Observatoire de Paris (France); C. Dickson, D. Atkinson, T. Baillie, A. Longmore, S. Todd, UK Astronomy Technology Ctr. (United Kingdom); G. Talbot, S. Morris, Durham Univ. (United Kingdom); G. Rousset, LESIA, CNRS, Observatoire de Paris (France); R. Myers, Durham Univ. (United Kingdom)
- 9148 1J **A measurement of the systematic astrometric error in GeMS and the short-term astrometric precision in ShaneAO** [9148-53]  
S. M. Ammons, Lawrence Livermore National Lab. (United States); B. Neichel, Lab. d'Astrophysique de Marseille, CNRS, Aix-Marseille Univ. (France) and Gemini Observatory (Chile); J. Lu, Institute for Astronomy, Univ. of Hawai'i (United States); D. T. Gavel, S. Srinath, R. McGurk, A. Rudy, C. Rockosi, Univ. of California, Santa Cruz (United States); C. Marois, National Research Council Canada (Canada); B. Macintosh, Stanford Univ. (United States); D. Savransky, Cornell Univ. (United States); R. Galicher, LESIA, CNRS, Observatoire de Paris (France); E. Bendek, NASA Ames Research Ctr. (United States); O. Guyon, The Univ. of Arizona (United States); E. Marin, V. Garrel, G. Sivo, Gemini Observatory (Chile)
- 9148 1K **`Imaka: a path-finder ground-layer adaptive optics system for the University of Hawaii 2.2-meter telescope on Maunakea** [9148-54]  
M. R. Chun, Institute for Astronomy, Univ. of Hawai'i (United States); O. Lai, Gemini Observatory (United States) and Subaru Telescope, National Astronomical Observatory of Japan (United States); D. Toomey, Mauna Kea Infrared LLC (United States); J. R. Lu, C. Baranec, Institute for Astronomy, Univ. of Hawai'i (United States); S. Thibault, D. Brousseau, Univ. Laval (Canada); H. Zhang, ImmerVision (Canada); Y. Hayano, S. Oya, Gemini Observatory (United States)

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**SESSION 14 ASTRONOMY WITH AO II**

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- 9148 1L **Circumstellar disk and planet imaging with AO (Invited Paper)** [9148-55]  
M. Janson, Queen's Univ. Belfast (United Kingdom)
- 9148 1M **Into the blue: AO science with MagAO in the visible (Invited Paper)** [9148-56]  
L. M. Close, J. R. Males, K. B. Follette, P. Hinz, K. Morzinski, Y.-L. Wu, Steward Observatory, The Univ. of Arizona (United States); D. Kopon, Max-Planck-Institut für Astronomie (Germany); A. Riccardi, S. Esposito, A. Puglisi, E. Pinna, M. Xompero, R. Briguglio, F. Quiros-Pacheco, INAF - Osservatorio Astrofisico di Arcetri (Italy)
- 9148 1O **Results from the Gemini NICI Planet-Finding Campaign (Invited Paper)** [9148-58]  
B. A. Biller, The Univ. of Edinburgh (United Kingdom); M. C. Liu, Institute for Astronomy, Univ. of Hawai'i (United States); Z. Wahhaj, European Southern Observatory (Chile); E. L. Nielsen, Institute for Astronomy, Univ. of Hawai'i (United States); T. L. Hayward, Gemini Observatory (Chile); M. R. 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); J. R. Males, Steward Observatory, The Univ. of Arizona (United States); M. Hartung, Gemini Observatory (Chile); I. N. Reid, Space Telescope Science Institute (United States); E. Shkolnik, Lowell Observatory (United States); A. J. Skemer, Steward Observatory, The Univ. of Arizona (United States); M. Tecza, N. A. Thatte, F. Clarke, Univ. of Oxford (United Kingdom); D. Toomey, Mauna Kea Infrared LLC (United States)

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**SESSION 15 STATUS OF CURRENT AO INSTRUMENT PROJECTS II**

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- 9148 1R **Adaptive optics at the Subaru telescope: current capabilities and development (Invited Paper)** [9148-60]  
O. Guyon, Y. Hayano, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Tamura, National Astronomical Observatory of Japan (Japan); T. Kudo, S. Oya, Y. Minowa, O. Lai, N. Jovanovic, N. Takato, Subaru Telescope, National Astronomical Observatory of Japan (United States); J. Kasdin, T. Groff, Princeton Univ. (United States); M. Hayashi, National Astronomical Observatory of Japan (Japan); N. Arimoto, Subaru Telescope, National Astronomical Observatory of Japan (United States); H. Takami, National Astronomical Observatory of Japan (Japan); C. Bradley, Univ. of Victoria (Canada); H. Sugai, Kavli Institute for the Physics and Mathematics of the Universe, The Univ. of Tokyo (Japan); G. Perrin, LESIA, CNRS, Observatoire de Paris (France); P. Tuthill, The Univ. of Sydney (Australia); B. Mazin, Univ. of California, Santa Barbara (United States)
- 9148 1S **Solar adaptive optics with the DKIST: status report** [9148-61]  
L. C. Johnson, K. Cummings, M. Drobilek, S. Gregory, S. Hegwer, E. Johansson, J. Marino, K. Richards, T. Rimmele, P. Sekulic, F. Wöger, National Solar Observatory (United States)
- 9148 1T **GREGOR MCAO looking at the Sun** [9148-62]  
D. Schmidt, National Solar Observatory (United States); T. Berkefeld, F. Heidecke, A. Fischer, O. von der Lühe, D. Soltau, Kiepenheuer-Institut für Sonnenphysik (Germany)

- 9148 1U **Final performance and lesson-learned of SAXO, the VLT-SPHERE extreme AO: from early design to on-sky results** [9148-63]  
 T. Fusco, J.-F. Sauvage, ONERA (France) and Lab. d'Astrophysique de Marseille, CNRS, Aix-Marseille Univ. (France); C. Petit, ONERA (France); A. Costille, K. Dohlen, Lab. d'Astrophysique de Marseille, CNRS, Aix-Marseille Univ. (France); D. Mouillet, J.-L. Beuzit, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS (France); M. Kasper, M. Suarez, C. Soenke, European Southern Observatory (Germany); E. Fedrigo, LESIA, CNRS, Observatoire de Paris (France); M. Downing, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS (France); P. Baudoz, A. Sevin, D. Perret, LESIA, CNRS, Observatoire de Paris (France); A. Barrufolo, B. Salasnich, INAF - Osservatorio Astronomico di Bologna (Italy); P. Puget, F. Feautrier, S. Rochat, T. Moulin, A. Deboulbé, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS (France); E. Hugot, A. Vigan, Lab. d'Astrophysique de Marseille, CNRS, Aix-Marseille, Univ. (France); D. Mawet, J. Girard, N. Hubin, European Southern Observatory (Germany)
- 9148 1V **Gender equity issues in astronomy: facts, fiction, and what the adaptive optics community can do to close the gap (Invited Paper)** [9148-64]  
 C. D'Orgeville, F. Rigaut, The Australian National Univ. (Australia); S. Maddison, Swinburne Univ. of Technology (Australia); E. Masciadri, INAF - Osservatorio Astrofisico di Arcetri (Italy)

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**SESSION 16 CHARACTERIZATION, MEASUREMENT AND MODELING OF THE DISTRUBANCES FACED BY AO**

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- 9148 1W **Review on atmospheric turbulence monitoring (Invited Paper)** [9148-65]  
 G. Lombardi, J. Navarrete, European Southern Observatory (Chile); M. Sarazin, European Southern Observatory (Germany)
- 9148 1X **Turbulence profiling methods applied to ESO's adaptive optics facility** [9148-66]  
 J. Valenzuela, Pontificia Univ. Católica de Chile (Chile) and European Southern Observatory (Germany); C. Béchet, Pontificia Univ. Católica de Chile (Chile); A. Garcia-Rissmann, F. Gonté, J. Kolb, M. Le Louarn, European Southern Observatory (Germany); B. Neichel, Lab. d'Astrophysique de Marseille, CNRS, Aix Marseille Univ. (France); P.-Y. Madec, European Southern Observatory (Germany); A. Guesalaga, Pontificia Univ. Católica de Chile (Chile)
- 9148 1Z **Progress towards wind predictive control on ShaneAO: test bench results** [9148-68]  
 A. R. Rudy, S. Srinath, Univ. of California, Santa Cruz (United States); L. Poyneer, S. M. Ammons, Lawrence Livermore National Lab. (United States); D. Gavel, R. Kupke, D. Dillon, C. Rockosi, Univ. of California Observatories (United States)

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**SESSION 17 EXTREME AO II**

