

# PROCEEDINGS OF SPIE

## ***Space Telescopes and Instrumentation 2016: Optical, Infrared, and Millimeter Wave***

**Howard A. MacEwen**  
**Giovanni G. Fazio**  
**Makenzie Lystrup**  
*Editors*

**26 June – 1 July 2016**  
**Edinburgh, United Kingdom**

*Sponsored by*  
SPIE

*Cooperating Organizations*

American Astronomical Society (United States) • Australian Astronomical Observatory (Australia) • Association of Universities for Research in Astronomy (AURA)  
Canadian Astronomical Society (CASCA) (Canada) • Canadian Space Agency (Canada)  
European Astronomical Society (Switzerland) • European Southern Observatory (Germany)  
National Radio Astronomy Observatory • Royal Astronomical Society (United Kingdom)  
Science & Technology Facilities Council (United Kingdom)

*Published by*  
SPIE

Part One of Three Parts

**Volume 9904**

Proceedings of SPIE 0277-786X, V. 9904

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Space Telescopes and Instrumentation 2016: Optical, Infrared, and Millimeter Wave, edited by  
Howard A. MacEwen, Giovanni G. Fazio, Makenzie Lystrup, Proc. of SPIE Vol. 9904,  
990401 · © 2016 SPIE · CCC code: 0277-786X/16/\$18 · doi: 10.1117/12.2249638

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at [SPIDigitalLibrary.org](http://SPIDigitalLibrary.org).

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Space Telescopes and Instrumentation 2016: Optical, Infrared, and Millimeter Wave*, edited by Howard A. MacEwen, Giovanni G. Fazio, Makenzie Lystrup, Proceedings of SPIE Vol. 9904 (SPIE, Bellingham, WA, 2016) Six-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510601871

ISBN: 9781510601888 (electronic)

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](http://SPIE.org)

Copyright © 2016, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at [copyright.com](http://copyright.com). Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/16/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

**SPIE. DIGITAL  
LIBRARY**

[SPIDigitalLibrary.org](http://SPIDigitalLibrary.org)

---

**Paper Numbering:** Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print. Papers are published as they are submitted and meet publication criteria. A unique citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID Number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages.

# Contents

xv	<i>Authors</i>
xxvii	<i>Conference Committee</i>
xxxi	<i>Introduction</i>

## Part One

<b>SESSION 1</b>	<b>JWST I</b>
<hr/>	
9904 03	<b>Status of the JWST optical telescope element [9904-2]</b>
9904 04	<b>JWST telescope integration and test progress [9904-3]</b>
<b>SESSION 2</b>	<b>JWST II</b>
<hr/>	
9904 06	<b>The JWST science instrument payload: mission context and status [9904-5]</b>
9904 07	<b>James Webb Space Telescope optical telescope element/integrated science instrument module (OTIS) status [9904-6]</b>
9904 08	<b>Cryo-vacuum testing of the JWST Integrated Science Instrument Module [9904-7]</b>
9904 09	<b>Wavefront-error performance characterization for the James Webb Space Telescope (JWST) Integrated Science Instrument Module (ISIM) science instruments [9904-164]</b>
<b>SESSION 3</b>	<b>JWST III</b>
<hr/>	
9904 0A	<b>Stray light field dependence for the James Webb Space Telescope [9904-9]</b>
9904 0B	<b>The JWST/NIRSpec instrument: update on status and performances [9904-14]</b>
9904 0C	<b>Hartmann test for the James Webb Space Telescope [9904-11]</b>
9904 0D	<b>Getting JWST's NIRSpec back in shape [9904-12]</b>
9904 0E	<b>Slitless spectroscopy with the James Webb Space Telescope Near-Infrared Camera (JWST NIRCam) [9904-13]</b>
9904 0F	<b>Preparing for JWST wavefront sensing and control operations [9904-10]</b>

---

**SESSION 4 NASA LARGE MISSION CONCEPTS**

---

- 9904 0G **Potential large missions enabled by NASA's space launch system** [9904-15]
- 9904 0H **End-to-end assessment of a large aperture segmented ultraviolet optical infrared (UVOIR) telescope architecture** [9904-16]
- 9904 0J **Initial technology assessment for the Large-Aperture UV-Optical-Infrared (LUVOIR) mission concept study** [9904-18]

---

**SESSION 5 NASA MISSION STUDIES: JOINT SESSION WITH CONFERENCES 9904 AND 9905**

---

- 9904 0K **The Far-Infrared Surveyor Mission study: paper I, the genesis (Invited Paper)** [9904-301]
- 9904 0M **The LUVOIR science and technology definition team (STD): overview and status (Invited Paper)** [9904-303]
- 9904 0N **The X-Ray Surveyor mission concept study: forging the path to NASA astrophysics 2020 decadal survey prioritization (Invited Paper)** [9904-304]

---

**SESSION 6 EUCLID**

---

- 9904 0O **The Euclid mission design** [9904-19]
- 9904 0P **Euclid end-to-end straylight performance assessment** [9904-21]
- 9904 0Q **VIS: the visible imager for *Euclid*** [9904-20]
- 9904 0R **Optical verification tests of the NISP/Euclid Grism qualification model** [9904-24]
- 9904 0T **Euclid Near Infrared Spectrometer and Photometer instrument concept and first test results obtained for different breadboards models at the end of phase C** [9904-22]
- 9904 0U **The read-out shutter unit of the Euclid VIS instrument** [9904-89]
- 9904 0V **Coating induced phase shift and impact on Euclid imaging performance** [9904-87]

---

**SESSION 7 DEEP SURVEYS**

---

- 9904 0W **The Primordial Inflation Explorer (PIXIE)** [9904-26]
- 9904 0X **LiteBIRD: lite satellite for the study of B-mode polarization and inflation from cosmic microwave background radiation detection** [9904-27]

---

**SESSION 8 SOLAR SYSTEM STUDIES**

---

- 9904 0Z **Main results of the PICARD mission** [9904-29]

- 9904 10 **Geometrical distortion calibration of the stereo camera for the BepiColombo mission to Mercury** [9904-30]
- 9904 11 **Development of compact metal-mirror image slicer unit for optical telescope of the SOLAR-C mission** [9904-31]

---

**SESSION 9 WFIRST I**

---

- 9904 13 **Canadian contributions studies for the WFIRST instruments** [9904-33]

---

**SESSION 10 WFIRST II**

---

- 9904 18 **Low order wavefront sensing and control for WFIRST coronagraph** [9904-38]
- 9904 19 **Closing the contrast gap between testbed and model prediction with WFIRST-CGI shaped pupil coronagraph** [9904-39]
- 9904 1A **PISCES: an integral field spectrograph technology demonstration for the WFIRST coronagraph** [9904-119]

