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Ramón Navarro
Colin R. Cunningham
Eric Prieto
Editors

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- 8450 1V **PRAXIS: a low background NIR spectrograph for fibre Bragg grating OH suppression** [8450-65]
A. Horton, S. Ellis, J. Lawrence, Australian Astronomical Observatory (Australia); J. Bland-Hawthorn, The Univ. of Sydney (Australia)

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- 8450 1Z **The JWST MIRI FM wheel mechanisms characterisation for open loop drive** [8450-69]
 Ö. Detre, U. Grözinger, O. Krause, F. Müller, S. Scheithauer, Max Planck Institute for Astronomy (Germany)
- 8450 20 **Development of a 2D precision cryogenic chopper for METIS** [8450-70]
 S. L. Paalvast, H. Janssen, M. Teuwen, Janssen Precision Engineering B.V. (Netherlands); R. Huisman, SRON Netherlands Institute for Space Research (Netherlands); B. Brandl, Leiden Observatory, Leiden Univ. (Netherlands); F. Molster, NOVA (Netherlands); L. Venema, ASTRON (Netherlands)

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- 8450 21 **JWST: Tinsley achievements on the largest beryllium polishing project (Invited Paper)** [8450-82]
 J. Daniel, L-3 Communications Tinsley Labs. Inc. (United States); T. Hull, Univ. of New Mexico (United States); J. B. Barentine, L-3 Communications Tinsley Labs. Inc. (United States)
- 8450 22 **Zero-expansion glass ceramic ZERODUR: recent developments reveal high potential (Invited Paper)** [8450-83]
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- 8450 23 **Prototype segments polishing and testing for ELT M1** [8450-84]
 J. Rodolfo, L. Chouarche, G. Chaussat, A. Hamy, J. Carel, B. Pernet, J. Billet, H. Leplan, E. Ruch, SAGEM Défense Sécurité (France)
- 8450 25 **Tinsley proves stress mirror polishing for giant segmented telescopes** [8450-86]
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- 8450 27 **Ultra-stable isostatic bonded optical mount design for harsh environments** [8450-72]
 J. Pijnenburg, M. J. A. te Voert, J. de Vreugd, A. Vosteen, W. van Werkhoven, J. Mekking, B. H. Nijland, TNO (Netherlands)
- 8450 28 **Glue test results for high-precision large cryogenic lens holder** [8450-74]
 A. Reutlinger, A. Mottaghbonab, C. Gal, A. Boesz, Kayser-Threde GmbH (Germany); F. Grupp, Max-Planck-Institut für extraterrestrische Physik (Germany) and Univ.-Sternwarte München (Germany); N. Geis, A. Bode, R. Katterloher, Max-Planck-Institut für extraterrestrische Physik (Germany); R. Bender, Max-Planck-Institut für extraterrestrische Physik (Germany) and Univ.-Sternwarte München (Germany)

- 8450 29 **A new generation active arrays for optical flexibility in astronomical instrumentation** [8450-75]
G. Kroes, ASTRON (Netherlands); A. Jaskó, ASTRON (Netherlands) and Konkoly Thege Miklós Astronomical Institute (Hungary); J. H. Pragt, L. Venema, M. De Haan, ASTRON (Netherlands)

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- 8450 2B **Test production of a mirror segment for the Thirty Meter Telescope** [8450-88]
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- 8450 2D **Production of 8.4m segments for the Giant Magellan Telescope** [8450-90]
H. M. Martin, R. G. Allen, Steward Observatory, The Univ. of Arizona (United States); J. H. Burge, Steward Observatory and College of Optical Sciences, The Univ. of Arizona (United States); D. Kim, College of Optical Sciences, The Univ. of Arizona (United States); J. S. Kingsley, K. Law, R. D. Lutz, P. A. Strittmatter, Steward Observatory, The Univ. of Arizona (United States); P. Su, College of Optical Sciences, The Univ. of Arizona (United States); M. T. Tuell, S. C. West, Steward Observatory, The Univ. of Arizona (United States); P. Zhou, College of Optical Sciences, The Univ. of Arizona (United States)
- 8450 2E **Light-weight glass optics for segmented x-ray mirrors** [8450-91]
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- 8450 2G **Progress in UCO's search for silver-based telescope mirror coatings** [8450-77]
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- 8450 2H **Enhanced MgF₂ and LiF over-coated Al mirrors for FUV space astronomy** [8450-78]
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- 8450 2J **Towards ultra-precise optical interference filters on large area: computational and experimental optimization of the homogeneity of magnetron-sputtered precision optical coatings** [8450-80]
M. Vergöhl, A. Pflug, D. Rademacher, Fraunhofer Institute for Surface Engineering and Thin Films (Germany)
- 8450 2K **Optical reflector coatings for astronomical applications from EUV to IR** [8450-81]
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- 8450 2P **The 3.2m all SiC Telescope for SPICA** [8450-96]
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- 8450 2Q **Manufacturing of high-precision aspherical and freeform optics** [8450-97]
A. M. Hoogstrate, C. van Drunen, B. van Venrooy, R. Henselmans, TNO (Netherlands)
- 8450 2R **Development of CFRP mirrors for low-temperature application of satellite telescopes** [8450-98]
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M. Gully-Santiago, W. Wang, The Univ. of Texas at Austin (United States); C. Deen, The Univ. of Texas at Austin (United States) and Max-Planck Institut für Astronomie (Germany); D. Jaffe, The Univ. of Texas at Austin (United States)
- 8450 2T **Development of silicon immersed grating for METIS on E-ELT** [8450-100]
A. H. van Amerongen, SRON Netherlands Institute for Space Research (Netherlands); T. Agocs, ASTRON (Netherlands); H. van Brug, TNO Science and Industry (Netherlands); G. Nieuwland, Philips Innovation Services (Netherlands); L. Venema, ASTRON (Netherlands); R. W. M. Hoogeveen, SRON Netherlands Institute for Space Research (Netherlands)