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- 9148 20 **Direct imaging of exoplanets in the habitable zone with adaptive optics (Invited Paper)** [9148-69]  
 J. R. Males, L. M. Close, O. Guyon, K. Morzinski, Steward Observatory, The Univ. of Arizona (United States); A. Puglisi, INAF - Osservatorio Astrofisico di Arcetri (Italy); P. Hinz, K. B. Follette, Steward Observatory, The Univ. of Arizona (United States); J. D. Monnier, Univ. of Michigan (United States); V. Tolls, Harvard-Smithsonian Ctr. for Astrophysics (United States); T. J. Rodigas, A. Weinberger, A. Boss, Carnegie Institution of Washington

(United States); D. Kopon, Max-Planck-Institut für Astronomie (Germany); Y. Wu, Steward Observatory, The Univ. of Arizona (United States); S. Esposito, A. Riccardi, M. Xompero, R. Briguglio, E. Pinna, INAF - Osservatorio Astrofisico di Arcetri (Italy)

- 9148 21 **On-sky speckle nulling with the Subaru Coronagraphic Extreme AO (SCEXAO) instrument** [9148-70]  
F. Martinache, Lab. J.L. Lagrange, CNRS, Observatoire de la Côte d'Azur (France) and Subaru Telescope, National Astronomical Observatory of Japan (United States); O. Guyon, Subaru Telescope, National Astronomical Observatory of Japan (United States) and The Univ. of Arizona (United States); N. Jovanovic, C. Clergeon, G. Singh, T. Kudo, Subaru Telescope, National Astronomical Observatory of Japan (United States)
- 9148 22 **Real-time speckle sensing and suppression with project 1640 at Palomar** [9148-71]  
G. Vasisht, E. Cady, C. Zhai, T. Lockhart, Jet Propulsion Lab. (United States); B. Oppenheimer, American Museum of Natural History (United States)

## Part Two

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### SESSION 18 WAVEFRONT CORRECTION II

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- 9148 24 **On the way to build the M4 Unit for the E-ELT** [9148-73]  
E. Vernet, M. Cayrel, N. Hubin, European Southern Observatory (Germany); R. Biasi, Microgate S.r.l. (Italy); D. Gallieni, M. Tintori, A.D.S. International S.r.l. (Italy)
- 9148 25 **Recent improvements of high density magnetic deformable mirrors: faster, larger and stronger** [9148-74]  
J. Charton, ALPAO S.A.S. (France); U. Bitenc, Durham Univ. (United Kingdom); J.-F. Curis, S. Camet, R. Di Chiaro, R. Bougeard, ALPAO S.A.S. (France)

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### SESSION 19 STATUS OF CURRENT AO INSTRUMENT PROJECTS III

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- 9148 26 **The ERIS adaptive optics system** [9148-75]  
E. Marchetti, E. Fedrigo, M. Le Louarn, P.-Y. Madec, C. Soenke, R. Brast, R. Conzelmann, B. Delabre, M. Duchateau, C. Frank, B. Klein, P. Amico, N. Hubin, European Southern Observatory (Germany); S. Esposito, J. Antichi, L. Carbonaro, A. Puglisi, F. Quirós-Pacheco, A. Riccardi, M. Xompero, INAF - Osservatorio Astrofisico di Arcetri (Italy)
- 9148 27 **Status of the PALM-3000 high order adaptive optics instrument** [9148-4]  
R. S. Burruss, Jet Propulsion Lab. (United States); R. G. Dekany, Caltech Optical Observatories (United States); J. E. Roberts, J. C. Shelton, J. K. Wallace, J. A. Tesch, D. L. Palmer, Jet Propulsion Lab. (United States); D. Hale, Caltech Optical Observatories (United States); R. Bartos, Jet Propulsion Lab. (United States); K. M. Rykoski, C. M. Heffner, Palomar Observatory, California Institute of Technology (United States); J. E. Eriksen, Jet Propulsion Lab. (United States); F. Vescelus, California Institute of Technology (United States)

- 9148 28 **Pathfinder first light: alignment, calibration, and commissioning of the LINC-NIRVANA ground-layer adaptive optics subsystem** [9148-77]  
D. Kopon, A. Conrad, Max-Planck-Institut für Astronomie (Germany); C. Arcidiacono, INAF - Osservatorio Astrofisico di Bologna (Italy); T. Herbst, Max-Planck-Institut für Astronomie (Germany); V. Viotto, J. Farinato, M. Bergomi, R. Ragazzoni, L. Marafatto, INAF - Osservatorio Astronomico di Padova (Italy); H. Baumeister, T. Bertram, J. Berwein, F. Briegel, R. Hofferbert, F. Kittmann, M. Kürster, L. Mohr, K. Radhakrishnan, Max-Planck-Institut für Astronomie (Germany)

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**SESSION 20 WAVEFRONT SENSING II**

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- 9148 2A **Strategies to cope with sodium layer profile variations in laser guide star AO systems (Invited Paper)** [9148-79]  
B. L. Ellerbroek, Thirty Meter Telescope Observatory Corp. (United States)
- 9148 2B **A near-infrared tip-tilt sensor for the Keck I laser guide star adaptive optics system** [9148-80]  
P. Wizinowich, W. M. Keck Observatory (United States); R. Smith, California Institute of Technology (United States); R. Biasi, Microgate S.r.l. (Italy); S. Cetre, W. M. Keck Observatory (United States); R. Dekany, California Institute of Technology (United States); B. Femenia-Castella, W. M. Keck Observatory (United States); J. Fucik, D. Hale, California Institute of Technology (United States); C. Neyman, W. M. Keck Observatory (United States); D. Pescoller, Microgate S.r.l. (Italy); S. Ragland, P. Stomski, W. M. Keck Observatory (United States); M. Andrighttoni, Microgate S.r.l. (Italy); R. Bartos, K. Bui, California Institute of Technology (United States); A. Cooper, W. M. Keck Observatory (United States); J. Cromer, California Institute of Technology (United States); M. van Dam, Flat Wavefronts (New Zealand); M. Hess, E. James, J. Lyke, W. M. Keck Observatory (United States); H. Rodriguez, California Institute of Technology (United States); T. Stalcup, W. M. Keck Observatory (United States)
- 9148 2E **A miniature curvature wavefront sensor with coherent fiber image bundle** [9148-83]  
J. Zheng, Australian Astronomical Observatory (Australia); S. Richards, Australian Astronomical Observatory (Australia) and The Univ. of Sydney (Australia); M. Goodwin, J. Lawrence, Australian Astronomical Observatory (Australia); S. Leon-Saval, A. Argyros, The Univ. of Sydney (Australia)

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**SESSION 21 ADVANCES IN AO CONTROL II**

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- 9148 2F **Results of the NFIRAOS RTC trade study (Invited Paper)** [9148-84]  
J.-P. Véran, National Research Council Canada (Canada); C. Boyer, B. L. Ellerbroek, L. Gilles, Thirty Meter Telescope Observatory Corp. (United States); G. Herriot, D. A. Kerley, Z. Ljusic, National Research Council Canada (Canada); E. A. McVeigh, R. Prior, Univ. of Victoria (Canada); M. Smith, National Research Council Canada (Canada); L. Wang, Thirty Meter Telescope Observatory Corp. (United States)
- 9148 2G **Enabling technologies for GPU driven adaptive optics real-time control** [9148-85]  
A. Sevin, D. Perret, D. Gratadour, M. Lainé, J. Brulé, B. Le Ruyet, LESIA, CNRS, Univ. Paris Diderot (France)



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**SESSION 22 AO MODELING, ANALYSIS AND SIMULATIONS**

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- 9148 2J **Physical optics modeling of sky coverage for TMT NFIRAOS with advanced LQG controller** [9148-88]  
L. Wang, L. Gilles, B. Ellerbroek, Thirty Meter Telescope Observatory Corp. (United States);  
C. Correia, Univ. do Porto (Portugal)
- 9148 2K **Tomography and calibration for Raven: from simulations to laboratory results** [9148-89]  
K. Jackson, Univ. of Victoria (Canada); C. Correia, Univ. do Porto (Portugal); O. Lardière,  
Univ. of Victoria (Canada); D. Andersen, NRC - Herzberg Institute of Astrophysics (Canada);  
C. Bradley, L. Pham, C. Blain, R. Nash, D. Gamroth, Univ. of Victoria (Canada); J.-P. Véran,  
NRC - Herzberg Institute of Astrophysics (Canada)
- 9148 2L **Thirty Meter Telescope astrometry error budget** [9148-90]  
M. Schöck, Thirty Meter Telescope Observatory Corp. (United States); T. Do, Univ. of Toronto  
(Canada); B. Ellerbroek, L. Gilles, Thirty Meter Telescope Observatory Corp. (United States);  
G. Herriot, National Research Council Canada (Canada); L. Meyer, Univ. of California, Los  
Angeles (United States); R. Suzuki, National Astronomical Observatory of Japan (Japan);  
L. Wang, Thirty Meter Telescope Observatory Corp. (United States); S. Yelda, National  
Astronomical Observatory of Japan (Japan)
- 9148 2M **Design and numerical simulations of the GMT Natural Guide star WFS** [9148-91]  
E. Pinna, G. Agapito, F. Quirós-Pacheco, J. Antichi, L. Carbonaro, R. Briguglio, M. Bonaglia,  
A. Riccardi, A. Puglisi, V. Biliotti, INAF - Osservatorio Astrofisico di Arcetri (Italy);  
C. Arcidiacono, INAF - Osservatorio Astrofisico di Arcetri (Italy) and INAF - Osservatorio  
Astronomico di Bologna (Italy); M. Xompero, INAF - Osservatorio Astrofisico di Arcetri (Italy);  
G. Di Rico, A. Valentini, INAF - Osservatorio Astronomico di Teramo (Italy); A. Bouchez,  
F. Santoro, G. Trancho, Giant Magellan Telescope Corp. (United States); S. Esposito, INAF -  
Osservatorio Astrofisico di Arcetri (Italy)