---

**SESSION 11 TECHNOLOGIES**

---

- 9904 1B **The LATT way towards large active primaries for space telescopes** [9904-41]
- 9904 1C **Telescope polarization and image quality: Lyot coronagraph performance** [9904-42]
- 9904 1D **Innovative focal plane design for large space telescopes** [9904-43]
- 9904 1E **The CaSSIS imaging system: optical performance overview** [9904-44]

---

**SESSION 12 SYSTEMS I**

---

- 9904 1H **The Configurable Aperture Space Telescope (CAST)** [9904-47]
- 9904 1I **APERTURE: a precise extremely large reflective telescope using re-configurable elements** [9904-48]
- 9904 1J **ASTRO-1: a 1.8m unobscured space observatory for next generation UV/visible astrophysics and exoplanet exploration** [9904-49]

---

**SESSION 13 SYSTEMS II**

---

- 9904 1K **Optical telescope system-level design considerations for a space-based gravitational wave mission** [9904-50]

9904 1L **A development roadmap for critical technologies needed for TALC: a deployable 20m annular space telescope** [9904-51]

---

**SESSION 14 IN-SPACE SERVICING**

---

9904 1N **SEL2 servicing: increased science return via on-orbit propellant replenishment** [9904-53]

9904 1O **In-space assembly and servicing infrastructures for the Evolvable Space Telescope (EST)** [9904-54]

---

**SESSION 15 NANOSATS AND CUBESATS**

---

9904 1P **FalconSAT-7: a membrane space solar telescope** [9904-55]

9904 1Q **The Australian Space Eye: studying the history of galaxy formation with a CubeSat** [9904-56]

9904 1R **Image processing in the BRITE nano-satellite mission** [9904-57]

---

**SESSION 16 EXOPLANETS I**

---

9904 1S **The maturing of high contrast imaging and starlight suppression techniques for future NASA exoplanet characterization missions** [9904-58]

9904 1T **A comparison of analytical depth of search metrics with mission simulations for exoplanet imagers** [9904-59]

9904 1U **A direct comparison of exoEarth yields for starshades and coronagraphs** [9904-60]

9904 1W **ARIEL: an ESA M4 mission candidate** [9904-62]

9904 1X **The science of ARIEL (Atmospheric Remote-sensing Infrared Exoplanet Large-survey)** [9904-63]

---

**SESSION 17 EXOPLANETS II**

---

9904 1Y **Lyot coronagraph design study for large, segmented space telescope apertures** [9904-64]

**Part Two**

9904 20 **The Segmented Aperture Interferometric Nulling Testbed (SAINT) I: overview and air-side system description** [9904-66]

9904 21 **A new deformable mirror architecture for coronagraphic instrumentation** [9904-67]

---

**SESSION 18**    **EXOPLANETS III**

---

- 9904 22    **High contrast imaging in multi-star systems: technology development and first lab results**  
[9904-68]
- 9904 25    **Starshade starlight-suppression performance with a deployable structure** [9904-71]

---

**SESSION 19**    **EXOPLANETS IV**

---

- 9904 28    **PLATO: a multiple telescope spacecraft for exo-planets hunting** [9904-73]
- 9904 29    **ESA CHEOPS mission: development status** [9904-74]
- 9904 2A    **CHEOPS: status summary of the instrument development** [9904-75]
- 9904 2C    **The TESS camera: modeling and measurements with deep depletion devices** [9904-77]

---

**SESSION 20**    **ASTROMETRY**

---

- 9904 2D    **Gaia: focus, straylight and basic angle** [9904-78]
- 9904 2E    **Enabling science with Gaia observations of naked-eye stars** [9904-79]
- 9904 2F    **Microarcsecond astrometric observatory Theia: from dark matter to compact objects and nearby earths** [9904-80]

---

**SESSION 21**    **IR SYSTEMS**

---

- 9904 2H    **New cryogenic system of the next-generation infrared astronomy mission SPICA** [9904-82]
- 9904 2I    **SPICA Mid-infrared Instrument (SMI): technical concepts and scientific capabilities**  
[9904-83]
- 9904 2K    **The Far Infrared Spectroscopic Explorer (FIRSPEX): probing the lifecycle of the ISM in the universe** [9904-85]
- 9904 2L    **The Space High Angular Resolution Probe for the Infrared (SHARP-IR)** [9904-86]
- 9904 2M    **Final tolerancing approach and the value of short-cutting tolerances by measurement**  
[9904-23]
- 9904 2N    **The FLARE mission: deep and wide-field 1-5 $\mu$ m imaging and spectroscopy for the early universe: a proposal for M5 cosmic vision call** [9904-179]

---

**POSTER SESSION: EUCLID**

---

- 9904 2Q **Detailed design and first tests of the application software for the instrument control unit of Euclid-NISP** [9904-92]
- 9904 2R **Modeling effects of common molecular contaminants on the Euclid infrared detectors** [9904-93]
- 9904 2T **EGSE customization for the Euclid NISP Instrument AIV/AIT activities** [9904-97]
- 9904 2U **How to test NISP instrument for EUCLID mission in laboratory** [9904-95]
- 9904 2V **Focal plane mechanical design of the NISP/Euclid instrument** [9904-96]

---

**POSTER SESSION: EXOPLANETS**

---

- 9904 2X **Testing and characterization of the TESS CCDs** [9904-100]
- 9904 2Y **The instrument control unit of the ESA-PLATO 2.0 mission** [9904-101]
- 9904 2Z **Manufacturing and alignment tolerance analysis through Montecarlo approach for PLATO** [9904-102]
- 9904 30 **Radiation, thermal gradient and weight: a threefold dilemma for PLATO** [9904-103]
- 9904 31 **Thermal effects on PLATO point spread function** [9904-104]
- 9904 32 **A display model for the TOU of PLATO: just a cool toy or a benchmark of opportunities?** [9904-105]
- 9904 33 **An integrated payload design for the Atmospheric Remote-sensing Infrared Exoplanet Large-survey (ARIEL)** [9904-106]
- 9904 34 **Design of an afocal telescope for the ARIEL mission** [9904-107]
- 9904 36 **The Atmospheric Remote-sensing Infrared Exoplanets Large-survey (ARIEL) payload electronic subsystems** [9904-109]
- 9904 37 **Dimensional stability testing in thermal vacuum of the CHEOPS optical telescope assembly** [9904-111]
- 9904 38 **The performance of the CHEOPS on-ground calibration system** [9904-112]
- 9904 39 **Aligning the demonstration model of CHEOPS** [9904-113]
- 9904 3A **Coronagraphic wavefront sensing with COFFEE: high spatial-frequency diversity and other news** [9904-114]
- 9904 3C **High-contrast imager for Complex Aperture Telescopes (HiCAT). 4. Status and wavefront control development** [9904-118]