- 8450 2U **Silicon immersion gratings and their spectroscopic applications** [8450-101]
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- 8450 2V **High-performance astronomical gratings by Canon** [8450-103]
T. Sukegawa, S. Sugiyama, T. Kitamura, Y. Okura, M. Koyama, Canon Inc. (Japan)
- 8450 2W **Materials for VPHGs: practical considerations in the case of astronomical instrumentation (Invited Paper)** [8450-104]
A. Bianco, G. Pariani, INAF - Osservatorio Astronomico di Brera (Italy); A. Zanutta, INAF - Osservatorio Astronomico di Brera (Italy) and Politecnico di Milano (Italy); C. Bertarelli, Politecnico di Milano (Italy)
- 8450 2X **Performance of volume phase gratings manufactured using ultrafast laser inscription** [8450-105]
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- 8450 2Y **Novel diffraction gratings fabricated by means of plasma nanotechnologies** [8450-106]
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- 8450 2Z **High-performance dielectric diffraction gratings for space applications (Best Oral Presentation)** [8450-107]
U. D. Zeitner, Fraunhofer Institute of Applied Optics and Precision Engineering (Germany) and Friedrich-Schiller-Univ. Jena (Germany); F. Fuchs, Fraunhofer Institute of Applied Optics and Precision Engineering (Germany); E.-B. Kley, Fraunhofer Institute of Applied Optics and Precision Engineering (Germany) and Friedrich-Schiller-Univ. Jena (Germany)

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C. R. Cunningham, C. J. Evans, UK Astronomy Technology Ctr., Royal Observatory (United Kingdom); F. Molster, Leiden Observatory, Leiden Univ. (Netherlands); S. Kendrew, Max-Planck-Institut für Astronomie (Germany); M. A. Kenworthy, F. Snik, Leiden Observatory, Leiden Univ. (Netherlands)
- 8450 33 **Extremely aspheric mirrors: prototype development of an innovative manufacturing process based on active optics** [8450-110]
Z. Challita, E. Hugot, M. Ferrari, J. Le Merrer, D. Le Mignant, J.-G. Cuby, Lab. d'Astrophysique de Marseille, CNRS, Aix-Marseille Univ. (France)
- 8450 34 **Fast figuring of large optics by reactive atom plasma** [8450-111]
M. Castelli, R. Jourdain, P. Morantz, P. Shore, Cranfield Univ. (United Kingdom)