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**SESSION 23 POST-PROCESSING AO DATA II**

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- 9148 2N **Detailed analysis of the Canary on-sky results at the WHT using Rayleigh laser guide stars** [9148-92]  
O. Martin, E. Gendron, LESIA, CNRS, Univ. Paris Diderot (France); T. Morris, A. Basden,  
Durham Univ. (United Kingdom); Z. Hubert, D. Gratadour, LESIA, CNRS, Univ. Paris Diderot  
(France); J. Osborn, Durham Univ. (United Kingdom); F. Vidal, LESIA, CNRS, Univ. Paris  
Diderot (France); F. Chemla, GEPI, CNRS, Univ. Paris Diderot (France); G. Rousset, LESIA,  
CNRS, Univ. Paris Diderot (France); R. Myers, Durham Univ. (United Kingdom)
- 9148 2O **Image restoration with spatially variable PSF** [9148-182]  
P. Ciliegi, INAF - Osservatorio Astronomico di Bologna (Italy); A. La Camera, Univ. degli  
Studi di Genova (Italy); L. Schreiber, M. Bellazzini, INAF - Osservatorio Astronomico di  
Bologna (Italy); M. Bertero, P. Boccacci, Univ. degli Studi di Genova (Italy); E. Diolaiti,  
I. Foppiani, M. Lombini, INAF - Osservatorio Astronomico di Bologna (Italy); D. Massari, Univ.  
degli Studi di Bologna (Italy); P. Montegriffo, INAF - Osservatorio Astronomico di Bologna  
(Italy); M. Talia, Univ. degli Studi di Bologna (Italy)
- 9148 2P **Perspectives on phase retrieval and phase diversity in astronomy** [9148-94]  
R. A. Gonsalves, Tufts Univ. (United States)

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**POSTER SESSION: STATUS OF CURRENT AO INSTRUMENT PROJECTS**

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- 9148 2R **Ground layer correction: the heart of LINC-NIRVANA** [9148-97]  
K. K. Radhakrishnan Santhakumari, Max-Planck-Institut für Astronomie (Germany); L. Marafatto, INAF - Osservatorio Astronomico di Padova (Italy) and Univ. degli Studi di Padova (Italy); M. Bergomi, V. Viotto, J. Farinato, R. Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy); T. Herbst, T. Bertram, Max-Planck-Institut für Astronomie (Germany); M. Dima, INAF - Osservatorio Astronomico di Padova (Italy); P. Bizenberger, F. Briegel, F. Kittmann, L. Mohr, Max-Planck-Institut für Astronomie (Germany); D. Magrin, INAF - Osservatorio Astronomico di Padova (Italy)
- 9148 2S **ULTIMATE-SUBARU: project status** [9148-98]  
Y. Hayano, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Akiyama, Tohoku Univ. (Japan); T. Hattori, I. Iwata, Subaru Telescope, National Astronomical Observatory of Japan (United States); T. Kodama, National Astronomical Observatory of Japan (Japan); O. Lai, Subaru Telescope, National Astronomical Observatory of Japan (United States) and Gemini Observatory (United States); Y. Minowa, Subaru Telescope, National Astronomical Observatory of Japan (United States); Y. Ono, Tohoku Univ. (Japan); S. Oya, K. Takiura, I. Tanaka, Y. Tanaka, N. Arimito, Subaru Telescope, National Astronomical Observatory of Japan (United States)
- 9148 2T **Integration and bench testing for the GRAVITY Coudé IR adaptive optics (CIAO) wavefront sensor** [9148-99]  
C. Deen, Max-Planck-Institut für Astronomie (Germany); P. Yang, Max-Planck-Institut für Astronomie (Germany) and Shanghai Institute of Optics and Fine Mechanics (China); A. Huber, Max-Planck-Institut für Astronomie (Germany); M. Suarez-Valles, European Southern Observatory (Germany); S. Hippler, W. Brandner, Max-Planck-Institut für Astronomie (Germany); E. Gendron, Y. Clénet, LESIA, CNRS, Observatoire de Paris, Univ. Paris Diderot (France); S. Kendrew, Max-Planck-Institut für Astronomie (Germany) and Univ. of Oxford (United Kingdom); A. Glauser, Max-Planck-Institut für Astronomie (Germany) and ETH Zürich (Switzerland); R. Klein, W. Laun, R. Lenzen, U. Neumann, J. Panduro, J. Ramos, R.-R. Rohloff, A. Salzinger, N. Zimmerman, T. Henning, Max-Planck-Institut für Astronomie (Germany); K. Perraut, UJF-Grenoble 1, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS (France); G. Perrin, LESIA, CNRS, Observatoire de Paris, Univ. Paris Diderot (France) and Groupement d'Intérêt Scientifique PHASE (France); C. Straubmeier, Univ. zu Köln (Germany); A. Amorim, Lab. de Sistemas, Instrumentação e Modelação em Ciências e Tecnologias do Ambiente e do Espaço (Portugal); F. Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany)
- 9148 2U **The multi-conjugate adaptive optics system of the New Solar Telescope at Big Bear Solar Observatory** [9148-100]  
D. Schmidt, National Solar Observatory (United States); N. Gorceix, X. Zhang, Big Bear Solar Observatory (United States); J. Marino, National Solar Observatory (United States); R. Coulter, S. Shumko, P. Goode, Big Bear Solar Observatory (United States); T. Rimmele, National Solar Observatory (United States); T. Berkefeld, Kiepenheuer-Institut für Sonnenphysik (Germany)
- 9148 2V **GALACSI integration and functional tests** [9148-101]  
P. La Penna, S. Ströbele, E. Aller Carpentier, J. Argomedo, R. Arsenault, R. D. Conzelmann, B. Delabre, R. Donaldson, M. Duchateau, E. Fedrigo, F. Gago, N. Hubin, J. Quentin, P. Jolley, M. Kiekebusch, J. P. Kirchbauer, B. Klein, J. Kolb, H. Kuntschner, M. Le Louarn,

J. L. Lizon, P.-Y. Madec, A. Manescau, L. Mehrgan, B. Sedghi, M. Suárez Valles, C. Soenke, S. Tordo, J. Vernet, S. Zampieri, European Southern Observatory (Germany)