- 9904 3D **Recent achievements on ASPIICS, an externally occulted coronagraph for PROBA-3** [9904-121]
- 9904 3E **Contrast improvement with imperfect pre-coronagraph and dark-hole** [9904-122]
- 9904 3F **Low-signal, coronagraphic wavefront estimation with Kalman filtering in the high contrast imaging testbed** [9904-123]
- 9904 3G **Experimental study of starshade at flight Fresnel numbers in the laboratory** [9904-125]
- 9904 3H **Results of edge scatter testing for a starshade mission** [9904-126]
- 9904 3I **Ground-based testing and demonstrations of starshades** [9904-127]
- 9904 3J **Diffraction-based analysis of tunnel size for a scaled external occulter testbed** [9904-128]
- 9904 3K **Measurements of high-contrast starshade performance in the field** [9904-129]
- 9904 3L **Engineering considerations applied to starshade repointing** [9904-130]
- 9904 3O **The JWST/NIRSpec exoplanet exposure time calculator** [9904-135]
- 9904 3P **Exoplanets with JWST: degeneracy, systematics and how to avoid them** [9904-136]
- 9904 3R **Exploring the potential of the ExoSim simulator for transit spectroscopy noise estimation** [9904-138]

---

**POSTER SESSION: INFRARED**

- 9904 3U **SAFARI optical system architecture and design concept** [9904-141]
- 9904 3V **Sensitivity estimates for the SPICA Mid-Infrared Instrument (SMI)** [9904-142]
- 9904 3W **Mechanical cooler system for the next-generation infrared space telescope SPICA** [9904-143]

---

**POSTER SESSION: JWST**

- 9904 3Y **Use of living technical budgets to manage risk on the James Webb Space Telescope optical element** [9904-146]
- 9904 3Z **Alignment of the James Webb Space Telescope optical telescope element** [9904-147]
- 9904 40 **Characterization of the JWST Pathfinder mirror dynamics using the center of curvature optical assembly (CoCOA)** [9904-150]
- 9904 41 **MIRI/JWST detector characterization** [9904-151]

- 9904 42 **Calibration results using highly aberrated images for aligning the JWST instruments to the telescope** [9904-152]
- 9904 44 **In-orbit commissioning of the NIRSpec instrument on the James Webb Space Telescope** [9904-154]
- 9904 45 **The spectral calibration of JWST/NIRSpec: results from the recent cryo-vacuum campaign (ISIM-CV3)** [9904-156]
- 9904 46 **Flat-fielding strategy for the JWST/NIRSpec multi-object spectrograph** [9904-157]

### Part Three

- 9904 47 **First light of the NIRISS Optical Simulator (NOS)** [9904-158]
- 9904 48 **In-focus phase retrieval using JWST-NIRISS's non-redundant mask** [9904-159]
- 9904 49 **Alignment test results of the JWST Pathfinder Telescope mirrors in the cryogenic environment** [9904-161]
- 9904 4A **James Webb Space Telescope optical simulation testbed III: first experimental results with linear-control alignment** [9904-162]
- 9904 4B **A new method of superbias construction for NIRCam** [9904-163]
- 9904 4C **Model predictions and observed performance of JWST's cryogenic position metrology system** [9904-166]
- 9904 4D **Updated cryogenic performance test results for the flight model JWST fine guidance sensor** [9904-167]
- 9904 4E **Performance of the primary mirror center-of-curvature optical metrology system during cryogenic testing of the JWST Pathfinder telescope** [9904-251]

---

#### POSTER SESSION: SYSTEMS

- 9904 4F **On the performance of the Gaia auto-collimating flat mirror assembly: could it be even better?** [9904-168]
- 9904 4G **How mission requirements affect observations: case of the PICARD mission** [9904-169]
- 9904 4H **Optical designing of LiteBIRD** [9904-170]
- 9904 4J **The cosmic infrared background experiment-2 (CIBER-2) for studying the near-infrared extragalactic background light** [9904-172]
- 9904 4K **Prime focus architectures for large space telescopes: reduce surfaces to save cost** [9904-173]

- 9904 4L **Reaching sub-milimag photometric precision on Beta Pictoris with a nanosat: the PicSat mission** [9904-174]
- 9904 4N **The infrared spectrometer for Twinkle** [9904-176]
- 9904 4R **Status and path forward for the large ultraviolet/optical/infrared surveyor (LUVOIR) mission concept study** [9904-181]

---

**POSTER SESSION: INSTRUMENTS**

---

- 9904 4T **Correcting for the effects of pupil discontinuities with the ACAD method** [9904-184]
- 9904 4U **A four mirror anastigmat collimator design for optical payload calibration** [9904-185]
- 9904 4V **Xenon arc lamp spectral radiance modelling for satellite instrument calibration** [9904-186]
- 9904 4W **Application of Peterson's stray light model to complex optical instruments** [9904-187]
- 9904 4Z **The shadow position sensors (SPS) formation flying metrology subsystem for the ESA PROBA-3 mission: present status and future developments** [9904-191]
- 9904 50 **Preliminary evaluation of the diffraction behind the PROBA 3/ASPIICS optimized occulter** [9904-192]
- 9904 51 **Trade-off between TMA and RC configurations for JANUS camera** [9904-193]
- 9904 52 **Alignment procedure for detector integration and characterization of the CaSSIS instrument onboard the TGO mission** [9904-194]
- 9904 54 **Achromatic interfero-coronagraph with variable rotational shear in laboratory experiments** [9904-196]
- 9904 56 **The front-end electronics of the LSPE-SWIPE experiment** [9904-198]
- 9904 58 **PILOT optical alignment** [9904-200]
- 9904 59 **Near-infrared imaging spectrometer onboard NEXTSat-1** [9904-201]
- 9904 5A **Testing and characterization of a prototype telescope for the evolved Laser Interferometer Space Antenna (eLISA)** [9904-202]
- 9904 5B **SINBAD electronic models of the interface and control system for the NOMAD spectrometer on board of ESA ExoMars Trace Gas Orbiter mission** [9904-203]
- 9904 5C **Concept study for a compact planetary homodyne interferometer (PHI) for temporal global observation of methane on Mars in IR** [9904-204]
- 9904 5D **HST/WFC3: understanding and mitigating radiation damage effects in the CCD detectors** [9904-205]

- 9904 5E **Performance of a cryogenic test facility for 4 K interferometer delay line investigations** [9904-206]
- 9904 5G **The latest results from DICE (Detector Interferometric Calibration Experiment)** [9904-209]
- 9904 5H **A cryogenic testbed for the characterisation of large detector arrays for astronomical and Earth-observing applications in the near to very-long-wavelength infrared** [9904-210]