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U. Lemke, Georg-August-Univ. Göttingen (Germany) and Durham Univ. (United Kingdom);
J. R. Allington-Smith, Durham Univ. (United Kingdom); J. Stürmer, ZAH Landessternwarte
Heidelberg (Germany)
- 8450 36 **Optical fiber systems for the BigBOSS instrument** [8450-114]
J. Edelstein, Univ. of California, Berkeley (United States); C. Poppett, Lawrence Berkeley
National Lab. (United States); M. Sirk, R. Besuner, Univ. of California, Berkeley (United
States); R. Lafever, Lawrence Berkeley National Lab. (United States); J. R. Allington-Smith,
G. J. Murray, Durham Univ. (United Kingdom)
- 8450 37 **Guide, focus/alignment system for BigBOSS** [8450-115]
K. Reil, SLAC National Accelerator Lab. (United States); C. Bebek, Lawrence Berkeley
National Lab. (United States); R. Besuner, Space Sciences Lab., Univ. of California, Berkeley
(United States); M. Lampton, Lawrence Berkeley National Lab. (United States) and Space
Sciences Lab., Univ. of California, Berkeley (United States); A. Roodman, SLAC National
Accelerator Lab. (United States); M. Sholl, Lawrence Berkeley National Lab. (United States)
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J. H. Silber, C. Schenk, E. Anderssen, C. Bebek, F. Becker, Lawrence Berkeley National Lab.
(United States); R. Besuner, Space Sciences Lab., Univ. of California, Berkeley (United
States); M. Cepeda, Lawrence Berkeley National Lab. (United States); J. Edelstein,
H. Heetderks, Space Sciences Lab., Univ. of California, Berkeley (United States); P. Jelinsky,
T. Johnson, A. Karcher, P. Perry, R. Post, Lawrence Berkeley National Lab. (United States);
M. Sholl, Space Sciences Lab., Univ. of California, Berkeley (United States); K. Wilson,
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- 8450 3F **Applied stress on coated multimode optical fibres: a different point of view to bending
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- 8450 3G **Development of different kind of IFU prototypes for the OPTIMOS-EVE study for the E-ELT** [8450-125]
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- 8450 3H **On-sky tests of sky-subtraction methods for fiber-fed spectrographs** [8450-126]
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- 8450 3I **Development of the single fibres and IFUs of WEAWE** [8450-127]
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- 8450 3L **Multicore fibre Bragg grating developments for OH suppression** [8450-131]
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- 8450 3O **Reflective coating for near-infrared immersion gratings** [8450-134]
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- 8450 3P **Fabrication and testing of germanium grisms for LMIRcam** [8450-135]
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- 8450 3S **Design of the J-PAS and J-PLUS filter systems** [8450-138]
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A. Feller, N. Krishnappa, O. Pleier, J. Hirzberger, Max-Planck-Institut für Sonnensystemforschung (Germany); P.J. Jobst, M. Schürmann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)
- 8450 3V **Developing metal coated mesh filters for mid-infrared astronomy** [8450-141]
S. Sako, T. Miyata, T. Kamizuka, Institute of Astronomy, The Univ. of Tokyo (Japan); T. Nakamura, The Univ. of Tokyo (Japan); K. Asano, M. Uchiyama, Institute of Astronomy, The Univ. of Tokyo (Japan); T. Onaka, I. Sakon, The Univ. of Tokyo (Japan); T. Wada, Institute of Space and Astronomical Science, Japan Aerospace Exploration Agency (Japan)
- 8450 3W **Octadecanethiol for tarnish-resistant silver coatings** [8450-142]
A. C. Phillips, Univ. of California Observatories (United States); A. Cowley, Lick Observatory, Univ. of California, Santa Cruz (United States)
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S. Ozaki, National Astronomical Observatory of Japan (Japan); Y. Kitagawa, K. Motohara, M. Konishi, H. Takahashi, Institute of Astronomy, The Univ. of Tokyo (Japan); T. Yoshikawa, Koyama Astronomical Observatory, Kyoto Sangyo Univ. (Japan); K. Tateuchi, N. Kato, Institute of Astronomy, The Univ. of Tokyo (Japan)
- 8450 40 **Electro-optical polarimeters for ground-based and space-based observations of the solar K-corona** [8450-146]
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Introduction

Ever since the invention of the telescope, new technologies have been used in astronomy to improve observations and to eventually enable better understand our position in the universe.

For almost forty years, SPIE has organized conferences on astronomical telescopes and instrumentation. These events grew to become huge symposia with specialized parallel conferences on all major instrumental areas, such as space- and ground-based telescopes, detectors, interferometers, and adaptive optics. The increasing complexity of astronomical instrumentation resulted in the need for yet another conference dedicated to the enabling technologies. This conference "Modern Technologies in Space- and Ground-based Telescopes and Instrumentation" was held for the first time in 2002 with 47 contributions, as part of the SPIE symposium of several conferences on astronomical telescopes and instrumentation. In 2012 the number of papers has increased to over 200. Six full days were necessary to schedule about half of the submitted contributions for oral presentations, seven days if you take into account the entire day with parallel sessions. The other half of the contributions was presented as posters. Several participants felt rather exhausted after this full conference week. The readers of these proceedings are in a more comfortable position: they can take their time to study the interesting and well written contributions from scientists, engineers and technologists from laboratories all over the world. However, they will of course miss out on the presentations, which often contain additional details and graphs and an increasing number of videos.

This volume documents the completion of the fabrication of the optical components for the James Webb Space Telescope. The test and metrology of these components is just as interesting. The next generation of extremely large ground-based telescopes requires technology development due to the large number of mirror segments. The tendency for the instrumentation for this new generation of telescopes is to become more active. Photonic techniques used in optical fibres and miniaturised mechanisms for positioners allow larger surveys with multi object spectrographs. Spectroscopy benefits from improvements in volume phase holographic gratings and immersed grating techniques. New mechanisms and optical mounts were presented for cryogenic space and ground-based instrumentation. And there is much more to explore in these proceedings.

We hope that the readers find these proceedings exciting, and that they stimulate ideas for their own research.

We look forward to seeing you at the next conference on "Modern Technologies."
in Montreal in the summer of 2014.

Ramón Navarro
Colin Cunningham
Eric Prieto