- 9148 2W **The first portable solar and stellar adaptive optics** [9148-102]  
D. Ren, California State Univ., Northridge (United States) and Nanjing Institute of Astronomical Optics & Technology (China); R. Li, Nanjing Institute of Astronomical Optics & Technology (China) and Univ. of Chinese Academy of Sciences (China); X. Zhang, J. Dou, Y. Zhu, G. Zhao, Z. Wu, R. Chen, Nanjing Institute of Astronomical Optics & Technology (China); C. Liu, Nanjing Institute of Astronomical Optics & Technology (China) and Univ. of Chinese Academy of Sciences (Central African Republic); F. Yang, C. Yang, Nanjing Institute of Astronomical Optics & Technology (China) and Univ. of Chinese Academy of Sciences (China)
- 9148 2Y **First light of the LINC-NIRVANA Pathfinder experiment** [9148-106]  
M. Bergomi, V. Viotto, INAF - Osservatorio Astronomico di Padova (Italy); C. Arcidiacono, INAF - Osservatorio Astronomico di Bologna (Italy) and INAF - Osservatorio Astrofisico di Arcetri (Italy); L. Marafatto, INAF - Osservatorio Astronomico di Padova (Italy) and Univ. degli Studi di Padova (Italy); J. Farinato, INAF - Osservatorio Astronomico di Padova (Italy); H. Baumeister, T. Bertram, J. Berwein, F. Briegel, A. Conrad, F. Kittman, D. Kopon, R. Hofferbert, Max-Planck-Institut für Astronomie (Germany); D. Magrin, INAF - Osservatorio Astronomico di Padova (Italy); K. K. Radhakrishnan Santhakumari, Max-Planck-Institut für Astronomie (Germany); A. Puglisi, M. Xompero, R. Briguglio, F. Quiros-Pacheco, INAF - Osservatorio Astrofisico di Arcetri (Italy); T. M. Herbst, Max-Planck-Institut für Astronomie (Germany); R. Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy)
- 9148 2Z **Swimming with SHARCS: comparison of on-sky sensitivity with model predictions for ShaneAO on the Lick Observatory 3-meter telescope** [9148-107]  
S. Srinath, R. McGurk, C. Rockosi, Univ. of California, Santa Cruz (United States); R. Kupke, D. Gavel, G. Cabak, D. Cowley, M. Peck, C. Ratliff, E. Gates, D. Dillon, A. Norton, M. Reining, Univ. of California Observatories (United States)
- 9148 30 **The CHARA array adaptive optics I: common-path optical and mechanical design, and preliminary on-sky results** [9148-108]  
X. Che, Univ. of Michigan (United States); L. Sturmann, The CHARA Array, Mountain Wilson Observatory (United States); J. D. Monnier, Univ. of Michigan (United States); T. A. ten Brummelaar, J. Sturmann, The CHARA Array, Mountain Wilson Observatory (United States); S. T. Ridgway, National Optical Astronomy Observatory (United States); M. J. Ireland, Macquarie Univ. (Australia); N. H. Turner, The CHARA Array, Mountain Wilson Observatory (United States); H. A. McAlister, Georgia State Univ. (United States)
- 9148 31 **Development of a new solar adaptive optics system at the Hida Observatory** [9148-109]  
N. Miura, A. Oh-ishi, S. Aoki, H. Mogaki, S. Kuwamura, Kitami Institute of Technology (Japan); N. Baba, Hokkaido Univ. (Japan); Y. Hanaoka, National Astronomical Observatory of Japan (Japan); M. Yamaguchi, S. Ueno, Y. Nakatani, K. Ichimoto, Kyoto Univ. (Japan)
- 9148 33 **Optical design of the relay optics for the MICADO SCAO system** [9148-111]  
M. Cohen, F. Chemla, T. Buey, E. Gendron, Z. Hubert, LESIA, CNRS, GEPI Observatoire de Paris (France); M. Hartl, Max-Planck-Institut für extraterrestrische Physik (Germany); Y. Clénet, LESIA, CNRS, GEPI Observatoire de Paris (France); R. Davies, Max-Planck-Institut für extraterrestrische Physik (Germany)

- 9148 34 **ARGOS wavefront sensing: from detection to correction** [9148-112]  
 G. Orban de Xivry, Max-Planck-Institut für extraterrestrische Physik (Germany); M. Bonaglia, INAF - Osservatorio Astrofisico di Arcetri (Italy); J. Borelli, Max-Planck-Institut für Astronomie (Germany); L. Busoni, INAF - Osservatorio Astrofisico di Arcetri (Italy); C. Connot, Max-Planck-Institut für Radioastronomie (Germany); S. Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy); W. Gaessler, M. Kulas, Max-Planck-Institut für Astronomie (Germany); T. Mazzone, A. Puglisi, INAF - Osservatorio Astrofisico di Arcetri (Italy); S. Rabien, Max-Planck-Institut für extraterrestrische Physik (Germany); J. Storm, Leibniz-Institut für Astrophysik Potsdam (Germany); J. Ziegler, Max-Planck-Institut für extraterrestrische Physik (Germany)
- 9148 35 **AO-308: the high-order adaptive optics system at Big Bear Solar Observatory** [9148-113]  
 S. Shumko, N. Gorceix, Big Bear Solar Observatory (United States); S. Choi, Big Bear Solar Observatory (United States) and Korea Astronomy and Space Science Institute (Korea, Republic of); A. Kellerer, Big Bear Solar Observatory (United States); W. Cao, Big Bear Solar Observatory (United States) and New Jersey Institute of Technology (United States); P. R. Goode, New Jersey Institute of Technology (United States); V. Abramenko, Big Bear Solar Observatory (United States); K. Richards, T. R. Rimmele, J. Marino, National Solar Observatory (United States)
- 9148 37 **Present opto-mechanical design status of NFIRAOS** [9148-115]  
 P. W. G. Byrnes, J. Atwood, National Research Council Canada (Canada); M.-A. Boucher, Institut National d'Optique (Canada); J. Fitzsimmons, A. Hill, G. Herriot, P. Spanò, K. Szeto, I. Wevers, National Research Council Canada (Canada)
- 9148 38 **Altair performance and upgrades** [9148-116]  
 O. Lai, Gemini Observatory (United States) and Subaru Telescope, National Astronomical Observatory of Japan (United States); J.-P. Véran, G. Herriot, NRC - Herzberg Institute of Astrophysics (Canada); J. White, J. Ball, C. Trujillo, Gemini Observatory (United States)
- 9148 39 **KAPO first light: the design, construction and operation of a low-cost natural guide star adaptive optics system** [9148-117]  
 S. A. Severson, Sonoma State Univ. (United States); P. I. Choi, Pomona College (United States); K. E. Badham, Sonoma State Univ. (United States); D. Bolger, D. S. Contreras, Pomona College (United States); B. N. Gilbreth, Sonoma State Univ. (United States); C. Guerrero, Harvey Mudd College (United States); E. Littleton, J. Long, L. P. McGonigle, W. A. Morrison, F. Ortega, A. R. Rudy, J. R. Wong, Pomona College (United States); E. Spjut, Harvey Mudd College (United States); C. Baranec, Institute for Astronomy, Univ. of Hawai'i (United States); R. Riddle, California Institute of Technology (United States)
- 9148 3A **Commissioning ShARCS: the Shane adaptive optics infrared camera-spectrograph for the Lick Observatory Shane 3-m telescope** [9148-118]  
 R. McGurk, C. Rockosi, D. Gavel, R. Kupke, M. Peck, T. Pfister, J. Ward, W. Deich, J. Gates, E. Gates, B. Alcott, D. Cowley, D. Dillon, K. Lanclos, D. Sandford, M. Saylor, S. Srinath, Lick Observatory, Univ. of California, Santa Cruz (United States); J. Weiss, Univ. of California, Los Angeles (United States); A. Norton, Lick Observatory, Univ. of California, Santa Cruz (United States)
- 9148 3B **Opto-mechanical design of ShaneAO: the adaptive optics system for the 3-meter Shane Telescope** [9148-119]  
 C. Ratliff, J. Cabak, D. Gavel, R. Kupke, D. Dillon, E. Gates, W. Deich, J. Ward, D. Cowley, T. Pfister, M. Saylor, Lick Observatory, Univ. of California, Santa Cruz (United States)

- 9148 3D **The NGS Pyramid wavefront sensor for ERS** [9148-122]  
A. Riccardi, J. Antichi, F. Quirós-Pacheco, S. Esposito, L. Carbonaro, G. Agapito, V. Biliotti, R. Briguglio, G. Di Rico, INAF - Osservatorio Astrofisico di Arcetri (Italy); M. Dolci, INAF - Osservatorio Astronomico di Teramo (Italy); D. Ferruzzi, E. Pinna, A. Puglisi, M. Xompero, INAF - Osservatorio Astrofisico di Arcetri (Italy); E. Marchetti, E. Fedrigo, M. Le Louarn, R. Conzelmann, B. Delabre, P. Amico, N. Hubin, European Southern Observatory (Germany)

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**POSTER SESSION: LASER GUIDE STAR SYSTEMS**