---

**POSTER SESSION: PROCESSING**

---

- 9904 5J **Low noise flux estimate and data quality control monitoring in EUCLID-NISP cosmological survey** [9904-91]
- 9904 5K **Small-grid dithers for the JWST coronagraphs** [9904-165]
- 9904 5M **Data processing and algorithm development for the WFIRST coronagraph: comparison of RDI and ADI strategies and impact of spatial sampling on post-processing** [9904-215]
- 9904 5N **Accuracy analysis of a new method to estimate chromatic wavefront error** [9904-216]
- 9904 5O **Characterization of the ASPIICS/OPSE metrology sub-system and PSF centroiding procedure** [9904-217]
- 9904 5Q **Performance analysis of the GR712RC dual-core LEON3FT SPARC V8 processor in an asymmetric multi-processing environment** [9904-219]
- 9904 5R **On-board data processing for the near infrared spectrograph and photometer instrument (NISP) of the EUCLID mission** [9904-220]
- 9904 5S **Design-oriented analytic model of phase and frequency modulated optical links** [9904-222]
- 9904 5U **Gain determination of non-linear IR detectors with the differential photon transfer curve (dPTC) method** [9904-224]
- 9904 5V **Hi-fidelity multi-scale local processing for visually optimized far-infrared Herschel images** [9904-225]
- 9904 5W **The boot software of the control unit of the near infrared spectrograph of the Euclid space mission: technical specification** [9904-226]
- 9904 5Z **Spitzer Infrared Array Camera (IRAC) Pipeline: final modifications and lessons learned** [9904-230]
- 9904 60 **Instrument workstation for the EGSE of the Near Infrared Spectro-Photometer instrument (NISP) of the EUCLID mission** [9904-231]
- 9904 62 **The control unit of the near infrared spectrograph of the Euclid space mission: detailed design** [9904-254]

---

**POSTER SESSION: WFSC**

---

- 9904 63 **Zernike wavefront sensor (ZWFS) development for Low Order Wavefront Sensing (LOWFS)**  
[9904-243]
- 9904 64 **Sparse aperture mask wavefront sensor testbed results** [9904-244]
- 9904 66 **Modeling of microelectromechanical systems deformable mirror diffraction grating**  
[9904-246]
- 9904 68 **Unimorph piezoelectric deformable mirrors for space telescopes** [9904-248]
- 9904 69 **HYPATIA and STOIC: an active optics system for a large space telescope** [9904-249]
- 9904 6A **Wavefront sensing in space from the PICTURE-B sounding rocket** [9904-252]

---

**POSTER SESSION: TECHNOLOGIES**

---

- 9904 6B **Use of updated material properties in parametric optimization of spaceborne mirrors**  
[9904-233]
- 9904 6C **Laboratory demonstration of a primary active mirror for space with the LATT: large aperture telescope technology** [9904-234]
- 9904 6D **Co-phasing primary mirror segments of an optical space telescope using a long stroke Zernike WFS** [9904-235]
- 9904 6E **The satellite formation flying in lab: PROBA-3/ASPIICS metrology subsystems test-bed**  
[9904-236]
- 9904 6F **CFRP mirror technology for cryogenic space interferometry: review and progress to date**  
[9904-237]
- 9904 6H **A novel design of dual-channel optical system of star-tracker based on non-blind area PAL system** [9904-239]
- 9904 6I **Distortion of the pixel grid in HST WFC3/UVIS and ACS/WFC CCD detectors and its astrometric correction** [9904-240]
- 9904 6J **Battery-powered thin film deposition process for coating telescope mirrors in space**  
[9904-253]



## Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Abreu, A., 2E  
Accatino, L., 4Z  
Acton, D. Scott, 0C, 0F, 42  
Ade, Peter A. R., 58, 5H  
Aigrain, Suzanne, 3P  
Akiba, Y., 0X  
Alato, S., 0K  
Albert, Loïc, 47  
Alberts, Stacey, 41  
Allen, Marsha, 0F  
Alves de Oliveira, Catarina, 0B, 3O, 44, 45, 46  
Amiaux, Jérôme, 0O, 0P, 0Q, 0T, 0V, 1L  
Andersen, Geoff, 1P  
Andersen, J. J., 2T  
Andersen, Michael Ingemann, 0T, 2U  
Anderson, Jay, 5D, 6I  
André, Y., 58  
Anglada Escudé, Guillem, 2F  
Anselmi, Alberto, 0O  
Aparicio del Moral, Beatriz, 5B  
Arai, Toshiaki, 4J  
Aranyos, Thomas, 1N  
Arcidiacono, Carmelo, 1B, 6C  
Arenberg, Jon, 0H  
Armus, L., 0K  
Arnold, K., 0X  
Aroldi, Gianluca, 10  
Aronstein, David L., 09  
Arrazola, David, 3U  
Artigau, Étienne, 13, 47  
Artigues, B., 36  
Asano, Kentaroh, 2I  
Asmolova, Olha, 1P  
Asquier, J., 29  
Atkinson, Charlie, 03  
Audley, Michael D., 3U  
Aguères, Jean-Louis, 33  
Aumont, J., 58  
Auricchio, Natalia, 0T, 2Q, 2T, 5R, 6O  
Austin, James, 1L  
Autissier, N., 0U  
Awan, S., 0Q  
Azzollini, Ruyman, 0O, 0Q  
Baccani, Cristian, 4Z, 5O, 5O, 6E  
Bacinski, J., 44  
Bacon, Charles, 1N  
Baggett, S. M., 5D  
Baggett, Wayne, 0F  
Bai, Jian, 6H  
Bajaj, V., 5D  
Balasubramanian, Kunjithapatham, 18  
Balestra, Andrea, 0T, 2Q, 2T, 5R, 6O  
Ballard, Marlin, 2O  
Bandy, Timothy, 28, 2Z, 3O, 3I  
Barbier, Rémi, 0T, 2R, 5J  
Barker, Elizabeth, 0F  
Barraclough, Simon, 1Q  
Barrière, Jean Christophe, 0T  
Barron, D., 0X  
Barstow, Joanna K., 1X, 3P  
Barto, Allison A., 3Y  
Bartos, Randall, 18  
Basso, Stefano, 28, 2Z, 3O, 3I  
Battersby, C., 0K  
Battle, John, 4J  
Baudoz, P., 3A  
Baustista, L., 58  
Beaton, Alexander, 4D  
Beaulieu, Jean-Philippe, 1X, 33  
Beaumont, Florent, 0T, 2U  
Beck, T., 2A, 39  
Behar, E., 5G  
Belenguer, Tomás, 3U  
Belikov, Ruslan, 22, 5N, 66  
Bello, Mara, 1L  
Bemporad, Alessandro, 4Z, 5O, 5O, 6E  
Bendek, Eduardo A., 1H, 22  
Bender, Ralf, 2M  
Benson, Craig, 1Q  
Benz, Willy, 28, 29, 2A, 2Z, 3O, 3I, 39  
Bergin, E., 0K  
Bergomi, Maria, 28, 2A, 2Z, 3O, 3I, 32, 39  
Berkenbosch, Sophie, 5B  
Bernard, J.-Ph., 58  
Berthé, Michel, 0O, 0Q, 0T  
Bevilacqua, A., 56  
Bianucci, Giovanni, 1L  
Biasi, Roberto, 1B, 6C  
Biasotti, M., 56  
Biermann, M., 2D  
Biondi, Federico, 28, 2Z, 3O, 3I, 32, 39  
Birkmann, Stephan M., 08, 0B, 0D, 3O, 44, 45, 46  
Bishop, Georgia, 33  
Bisson, Gary, 3Z  
Bock, James, 4J  
Bode, Andreas, 2M  
Bodendorf, Christof, 2M  
Bodin, Pierre, 28

Boehm, Céline, 2F  
 Boenke, Tobias, 0O, 0P, 0T, 0V  
 Boerner, Anko, 28  
 Böker, Torsten, 0B, 3O, 44, 45, 46  
 Boland, John, 4C  
 Bolcar, Matthew R., 0H, 0J, 20, 4R  
 Bolognese, Jeff, 20  
 Bombrun, A., 2D  
 Bon, William, 0T, 2V  
 Bonino, D., 2Q, 2T, 6O  
 Bonino, Luciana, 0P, 0V  
 Bonnefoi, Anne, 0T, 2V  
 Bonnefois, Aurélie, 4A  
 Bonnewijn, Sabrina, 5B  
 Bonoli, Carlotta, 0T, 2Q, 2T, 5R, 6O  
 Borncamp, David, 6I  
 Borrelli, Donato, 1O  
 Borrill, J., 0X  
 Borsa, Francesco, 28, 2Z, 3O, 3I  
 Borsato, Enrico, 0T, 5R  
 Bortoletto, Favio, 0T, 2Q, 2T, 5R, 6O  
 Bos, A., 4F  
 Bouchet, P., 4I  
 Boulade, O., 58  
 Boumier, P., 0Z  
 Bourque, M., 5D  
 Bousquet, F., 58  
 Bouzit, M., 58  
 Bowen, John, 1Q  
 Bowles, N., 1X  
 Boyadjian, J., 2D  
 Boyce, Russell, 1Q  
 Bozzo, E., 0Q, 0U  
 Bradford, C. M., 0K  
 Bramall, David G., 4U  
 Brandeker, Alexis, 28, 2Z, 3O, 3I  
 Brändli, Mathias, 28, 2Z, 3O, 3I  
 Brandt, Timothy, 1A  
 Bray, N., 58  
 Breckinridge, J. B., 1C, 4K  
 Brien, Thomas L. R., 5H  
 Bright, Stacey N., 4I  
 Briguglio, Runa, 1B, 6C  
 Broeg, Chris, 29, 2A  
 Brousseau, Denis, 13, 47  
 Bruno, Giordano, 28, 2Z, 3O, 3I  
 Buckley, Steve, 3D, 4Z, 6E  
 Buder, M., 2A  
 Budianu, E., 6E  
 Bulgarelli, A., 2T, 6O  
 Burgarella, D., 2N  
 Burke, Barry, 2C  
 Buttice, V., 58  
 Cabrera, Juan, 28  
 Cady, Eric J., 19, 1A, 1U, 3F  
 Caillat, Amandine, 0R, 0T, 58  
 Calabria, Peter, 5J  
 Calcines, Ariadna, 4U  
 Caldwell, M., 2K  
 Calvi, Adriano, 0O  
 Candini, Gian Paolo, 5B  
 Cao, J., 1I  
 Capobianco, Gerardo, 4Z, 5O, 5O, 6E  
 Capobianco, V., 2Q, 2T, 6O  
 Cara, C., 0Q, 5G  
 Carey, Sean J., 0K, 5Z  
 Carle, Michael, 0T, 2U  
 Carlotti, Alexis, 1Y  
 Carminati, Lionel, 0P, 0V  
 Carter, R., 0K  
 Casas, Ricard, 0T  
 Case, A., 1I  
 Casement, Suzanne, 25, 3H  
 Cash, Webster, 3I  
 Castera, Alain, 5J  
 Casti, M., 4Z, 5O, 6E  
 Catala, Claude, 28  
 Catalán, Jordi, 6Z  
 Caux, E., 2K  
 Cazaubiel, Vincent, 0O  
 Cernica, Ileana, 3D, 5O, 6E  
 Cessa, V., 2A, 39  
 Cessateur, G., 0Z  
 Chabanat, Eric, 5J  
 Chae, Jangsoo, 59  
 Chaigneau, M., 58  
 Chakrabarti, Supriya, 6A  
 Chambers, Victor J., 1A  
 Chaney, David, 4O, 4E  
 Charlieu, Florence, 5J  
 Charra, M., 58  
 Chassat, F., 2D  
 Chayer, Pierre, 4D  
 Chazelas, B., 38  
 Chendra, R., 0X  
 Chesbrough, Christian, 2C  
 Chesné, Simon, 1L  
 Chevalier, A., 0Z  
 Chiarusi, T., 0T, 2Q, 6O  
 Chinellato, Simonetta, 28, 2Z, 3O, 3I  
 Chinone, Y., 0X  
 Chipman, R. A., 1C  
 Chluba, Jens, 0W  
 Cho, H., 2R  
 Cho, S., 0X  
 Choquet, Élodie, 3C, 4A  
 Chrisp, Michael, 2C  
 Chu, Laurie, 0E  
 Chung, Y.-W., 1I  
 Cillis, A., 2R  
 Cimmino, Rosario F., 5S  
 Citterio, Oberto, 1L  
 Clairquin, Roland, 5B  
 Clampin, Mark, 1U, 2O, 5K  
 Clark, Kristin, 2C  
 Clark, Paul, 4V  
 Claudi, Riccardo, 34  
 Clemens, Jean-Claude, 0T, 2R, 2U, 5J  
 Cole, R., 0Q  
 Colless, Matthew, 1Q