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- 9148 3E **A sodium laser guide star facility for the ANU/EOS space debris tracking adaptive optics demonstrator** [9148-124]  
C. D'Orgeville, F. Bennet, The Australian National Univ. (Australia); M. Blundell, R. Brister, A. Chan, M. Dawson, Y. Gao, EOS Space Systems Pty. Ltd. (Australia); N. Paulin, I. Price, F. Rigaut, The Australian National Univ. (Australia); I. Ritchie, EOS Space Systems Pty. Ltd. (Australia); M. Sellars, The Australian National Univ. (Australia); C. Smith, EOS Space Systems Pty. Ltd. (Australia); K. Uhlendorf, Jenoptik Optical Systems GmbH (Germany); Y. Wang, EOS Space Systems Pty. Ltd. (Australia)
- 9148 3G **Pulsed laser architecture for enhancing backscatter from sodium** [9148-127]  
T. J. Kane, P. D. Hillman, C. A. Denman, FASORtronic LLC (United States)
- 9148 3H **ARGOS laser system mechanical design** [9148-128]  
M. Deysenroth, M. Honsberg, H. Gemperlein, J. Ziegleder, W. Raab, S. Rabien, L. Barl, Max-Planck-Institut für extraterrestrische Physik (Germany); W. Gässler, J. L. Borelli, Max-Planck-Institut für Astronomie (Germany)
- 9148 3I **Laboratory validation of a laser shaping system before guide star projection** [9148-129]  
S. Zúñiga, Univ. Técnica Federico Santa María (Chile); C. Béchet, H. González-Núñez, Pontificia Univ. Católica de Chile (Chile); B. Neichel, Lab. d'Astrophysique de Marseille, CNRS, Aix Marseille Univ. (France) and Gemini Observatory Southern Operations Ctr. (Chile); V. Fesquet, V. Garrel, Gemini Observatory Southern Operations Ctr. (Chile); P. Escárate, M. Castro, Univ. Técnica Federico Santa María (Chile); D. Guzmán, A. Guesalaga, Pontificia Univ. Católica de Chile (Chile)
- 9148 3J **Polarization control optimization of the Gemini South beam transfer optics** [9148-130]  
C. Araujo, C. Moreno, V. Fesquet, V. Garrel, C. Marchant, Gemini Observatory (Chile)
- 9148 3K **The ARGOS laser system: green light for ground layer adaptive optics at the LBT** [9148-131]  
W. Raab, S. Rabien, Max-Planck-Institut für extraterrestrische Physik (Germany); W. Gässler, Max-Planck-Institut für Astronomie (Germany); S. Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy); L. Barl, Max-Planck-Institut für extraterrestrische Physik (Germany); J. Borelli, Max-Planck-Institut für Astronomie (Germany); M. Daysenroth, H. Gemperlein, Max-Planck-Institut für extraterrestrische Physik (Germany); M. Kulas, Max-Planck-Institut für Astronomie (Germany); J. Ziegleder, Max-Planck-Institut für extraterrestrische Physik (Germany)
- 9148 3L **Coupling efficiency measurements for long-pulsed solid sodium laser based on measured sodium profile data** [9148-133]  
K. Jin, Institute of Optics and Electronics (China) and The Key Lab. on Adaptive Optics (China) and Univ. of Chinese Academy of Sciences (China); K. Wei, Institute of Optics and Electronics (China) and The Key Lab. on Adaptive Optics (China); S. Xie, Y. Bo, J. Zuo,

Technical Institute of Physics and Chemistry (China); P. Wang, Univ. of Chinese Academy of Sciences (China) and Technical Institute of Physics and Chemistry (China); L. Feng, National Observatory of China (China); X. Xue, Univ. of Science and Technology of China (China); M. Li, Institute of Optics and Electronics (China) and The Key Lab. on Adaptive Optics (China); X. Cheng, Wuhan Institute of Physics and Mathematics (China); C. Cui, Anhui Institute of Optics and Fine Mechanics (China); Y. Shen, Q. Bian, J. Yao, Technical Institute of Physics and Chemistry (China); A. Otárola, Thirty Meter Telescope Observatory Corp. (United States); X. Dai, Institute of Optics and Electronics (China) and The Key Lab. on Adaptive Optics (China) and Univ. of Chinese Academy of Sciences (China); Q. Peng, Technical Institute of Physics and Chemistry (China); C. Rao, Institute of Optics and Electronics (China) and The Key Lab. on Adaptive Optics (China); Z. Xu, Technical Institute of Physics and Chemistry (China); Y. Zhang, Institute of Optics and Electronics (China) and The Key Lab. on Adaptive Optics (China)

9148 3M **Proposal for a field experiment of elongated Na LGS wave-front sensing in the perspective of the E-ELT** [9148-134]

G. Rousset, D. Gratadour, E. Gendron, T. Buey, LESIA, CNRS, Observatoire de Paris, Univ. Paris Diderot (France); R. Myers, T. Morris, A. Basden, G. Talbot, Durham Univ. (United Kingdom); D. Bonaccini Calia, E. Marchetti, T. Pfrommer, European Southern Observatory (Germany)

9148 3N **Using a deformable mirror to generate custom laser guide star asterisms: simulation and laboratory results** [9148-135]

A. P. Norton, S. Srinath, D. Gavel, R. Kupke, D. Dillon, UC Observatory Lab. for Adaptive Optics (United States)

9148 3O **Assembly and test results of the AOF laser guide star units at ESO** [9148-136]

W. Hackenberg, D. Bonaccini Calia, B. Buzzoni, M. Comin, C. Dupuy, F. Gago, I. M. Guidolin, R. Guzman, R. Holzloehner, L. Kern, J. P. Kirchbauer, S. Lewis, J.-L. Lizon, S. McLay, T. Pfrommer, M. Quattri, J. Quentin, R. Ridings, European Southern Observatory (Germany)

9148 3P **Laser guide star pointing camera for ESO LGS Facilities** [9148-137]

D. Bonaccini Calia, European Southern Observatory (Germany); M. Centrone, F. Pedichini, INAF - Osservatorio Astronomico di Roma (Italy); A. Ricciardi, A. Cerruto, Astrel Instruments (Italy); F. Ambrosino, INAF - Osservatorio Astronomico di Roma (Italy)

9148 3Q **Evaluating the compliance of Keck's LGS AO automated aircraft protection system with FAA adopted criteria** [9148-138]

P. J. Stomski Jr., R. Campbell, W. M. Keck Observatory (United States); T. W. Murphy Jr., Univ. of California, San Diego (United States)

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**POSTER SESSION: ASTRONOMY WITH AO**

9148 3T **Experimental demonstration of brighter sodium resonant scattering with 1.7 GHz sideband repumping for long pulse laser** [9148-132]

L. Li, S. Zhang, W. Hua, H. Wang, Y. Ning, X. Xu, National Univ. of Defense Technology (China)

- 9148 3U **On the use of asymmetric PSF on NIR images of crowded stellar fields** [9148-142]  
 G. Fiorentino, INAF - Osservatorio Astronomico di Bologna (Italy); I. Ferraro, G. Iannicola, INAF - Osservatorio Astronomico di Roma (Italy); G. Bono, INAF - Osservatorio Astronomico di Roma (Italy) and Univ. degli Studi di Roma Tor Vergata (Italy); M. Monelli, Instituto de Astrofísica de Canarias (Spain) and Univ. de la Laguna (Spain); V. Testa, INAF - Osservatorio Astronomico di Roma (Italy); C. Arcidiacono, INAF - Osservatorio Astronomico di Bologna (Italy); M. Faccini, INAF - Osservatorio Astronomico di Roma (Italy); R. Gilmozzi, European Southern Observatory (Germany); M. Xompero, R. Briguglio, INAF - Osservatorio Astronomico di Arcetri (Italy)
- 9148 3V **Photometric performance of LGS MCAO with science-based metrics: first results from Gemini/GeMS observations of Galactic globular clusters** [9148-143]  
 P. Turri, Univ. of Victoria (Canada) and NRC - Herzberg Institute of Astrophysics (Canada); A. W. McConnachie, P. B. Stetson, NRC - Herzberg Institute of Astrophysics (Canada); G. Fiorentino, INAF - Osservatorio Astronomico di Bologna (Italy); D. R. Andersen, NRC - Herzberg Institute of Astrophysics (Canada); G. Bono, INAF - Osservatorio Astronomico di Bologna (Italy); J.-P. Véran, NRC - Herzberg Institute of Astrophysics (Canada)
- 9148 3X **L'-band AGPM vector vortex coronagraph's first light on LBTI/LMIRCam** [9148-145]  
 D. Defrère, Steward Observatory, The Univ. of Arizona (United States); O. Absil, Univ. de Liège (Belgium); P. Hinz, Steward Observatory, The Univ. of Arizona (United States); J. Kuhn, Jet Propulsion Lab. (United States); D. Mawet, European Southern Observatory (Chile); B. Mennesson, Jet Propulsion Lab. (United States); A. Skemer, Steward Observatory, The Univ. of Arizona (United States); K. Wallace, Jet Propulsion Lab. (United States); V. Bailey, E. Downey, Steward Observatory, The Univ. of Arizona (United States); C. Delacroix, Univ. de Liège (Belgium); O. Durney, Steward Observatory, The Univ. of Arizona (United States); P. Forsberg, Uppsala Univ. (Sweden); C. Gomez, S. Habraken, Univ. de Liège (Belgium); W. F. Hoffmann, Steward Observatory, The Univ. of Arizona (United States); M. Karlsson, Uppsala Univ. (Sweden); M. Kenworthy, Leiden Observatory (Netherlands); J. Leisenring, M. Montoya, Steward Observatory, The Univ. of Arizona (United States); L. Pueyo, Space Telescope Science Institute (United States); M. Skrutskie, Univ. of Virginia (United States); J. Surdej, Univ. de Liège (Belgium)