Collette, Christophe, 1L  
 Colodro-Conde, Carlos, 0T, 2Q, 5W, 6Z  
 Colombo, Cyril, 0O  
 Colomé, J., 36  
 Comber, Brian J., 08  
 Comeau, Thomas, 0F  
 Conforti, V., 2T, 6O  
 Connolly, Mark, 4O, 4E  
 Conscience, C., 0Z  
 Cook, Timothy A., 6A  
 Cooray, Asantha, 0K, 2K, 4J  
 Coppock, Eric, 0F  
 Corbard, T., 0Z  
 Corberand, P., 2D  
 Corbineau, M.-C., 1I  
 Corcione, Leonardo, 0T, 2Q, 2T, 5R, 6O  
 Cordiner, M., 2L  
 Corral Van Damme, C., 29, 2A  
 Correia, Sébastien, 1L  
 Cosentino, Joseph, 4O, 4E  
 Cosentino, R., 2Y  
 Costille, Anne, 0R, 0T, 2M, 2U  
 Coudé du Foresto, V., 1X  
 Coulter, Daniel R., 1S  
 Coustenis, A., 1X  
 Coverstone, V. L., 1I  
 Crane, B., 58  
 Cremonese, Gabriele, 1O, 1E, 51, 52  
 Cretot-Richert, G., 13  
 Crook, M., 36  
 Crooke, Julie A., 4R  
 Cropper, Mark, 0O, 0Q  
 Cruzet, P.-E., 1W  
 Crouzier, Antoine, 2F, 4L, 5G  
 Crowley, C. M., 2E  
 Crussaire, J.-P., 58  
 Cukierman, A., 0X  
 Da Deppo, Vania, 1O, 1E, 33, 34, 52  
 Daigle, O., 13  
 Dal Corso, F., 0T, 2Q, 2T  
 D'Alessandro, Maurizio, 0T, 5R  
 d'Amato, Francesco, 1B, 6C  
 Damé, L., 0Z, 4G  
 Dami, Michele, 1O  
 David, L., 4L  
 Davidson, M., 2D  
 Dawson, O., 2R  
 Dean, Bruce H., 0F, 42  
 Debei, S., 2Q, 2T, 51, 6O  
 de Bernardis, P., 58  
 Decin, L., 1X  
 de Haan, T., 0X  
 Delanoye, Sofie, 5B  
 Delboulbe, A., 5G  
 Deline, A., 38  
 Della Corte, V., 51  
 Delo, G., 2R  
 de Marchi, G., 46  
 Demers, Richard, 1A  
 Denis, François, 3D  
 Denniston, J., 0Q  
 De Roche, Thierry, 28, 2Z, 3O, 31  
 De Rosa, Adriano, 0T, 2T, 6O  
 De Sio, Antonio, 52  
 Desselle, Richard, 3D  
 Devaney, Nicholas, 69  
 de Vos, Lieve, 3D  
 DeWeese, Keith, 1N  
 Dewitte, S., 0Z  
 Dhabal, A., 2L  
 DiAntonio, Andrew, 4C  
 Díaz-García, José Javier, 0T, 62  
 Dichmann, Donald, 3L  
 Dicken, D., 41  
 Di Ferdinando, D., 2T  
 Di Giorgio, Anna M., 0Q, 2Y, 36, 5Q, 5V  
 Di Lellis, Andrea M., 5Q  
 Dima, Marco, 28, 2Z, 3O, 31, 32, 39  
 Dimitrijevic, Igor, 1Q  
 DiPirro, M., 0K, 2L  
 Djafer, D., 0Z, 4G  
 Dobbs, M., 0X  
 Dogoda, Peter, 2O  
 Dohlen, K., 2N  
 Domagal-Goldman, Shawn D., 1U, 3L, 4R  
 Dominjon, A., 0X  
 Donati, M., 5G  
 Dormoy, Doriane, 0T  
 Dorner, Bernhard, 0B, 45  
 Dotani, T., 0X  
 Douchin, F., 58  
 Douglas, Ewan S., 6A  
 Doumayrou, Eric, 58, 5G  
 Doyle, D., 2D  
 Doyon, René, 47  
 Drossart, P., 1X  
 Drummond, Rachel, 5B  
 Dubois, J.-P., 58  
 Ducharme, M.-È., 13  
 Ducret, Franck, 0T  
 Dufoing, C., 4L  
 Duò, Fabrizio, 1B, 6C  
 Dupont, J., 5G  
 Dupuis, J., 13  
 Durand, Gilles A., 1L  
 Dusini, Stefano, 0T, 2Q, 2T, 5R, 6O  
 Dworzanski, Daniel, 2O  
 Ealet, Anne, 0O, 0T, 2R, 2U, 5J  
 Eccleston, Paul, 1X, 33, 36  
 Eder, Robert, 0D  
 Egami, Eiichi, 0E  
 Egerman, Robert, 1J  
 Eggens, Martin, 3U  
 Egron, Sylvain, 3C, 4A  
 Ehrenreich, D., 2A  
 Ehrenwinkler, Ralf, 0D  
 Eldorado Riggs, A. J., 21, 3C, 3F, 64  
 Elleflot, T., 0X  
 Ellis, Scott, 3H  
 Ellison, B., 2K

El-Maarry, M. R., 1E  
 Encrenaz, T., 1X  
 Engel, C., 58  
 Ennico, Kimberly, 0K, 1H  
 Enokida, Y., 11  
 Enokuchi, Akito, 4J  
 Erikson, Anders, 28, 2Z, 30, 31  
 Errard, J., 0X  
 Escolar, D., 2D  
 Escolle, Clément, 4A  
 Escudero Sanz, I., 1W  
 Etcheto, P., 58  
 Evers, Jaap, 3U  
 Fabron, Christophe, 0T, 2U  
 Faiz, H., 4L  
 Farina, Maria, 36, 5Q  
 Farinato, Jacopo, 28, 2Z, 30, 31, 32, 39  
 Farinelli, Ruben, 0T, 2T, 5R  
 Farisato, G., 32, 39  
 Fatig, Curtis C., 08  
 Feautrier, P., 5G  
 Febvre, Aurélien, 0T  
 Feinberg, Lee D., 03, 04, 07, 0C, 0H, 0J  
 Feizi, A., 2R  
 Fernández-Conde, Jesús, 5W  
 Fernández-Rodríguez, M., 3U  
 Ferrari, Marc, 1D, 4A  
 Ferraro, N., 2R  
 Ferriol, Sylvain, 0T, 5J  
 Ferruit, Pierre, 0B, 3O, 44, 45, 46  
 Ficai Veltroni, Iacopo, 10, 1E  
 Fienup, James R., 09  
 Fineschi, Silvano, 3D, 4Z, 50, 5O, 6E  
 Fioretti, V., 2T, 60  
 Fixsen, Dale J., 0W, 2L  
 Fleury-Frenette, Karl, 3D  
 Flores, A., 0K  
 Focardi, Mauro, 2Y, 33, 34, 36, 4Z, 50, 5O, 6E  
 Foenard, G., 58  
 Foltz, R., 2R  
 Fontanelli, F., 56  
 Forget, F., 1X  
 Fornari, F., 0T, 2Q, 2T, 60  
 Fortier, A., 2A  
 Foulon, Benjamin, 0R, 0T, 2V  
 Fox, Ori, 41  
 France, Kevin C., 0J, 0M  
 Franceschi, Enrico, 0T, 2Q, 2T, 5R, 60  
 Fray, S., 4W  
 Friso, E., 51  
 Friswell, M., 1X  
 Frolov, Pavel, 54  
 Fujii, Takenori, 4H  
 Fujino, T., 0X  
 Fujishiro, Naofumi, 3V  
 Fuke, H., 0X  
 Funaki, T., 0X  
 Furesz, Gabor, 2C  
 Fusco, Thierry, 3C, 4A  
 Galano, Damien, 3D  
 Galicher, R., 3A  
 Gallagher, Ben B., 42  
 Gallagher, David B., 1S  
 Gallego, J. D., 2K  
 Galli, Emanuele, 5Q  
 Gallieni, Daniele, 1B, 6C  
 Galvin, Michael, 3G  
 Galy, Camille, 3D  
 Gambicorti, Lisa, 1E, 52  
 Gamper, Noah, 48  
 García Muñoz, Antonio, 3O  
 García, José, 0T, 2V  
 García-Marín, Macarena, 41  
 Garrett, Daniel, 1T  
 Gaskin, Jessica, 0N  
 Gaspar Venancio, Luis M., 0O, 0P, 0V  
 Geis, Norbert, 2M  
 Gélot, P., 58  
 Genolet, L., 0Q, 0U  
 Gerber, Michael, 1E, 52  
 Gerin, M., 0K, 2K  
 Gesa, L., 36  
 Ghigo, Mauro, 28, 2Z, 30, 31  
 Giacomini, F., 0T, 2Q, 2T, 60  
 Gianotti, F., 2T, 60  
 Giardino, Giovanna, 0B, 3O, 45, 46  
 Gielesen, W. L. M., 2D  
 Gigliotti, Trevis, 4C  
 Gillard, William, 0T, 2U, 5J  
 Gillis, Jean-Marie, 3D  
 Gimenez, Jean-Luc, 0T  
 Giusi, Giovanni, 2Y, 5Q  
 Glaccum, William, 5Z  
 Glasse, Alistair C. H., 08, 41  
 Glassman, Tiffany M., 25, 3K, 3Z  
 Glazer, Stuart D., 08  
 Goeckner-Wald, N., 0X  
 Goepel, M., 4W  
 Goicoechea, J. R., 2K  
 Goldsmith, P., 2K  
 Golimovski, David, 6I  
 Gom, Brad G., 5E, 6F  
 Gómez López, Juan M., 5B  
 Gomez, Jaime, 0T  
 Gómez-Sáenz-de-Tejada, Jaime, 5W, 62  
 Goncharov, Alexander, 69  
 Gondoin, Philippe, 28  
 Gong, Qian, 1A  
 Gonzales, Alexandria, 2C  
 González Fernández, Luis M., 3U  
 Goodsall, T., 2R  
 Gosmeyer, C., 5D  
 Goto, K., 2H  
 Goullioud, Renaud, 2F, 5G  
 Gow, J., 0Q  
 Goy, Matthias, 69  
 Graas, Estelle, 3D  
 Grabarnik, S., 58  
 Graczyk, Rafal, 3D  
 Grammer, Bryan, 1A

Grandmont, F. J., 13  
 Grassi, Emmanuel, 0T  
 Greeley, Bradford, 1A  
 Greenbaum, Alexandra Z., 48  
 Greene, Thomas P., 0E  
 Greenhouse, Matthew A., 06  
 Greggio, Davide, 28, 2Z, 30, 31, 32, 39, 51  
 Griffin, Douglas, 1Q  
 Griffin, M., 1X, 58  
 Groff, Tyler D., 21, 3F  
 Grogin, Norman, 6I  
 Grupp, Frank, 0T, 2M, 2U  
 Güdel, Manuel, 1X, 33  
 Guilpain, T., 2D  
 Guizzo, Gian Paolo, 0T, 2Q, 2T, 60  
 Gullieuszik, Marco, 28, 2Z, 30, 31, 39  
 Gunuganti, Sudhakar, 5E  
 Guyon, Olivier, 0H  
 Hadaway, James B., 40, 49, 4E  
 Hadjimichael, Theo, 3Z  
 Hahn, Walter, 3Z  
 Hailey, M., 0Q  
 Haiml, Markus, 5H  
 Haley, Craig, 4D  
 Hall, D., 0Q  
 Hallibert, Pascal, 69  
 Halverson, N., 0X  
 Hargrave, Peter C., 58, 5H  
 Harness, Anthony, 3I, 3K  
 Hartig, George, 0F  
 Hartogh, Paul, 1X, 33  
 Harvey, P., 0X  
 Hasebe, T., 0X  
 Hasegawa, M., 0X  
 Hattori, K., 0X  
 Hattori, M., 0X  
 Hauchecorne, A., 0Z, 4G  
 Hayden, William L., 0F  
 Hazumi, M., 0X  
 Hein, Randall, 18  
 Helmbrecht, Michael A., 20  
 Helmich, F., 0K  
 Hénault, F., 5G  
 Heras, Ana Maria, 28  
 Hernandez, J., 2D  
 Hernandez, Olivier, 47  
 Herscovici-Schiller, O., 3A  
 Heske, A., 1W, 1X  
 Hickey, M., 2R  
 Hicks, Brian A., 20  
 Hidehira, N., 0X  
 Hilbert, Bryan, 4B, 5U  
 Hill, C., 0X  
 Hilton, G., 0X  
 Hilton, George, 1A  
 Hines, Dean C., 4I, 5K  
 Hoar, John, 0O  
 Hochedez, J.-F., 0Z  
 Hodapp, Klaus W., 0E  
 Hoekstra, H., 0Q  
 Hoffmann, H., 51  
 Höhnemann, Holger, 5H  
 Holl, Berry, 2F  
 Holland, A., 0Q  
 Holmes, Warren, 0T, 2R  
 Holzapfel, W., 0X  
 Hopkins, Randall C., 0G  
 Hori, Y., 0X  
 Hormuth, Felix, 0T  
 Hornstrup, Allan, 0T  
 Horodyska, Petra, 3D  
 Horton, Anthony, 1Q  
 Hosseini, Sona, 5C  
 Howard, Joseph, 0C  
 Hristov, Viktor, 4J  
 Hubmayr, J., 0X  
 Hughes, A., 58  
 Hugot, Emmanuel, 1D, 4A  
 Hull, Tony, 6B  
 Hunt, Thomas, 0Q, 33  
 Hwang, T., 2R  
 Ichiki, K., 0X  
 Ikhlef, R., 0Z  
 Imada, Hiroaki, 0X, 4H  
 Inatani, J., 0X  
 Ingalls, James G., 5Z  
 Inoue, Masanori, 0X, 4H  
 Inoue, Y., 0X  
 Irbah, A., 0Z, 4G  
 Irie, F., 0X  
 Irwin, K., 0X  
 Irwin, Patrick G. J., 3P  
 Isaacs, John C., 5K  
 Isaak, Kate, 29, 2A, 3O  
 Ishihara, Daisuke, 2I, 3V  
 Ishino, Hirokazu, 0X, 4H  
 Ishitsuka, H., 0X  
 Isobe, Naoki, 2H, 2I  
 Israel, H., 0Q  
 Israelsson, Ulf, 0T, 2R  
 Ito, Makoto, 4H  
 Jackman, Angela, 0G  
 Jackson, Kate, 6D  
 Jahn, Wilfried, 1D  
 Jahnke, Knud, 0O, 0T  
 Jakobsen, Peter, 0T, 2U  
 Jaumann, R., 5I  
 Jellema, Willem, 3U  
 Jensen, Peter, 0B, 0D  
 Jeong, O., 0X  
 Jeong, Woong-Seob, 59  
 Jerónimo Zafra, José M., 5B  
 Jessen, Niels-Christian, 0T, 2U  
 Jhabvala, M., 2R  
 Johannig, Gary, 4C  
 Johnson, M., 1E  
 Johnson, Thomas E., 0D  
 Johnston, John D., 40  
 Joliet, E., 2E  
 Jones, Martyn L., 5E, 6F