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**POSTER SESSION: WAVEFRONT CORRECTION**

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- 9148 3Y **Double drive modes unimorph deformable mirror with high actuator count for astronomical application** [9148-146]  
 Y. Liu, Univ. of Science and Technology of China (China); J. Ma, Ningbo Univ. (China); J. Chen, B. Li, J. Chu, Univ. of Science and Technology of China (China)
- 9148 3Z **Payload characterization for CubeSat demonstration of MEMS deformable mirrors** [9148-147]  
 A. Marín, K. Cahoy, M. Webber, Massachusetts Institute of Technology (United States); R. Bellikov, E. Bendek, NASA Ames Research Ctr. (United States)
- 9148 40 **Analysis of the static deformation matching between numerical and experimental data on the voice-coil actuated deformable mirrors** [9148-148]  
 C. Del Vecchio, R. Briguglio, A. Riccardi, M. Xompero, INAF - Osservatorio Astrofisico di Arcetri (Italy)

- 9148 42 **A compact adaptive optics system with 3mm narrow-interval deformable mirror** [9148-150]  
M. Li, L. Xue, H. Xian, X. Rao, K. Wei, X. Zhang, S. Chen, A. Zhang, D. Chen, C. Rao,  
Y. Zhang, Institute of Optics and Electronics (China) and The Key Lab. On Adaptive Optics  
(China)
- 9148 43 **Optimization of electrode configuration in surface-parallel actuated deformable mirrors**  
[9148-151]  
M. Laslandes, S. Pellegrino, J. Steeves, California Institute of Technology (United States);  
K. Patterson, Jet Propulsion Lab. (United States)
- 9148 44 **The 384-channel prototype of DM Electronics for ELT AO systems** [9148-152]  
K. Caputa, J. Atwood, G. Herriot, J.-P. Véran, P. Spanò, National Research Council  
Canada (Canada); A. Zielinski, Univ. of Victoria (Canada)
- 9148 45 **The deformable secondary mirror of VLT: final electro-mechanical and optical acceptance  
test results** [9148-153]  
R. Briguglio, INAF - Osservatorio Astrofisico di Arcetri (Italy); R. Biasi, Microgate S.r.l. (Italy);  
M. Xompero, A. Riccardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); M. Andrichetoni,  
D. Pescoller, G. Angerer, Microgate S.r.l. (Italy); D. Gallieni, A.D.S. International S.r.l. (Italy);  
E. Vernet, J. Kolb, R. Arsenault, P.-Y. Madec, European Southern Observatory (Germany)
- 9148 46 **Deformable mirror interferometric analysis for the direct imagery of exoplanets** [9148-154]  
J. Mazoyer, R. Galicher, P. Baudoz, LESIA, CNRS, Observatoire de Paris (France); P. Lanzoni,  
F. Zamkotsian, Lab. d'Astrophysique de Marseille, CNRS, Aix-Marseille Univ. (France);  
G. Rousset, LESIA, CNRS, Observatoire de Paris (France)

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**POSTER SESSION: EXTREME AO**

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- 9148 48 **Lyot-based low order wavefront sensor: implementation on the Subaru Coronagraphic  
Extreme Adaptive Optics System and its laboratory performance** [9148-157]  
G. Singh, Subaru Telescope, National Astronomical Observatory of Japan (United States)  
and LESIA, CNRS, Observatoire de Paris (France); O. Guyon, Subaru Telescope, National  
Astronomical Observatory of Japan (United States) and Jet Propulsion Lab. (United States);  
P. Baudoz, LESIA, CNRS, Observatoire de Paris (France); N. Jovanovich, Subaru Telescope,  
National Astronomical Observatory of Japan (United States); F. Martinache, Observatoire  
de la Cote d'Azur, CNRS, Univ. de Nice Sophia-Antipolis (France); T. Kudo, Subaru  
Telescope, National Astronomical Observatory of Japan (United States); E. Serabyn,  
J. G. Kuhn, Jet Propulsion Lab. (United States)
- 9148 49 **CHARIS science: performance simulations for the Subaru Telescope's third-generation of  
exoplanet imaging instrumentation** [9148-158]  
T. D. Brandt, Institute for Advanced Study (United States); M. W. McElwain, NASA Goddard  
Space Flight Ctr. (United States); M. Janson, Queen's Univ. Belfast (United Kingdom);  
G. R. Knapp, Princeton Univ. (United States); K. Mede, The Univ. of Tokyo (Japan);  
M. A. Limbach, T. Groff, A. Burrows, J. E. Gunn, Princeton Univ. (United States); O. Guyon,  
Subaru Telescope, National Astronomical Observatory of Japan (United States) and The  
Univ. of Arizona (United States); J. Hashimoto, The Univ. of Oklahoma (United States);  
M. Hayashi, National Astronomical Observatory of Japan (Japan); N. Jovanovic, Subaru  
Telescope, National Astronomical Observatory of Japan (United States); N. J. Kasdin,  
Princeton Univ. (United States); M. Kuzuhara, National Astronomical Observatory of Japan  
(Japan) and Tokyo Institute of Technology (Japan); R. H. Lupton, Princeton Univ. (United



States); F. Martinache, Subaru Telescope, National Astronomical Observatory of Japan (United States) and Laboratoire Lagrange, CNRS, Observatoire de la Côte d'Azur (France); S. Sorahana, Nagoya Univ. (Japan); D. S. Spiegel, Institute for Advanced Study (United States); N. Takato, Subaru Telescope, National Astronomical Observatory of Japan (United States); M. Tamura, National Astronomical Observatory of Japan (Japan) and Univ. of Tokyo (Japan); E. L. Turner, Princeton Univ. (United States) and The Univ. of Tokyo (Japan); R. Vanderbei, Princeton Univ. (United States); J. Wisniewski, Univ. of Oklahoma (United States)

## Part Three

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### POSTER SESSION: ADVANCES IN AO CONTROL

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- 9148 4A **A software based de-rotation algorithm concept for the new adaptive optics module (NAOMI) for the auxiliary telescopes of the VLTI** [9148-159]  
E. Aller-Carpentier, E. Marchetti, R. Dorn, F. Delplancke-Stroebele, E. Fedrigo, M. Le Louarn, N. Hubin, J. Paufique, J. Woillez, European Southern Observatory (Germany)
- 9148 4B **Evaluation of the Xeon phi processor as a technology for the acceleration of real-time control in high-order adaptive optics systems** [9148-160]  
D. Barr, UK Astronomy Technology Ctr. (United Kingdom) and Heriot-Watt Univ. (United Kingdom); A. Basden, N. Dipper, Durham Univ. (United Kingdom); N. Schwartz, A. Vick, H. Schnetler, UK Astronomy Technology Ctr. (United Kingdom)
- 9148 4C **Preliminary evaluation and comparison of atmospheric turbulence rejection performance for infinite and receding horizon control in adaptive optics systems** [9148-161]  
M. V. Konnik, J. De Dona, The Univ. of Newcastle (Australia)
- 9148 4E **Multi-input multi-output identification for control of adaptive optics systems** [9148-165]  
R. Muradore, Univ. degli Studi di Verona (Italy); J. Kolb, L. Pettazzi, E. Marchetti, European Southern Observatory (Germany)
- 9148 4F **Real-time control for the high order, wide field DRAGON AO test bench** [9148-168]  
A. Basden, N. A. Bharmal, U. Bitenc, N. Dipper, T. Morris, R. Myers, A. Reeves, E. Younger, Durham Univ. (United Kingdom)
- 9148 4G **VLT DSM, the control system of the largest deformable secondary mirror ever manufactured** [9148-169]  
M. Manetti, Microgate S.r.l. (Italy); M. Morandini, P. Mantegazza, Politecnico di Milano (Italy); R. Biasi, M. Andrighettoni, Microgate S.r.l. (Italy); D. Gallieni, A.D.S. International S.r.l. (Italy)
- 9148 4H **Anti-windup control of tip-tilt mirror** [9148-172]  
J.-P. Folcher, Lab. Lagrange, CNRS, Univ. de Nice Sophia Antipolis (France)
- 9148 4J **Woofers-tweeters deformable mirror control for closed-loop adaptive optics: theory and practice** [9148-174]  
D. Gavel, Univ. of California Observatories (United States); A. Norton, Lockheed Martin Space Systems (United States)

- 9148 4K **Benchmarking hardware architecture candidates for the NFIRAOS real-time controller** [9148-176]  
M. Smith, D. Kerley, G. Herriot, J.-P. Véran, NRC - Dominion Astrophysical Observatory (Canada)
- 9148 4L **Kalman filter design for atmospheric tip/tilt, tip/tilt anisoplanatism and focus filtering on extremely large telescopes** [9148-177]  
L. Gilles, Thirty Meter Telescope Observatory Corp. (United States); H. F. Raynaud, Lab. Charles Fabry de l'Institut d'Optique, CNRS, Univ. Paris-Sud (France); C. Correia, Univ. do Porto (Portugal); L. Wang, B. Ellerbroek, C. Boyer, Thirty Meter Telescope Observatory Corp. (United States); C. Kulcsár, Lab. Charles Fabry de l'Institut d'Optique, CNRS, Univ. Paris-Sud (France)
- 9148 4M **First on-sky results of a neural network based tomographic reconstructor: Carmen on Canary** [9148-178]  
J. Osborn, Durham Univ. (United Kingdom); D. Guzman, Pontificia Univ. Católica de Chile (Chile); F. J. de Cos Juez, Univ. de Oviedo (Spain); A. G. Basden, T. J. Morris, Durham Univ. (United Kingdom); É. Gendron, LESIA, CNRS, Observatoire de Paris (France); T. Butterley, R. M. Myers, Durham Univ. (United Kingdom); A. Guesalaga, Pontificia Univ. Católica de Chile (Chile); F. Sanchez Lasheras, M. Gomez Victoria, M. L. Sánchez Rodríguez, Univ. de Oviedo (Spain); D. Gratadour, G. Rousset, LESIA, CNRS, Observatoire de Paris (France)
- 9148 4N **Robustness of tomographic reconstructors versus real atmospheric profiles in the ELT perspective** [9148-179]  
E. Gendron, C. Morel, LESIA, CNRS, Observatoire de Paris (France); J. Osborn, Durham Univ. (United Kingdom); O. Martin, D. Gratadour, F. Vidal, LESIA, CNRS, Observatoire de Paris (France); M. Le Louarn, European Southern Observatory (Germany); G. Rousset, LESIA, CNRS, Observatoire de Paris (France)

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**POSTER SESSION: POST-PROCESSING AO DATA**

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- 9148 4O **Morphology of distant galaxies with MCAO** [9148-180]  
B. Neichel, Lab. d'Astrophysique de Marseille, CNRS, Aix Marseille Univ. (France); M. Huertas-Company, T. Huellou, GEPI, CNRS, Observatoire de Paris à Meudon (France); B. Epinat, Lab. d'Astrophysique de Marseille, CNRS, Aix Marseille Univ. (France); M. Puech, GEPI, CNRS, Observatoire de Paris à Meudon (France); D. Gratadour, LESIA, CNRS, Observatoire de Paris (France)
- 9148 4P **Maximum likelihood approach for the adaptive optics point spread function reconstruction** [9148-181]  
J. Exposito, D. Gratadour, G. Rousset, Y. Clénet, LESIA, CNRS, Observatoire de Paris, Univ. Paris-Diderot (France); L. Mugnier, ONERA (France); É. Gendron, LESIA, CNRS, Observatoire de Paris, Univ. Paris-Diderot (France)

- 9148 4Q **CHARA array adaptive optics II: non-common-path correction and downstream optics** [9148-183]  
 T. ten Brummelaar, The CHARA Array (United States); X. Che, Univ. of Michigan (United States); H. McAlister, CHARA, Georgia State Univ. (United States); M. Ireland, The Australian National Univ. (Australia); J. Monnier, Univ. of Michigan (United States); D. Mourard, Univ. de Nice (France); S. Ridgway, National Optical Astronomy Observatory (United States); J. Sturmann, L. Sturmann, N. Turner, The CHARA Array (United States); P. Tuthill, The Univ. of Sydney (Australia)
- 9148 4S **Laser guide star adaptive optics point spread function reconstruction project at W. M. Keck Observatory: preliminary on-sky results** [9148-185]  
 L. Jolissaint, Univ. of Applied Sciences Western Switzerland (Switzerland); S. Ragland, P. Wizinowich, W. M. Keck Observatory (United States); A. Bouxin, Univ. of Applied Sciences Western Switzerland (Switzerland)
- 9148 4T **Real-time Strehl and image quality performance estimator at Paranal Observatory** [9148-186]  
 D. Mawet, A. Smette, European Southern Observatory (Chile); M. S. Sarazin, H. Kuntschner, European Southern Observatory (Germany); J. H. Girard, European Southern Observatory (Chile)
- 9148 4U **Strehl-constrained reconstruction of post-adaptive optics data and the Software Package AIRY, v. 6.1** [9148-187]  
 M. Carillet, Observatoire de la Cote d'Azur, CNRS, Univ. de Nice Sophia-Antipolis (France); A. La Camera, Univ. degli Studi di Genova (Italy); J. Deguignet, Observatoire de la Cote d'Azur, CNRS, Univ. de Nice Sophia-Antipolis (France); M. Prato, Univ. degli Studi di Modena e Reggio Emilia (Italy); M. Bertero, Univ. degli Studi di Genova (Italy); É. Aristidi, Observatoire de la Cote d'Azur, CNRS, Univ. de Nice Sophia-Antipolis (France); P. Boccacci, Univ. degli Studi di Genova (Italy)
- 9148 4V **On-sky PSF reconstruction with APETy** [9148-188]  
 R. Olguin, Pontificia Univ. Católica de Chile (Chile); M. Hartung, T. Hayward, Gemini Observatory (Chile); D. Gratadour, LESIA, CNRS, Observatoire de Paris (France); A. Guesalaga, Pontificia Univ. Católica de Chile (Chile)
- 9148 4W **Analysis of turbulent atmospheric anisoplanatism influence on adaptive optics system over horizontal path** [9148-253]  
 Q. Sun, Y. Ning, B. Shu, S. Du, National Univ. of Defense Technology (China)

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**POSTER SESSION: NEW PROPOSED AO SYSTEMS**

- 9148 4X **Meaningful options for a dichroic unit within the natural & laser guide star AO systems at the Giant Magellan Telescope** [9148-189]  
 J. Antichi, E. Pinna, S. Esposito, M. Bonaglia, L. Busoni, INAF - Osservatorio Astrofisico di Arcetri (Italy); F. Santoro, A. Bouchez, Giant Magellan Telescope Corp. (United States)
- 9148 4Z **Design of adaptive optics calibration source for the Giant Magellan Telescope** [9148-192]  
 P. Zhou, J. H. Burge, C. Zhao, S. Benjamin, B. Cuerden, College of Optical Sciences, The Univ. of Arizona (United States); A. Bouchez, Giant Magellan Telescope Corp. (United States)

- 9148 50 **Optical design of the Big Bear Solar Observatory's multi-conjugate adaptive optics system** [9148-193]  
X. Zhang, N. Gorceix, Big Bear Solar Observatory (United States); D. Schmidt, National Solar Observatory (United States); P. R. Goode, W. Cao, Big Bear Solar Observatory (United States); T. R. Rimmele, National Solar Observatory (United States); R. Coulter, Big Bear Solar Observatory (United States)
- 9148 51 **1500Hz adaptive optics system using commercially available components** [9148-194]  
A. Schimpf, M. Micallef, J. Charton, ALPAO S.A.S. (France)
- 9148 53 **Testing the analytical model of the pyramid wavefront sensor with high-order aberrations on the optical bench** [9148-196]  
M. Rosensteiner, J.-P. Véran, NRC - Herzberg Institute of Astrophysics (Canada)

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**POSTER SESSION: WAVEFRONT SENSING**

- 9148 55 **A composite tracking sensor with high accuracy and large dynamic range** [9148-199]  
X. Ma, K. Wei, W. Zheng, C. Rao, Institute of Optics and Electronics (China) and The Key Lab. Of Adaptive Optics (China)
- 9148 56 **Theoretical analyses for the relationship between the performance of quadrant photodetector and the size of incident light spot** [9148-201]  
Z. Zheng, Nanjing Institute of Astronomical Optics & Technology (China) and Univ. of Chinese Academy of Sciences (China); C. Li, S. Zhang, Nanjing Institute of Astronomical Optics & Technology (China)
- 9148 57 **Non-common path aberration corrections for current and future AO systems** [9148-202]  
M. Lamb, Univ. of Victoria (Canada) and NRC - Herzberg Institute of Astrophysics (Canada); D. R. Andersen, J.-P. Véran, NRC - Herzberg Institute of Astrophysics (Canada); C. Correia, Univ. do Porto (Portugal); G. Herriot, M. Rosensteiner, NRC - Herzberg Institute of Astrophysics (Canada); J. Fiege, Univ. of Manitoba (Canada)
- 9148 58 **Cross-scale inference and wavefront reconstruction** [9148-203]  
S. K. Maji, INRIA (France); T. Fusco, ONERA (France); H. Yahia, INRIA (France)
- 9148 59 **Wavefront sensing from the image domain with the Oxford-SWIFT integral field spectrograph** [9148-204]  
B. Pope, N. Thatte, Univ. of Oxford (United Kingdom); R. Burruss, Jet Propulsion Lab. (United States); M. Tecza, F. Clarke, G. Cotter, Univ. of Oxford (United Kingdom)
- 9148 5B **Near-infrared aberration tracking using a correlation algorithm on the Galactic Center** [9148-207]  
N. Anugu, P. Garcia, Univ. do Porto (Portugal); A. Amorim, P. Gordo, Univ. de Lisboa (Portugal); F. Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); G. Perrin, Observatoire de Paris à Meudon, CNRS (France); W. Brandner, Max-Planck-Institut für Astronomie (Germany); C. Straubmeier, Univ. zu Köln (Germany); K. Perraut, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS (France)

- 9148 5C **High speed and high precision pyramid wavefront sensor: In labs validation and preparation to on sky demonstration** [9148-208]  
K. El Hadi, Lab. d'Astrophysique de Marseille, CNRS, Aix Marseille Univ. (France); T. Fusco, J.-F. Sauvage, ONERA (France) and Lab. d'Astrophysique de Marseille, CNRS, Aix Marseille Univ. (France); B. Neichel, Lab. d'Astrophysique de Marseille, CNRS, Aix Marseille Univ. (France)
- 9148 5D **Focal-plane wavefront sensing with high-order adaptive optics systems** [9148-209]  
V. Korkiakoski, Delft Ctr. for Systems and Control (Netherlands) and Leiden Observatory (Netherlands); C. U. Keller, Leiden Observatory (Netherlands); N. Doelman, TNO Science and Industry (Netherlands) and Leiden Observatory (Netherlands); M. Kenworthy, G. Otten, Leiden Observatory (Netherlands); M. Verhaegen, Delft Ctr. for Systems and Control (Netherlands)
- 9148 5E **A novel means of measuring non-common path errors in an adaptive optics system** [9148-210]  
E. E. Bloemhof, National Science Foundation (United States)
- 9148 5G **Pre-shipment test of the ARGOS laser guide star wavefront sensor** [9148-212]  
M. Bonaglia, L. Busoni, T. Mazzoni, A. Puglisi, J. Antichi, S. Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy); G. Orban de Xivry, S. Rabien, Max-Planck-Institut für extraterrestrische Physik (Germany)
- 9148 5H **Design optimization and lab demonstration of ZELDA: a Zernike sensor for near-coronagraph quasi-static measurements** [9148-213]  
M. N'Diaye, Space Telescope Science Institute (United States); K. Dohlen, A. Caillat, A. Costille, Lab. d'Astrophysique de Marseille, CNRS, Aix-Marseille Univ. (France); T. Fusco, Lab. d'Astrophysique de Marseille, CNRS, Aix-Marseille Univ. (France) and ONERA (France); A. Jolivet, Lab. d'Astrophysique de Marseille, CNRS, Aix-Marseille Univ. (France) and Institut d'Astrophysique et de Géophysique (Belgium); F. Madec, Lab. d'Astrophysique de Marseille, CNRS, Aix-Marseille Univ. (France); L. Mugnier, ONERA (France); B. Paul, J.-F. Sauvage, Lab. d'Astrophysique de Marseille, CNRS, Aix-Marseille Univ. (France) and ONERA (France); R. Soummer, Space Telescope Science Institute (United States); A. Vigan, Lab. d'Astrophysique de Marseille, CNRS, Aix-Marseille Univ. (France); J. K. Wallace, Jet Propulsion Lab. (United States)
- 9148 5I **Understanding and correcting low order residual static aberrations in adaptive optics corrected images** [9148-214]  
R. Rampy, S. Ragland, P. Wizinowich, R. Campbell, W. M. Keck Observatory (United States)
- 9148 5J **Applications of variable focus liquid lenses for curvature wave-front sensors in astronomy** [9148-215]  
J. Fuentes-Fernández, S. Cuevas, L. C. Alvarez-Nuñez, A. M. Watson, Univ. Nacional Autónoma de México (Mexico)
- 9148 5K **Comparing the performance of open loop centroiding techniques in the Raven MOAO system** [9148-216]  
D. R. Andersen, NRC - Herzberg Institute of Astrophysics (Canada); C. Bradley, D. Gamroth, Univ. of Victoria (Canada); D. Kerley, NRC - Herzberg Institute of Astrophysics (Canada); O. Lardièrre, Univ. of Victoria (Canada); J.-P. Véran, NRC - Herzberg Institute of Astrophysics (Canada)

- 9148 5L **Effects of differential wavefront sensor bias drifts on high contrast imaging** [9148-217]  
N. Sadakuni, Gemini Observatory (United States); B. A. Macintosh, Kavli Institute for Particle Astrophysics and Cosmology, Stanford Univ. (United States) and Lawrence Livermore National Lab. (United States); D. W. Palmer, L. A. Poyneer, Lawrence Livermore National Lab. (United States); C. E. Max, Univ. of California, Santa Cruz (United States); D. Savransky, Cornell Univ. (United States); S. J. Thomas, NASA Ames Research Ctr. (United States); A. Cardwell, S. Goodsell, M. Hartung, P. Hibon, F. Rantakyro, A. Serio, Gemini Observatory (Chile)
- 9148 5M **Wavefront sensing in a partially illuminated, rotating pupil** [9148-218]  
T. Bertram, K. Kumar Radhakrishnan Santhakumari, Max-Planck-Institut für Astronomie (Germany); L. Marafatto, INAF - Osservatorio Astronomico di Padova (Italy) and Univ. degli Studi di Padova (Italy); C. Arcidiacono, INAF - Osservatorio Astronomico di Bologna (Italy); J. Berwein, Max-Planck-Institut für Astronomie (Germany); R. Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy); T. M. Herbst, Max-Planck-Institut für Astronomie (Germany)
- 9148 5N **A new phase retrieval algorithm based on multi-layered intensity distribution** [9148-220]  
S. Du, X. Zhang, B. Shu, National Univ. of Defense Technology (China)
- 9148 5O **New CCD imagers for adaptive optics wavefront sensors** [9148-221]  
D. R. Schuette, R. K. Reich, I. Prigozhin, B. E. Burke, MIT Lincoln Lab. (United States); R. Johnson, Air Force Research Lab. (United States)
- 9148 5P **Discretized aperture mapping with a micro-lenses array for interferometric direct imaging** [9148-222]  
F. Patru, J. Antichi, Osservatorio Astrofisico di Arcetri (Italy); D. Mawet, European Southern Observatory (Chile); L. Jolissaint, Haute Ecole d'Ingenierie et de Gestion du Canton de Vaud (Switzerland); M. Carbillet, Observatoire de la Côte d'Azur, CNRS (France); J. Milli, J. Girard, European Southern Observatory (Chile); P. Rabou, Institut de Planetologie et d'Astrophysique, CNRS (France); E. Giro, Osservatorio Astronomico di Padova (Italy); D. Mourard, Observatoire de la Cote d'Azur, CNRS (France)
- 9148 5Q **On-sky low order non-common path correction of the GPI calibration unit** [9148-224]  
M. Hartung, Gemini Observatory (Chile); B. Macintosh, Kavli Institute for Particle Astrophysics and Cosmology, Stanford Univ. (United States); P. Langlois, N. Sadakuni, Gemini Observatory (Chile); D. Gavel, Lick Observatory, Univ. of California, Santa Cruz (United States); J. K. Wallace, Jet Propulsion Lab. (United States); D. Palmer, L. Poyneer, Lawrence Livermore National Lab. (United States); D. Savransky, Cornell Univ. (United States); S. Thomas, NASA Ames Research Ctr. (United States); D. Dillon, Lick Observatory, Univ. of California, Santa Cruz (United States); J. Dunn, NRC - Herzburg Institute of Astrophysics (Canada); P. Hibon, F. Rantakyro, S. Goodsell, Gemini Observatory (Chile)

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**POSTER SESSION: PATHFINDERS TO ENABLE AO ON ELTS AND NEW AO CONCEPTS**

- 9148 5S **HALOS: fast, autonomous, holographic adaptive optics** [9148-226]  
G. P. Andersen, P. Gelsinger-Austin, R. Gaddipati, P. Gaddipati, F. Ghebremichael, U.S. Air Force Academy (United States)
- 9148 5T **A laser tomography test bed for extremely large telescopes** [9148-227]  
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