Jordan, Margaret, 0F  
 Juanola-Parramon, R., 2L  
 Jurling, Alden S., 0F, 42  
 Kahle, D., 2R  
 Kan, Em., 2R  
 Kan, Er., 2R  
 Kanai, H., 0X  
 Kanai, Yoshikazu, 4J  
 Kaneda, Hidehiro, 2I, 3V  
 Karatsu, K., 0X  
 Karl, Hermann, 0B, 44  
 Kasdin, N. Jeremy, 1Y, 3C, 3F, 3G, 3J, 64  
 Kashima, Shingo, 0X, 4H  
 Katayama, N., 0X  
 Katterloher, Reinhard, 2M  
 Kawada, Mitsunobu, 2H, 2I, 3W  
 Kawano, I., 0X  
 Kawasaki, T., 0X  
 Keating, B., 0X  
 Kelly, Douglas M., 08, 0E  
 Kendrew, Sarah, 3P  
 Kern, Brian D., 19, 3F  
 Kern, P., 5G  
 Kernasovskiy, S., 0X  
 Keski-Kuha, Ritva, 03, 04, 07  
 Keskitalo, R., 0X  
 Ketchazo, C., 5G  
 Khandrika, H., 5D  
 Kholikov, S., 0Z  
 Kibayashi, A., 0X  
 Kida, Y., 0X  
 Kienlen, Michael, 1N  
 Kim, Il-Joong, 59  
 Kim, Min Gyu, 4J, 59  
 Kim, Minjin, 59  
 Kim, Yunjong, 3G  
 Kimble, Randy A., 08  
 Kimura, Kimihiro, 0X, 4H  
 Kimura, N., 0X  
 Kirchhoff, Rule, 6B  
 Kirschner, V., 2D  
 Kiselev, Alexander, 54  
 Kisner, T., 0X  
 Kissel, S., 2X  
 Kitching, T., 0Q  
 Klebor, Maximilian, 28, 2Z, 30, 31  
 Klioner, S. A., 2D  
 Klop, W. A., 37  
 Knight, J. Scott, 0C, 0F, 3Y, 40, 42, 49  
 Ko, Jongwan, 59  
 Ko, Kyeongyeon, 59  
 Koca, Corina, 20  
 Koeck, C., 2D  
 Kogut, Alan, 0W  
 Kohley, Ralf, 0O  
 Kohri, K., 0X  
 Koller, S., 0Z  
 Komatsu, E., 0X  
 Komatsu, K., 0X  
 Korngut, Phillip, 4J  
 Kotani, Takayuki, 3E  
 Koyama, M., 11  
 Kozhurina-Platais, Vera, 6I  
 Kramer, C., 2K  
 Kranitis, Nektarios, 3D  
 Krick, Jessica E., 5Z  
 Krist, John E., 19, 5M  
 Kroneberger, M., 4W  
 Krone-Martins, Alberto, 2F  
 Kubik, Bogna, 0T, 5J  
 Kulp, Trey, 0F  
 Kumagai, Shiomi, 3E  
 Kuo, C.-L., 0X  
 Kurokawa, Takashi, 3E  
 Kuromiya, S., 0X  
 Kurowski, Michal, 3D  
 Kusaka, A., 0X  
 Labadie, Lucas, 2F  
 Lacour, S., 4L  
 Ladno, Michal, 3D  
 Lafrasse, S., 5G  
 Lafrenière, D., 13  
 Lagage, P. O., 1X, 5G  
 Laine, B., 2D  
 Lajoie, Charles-Philippe, 0F, 4A, 5K  
 Lallo, Matthew D., 0F  
 Lam, Raymond, 18  
 LaMarr, B., 2X  
 Lambert, Andrew, 1Q  
 Lamensans, Mikel, 0T  
 Lander, Juli A., 04, 07  
 Landini, Federico, 4Z, 50, 5O, 6E  
 Lange, Nicolas, 69  
 Lanz, Alicia, 4J  
 Lapeyrère, V., 4L  
 Larcheveque, C., 0U  
 Laudisio, Fulvio, 0T, 2Q, 2T, 5R  
 Laureijs, René J., 0O, 0P, 0Q, 0T, 0V, 58  
 Laurent, Philippe, 0T  
 Laurin, D., 13  
 Lavigne, J.-F., 13  
 Lawrence, Jon, 1Q  
 Lazzarini, Paolo, 1B, 6C  
 Leboulleux, Lucie, 3C, 4A  
 Leconte, J., 1X  
 Le Duigou, J.-M., 3A, 5G  
 Lee, A., 0X  
 Lee, Dae-Hee, 4J, 59  
 Lee, Dukhang, 59  
 Leese, Mark, 5B  
 Léger, Alain, 2F, 5G  
 Leisawitz, D. T., 0K, 2L  
 Leisenring, Jarron M., 0E, 5U  
 Le Mignant, David, 0T  
 Lemke, R., 44  
 Lemmer, Aaron, 21  
 Lemoult, T., 4L  
 Lepennec, Y., 58  
 Leriche, B., 58  
 Lesna, Valentina, 0O

Lessio, L., 32, 39  
 Levacher, Patrick, 28, 2N  
 Levesque, L. E., 13  
 Levi, Joshua, 3Z  
 Li Causi, G., 5V  
 Li, D., 0X  
 Liebecq, Sylvie, 3D  
 Liepmann, Till, 3Z  
 Lightsey, Paul A., 0A, 3Y  
 Ligorì, Sebastiano, 0T, 2Q, 2T, 5R, 6O  
 Lilje, Per B., 0T  
 Lillie, Charles F., 1O, 4K  
 Lindegren, L., 2D  
 Linder, E., 0X  
 Lis, D. C., 2K  
 Lisi, Franco, 1B, 6C  
 Lisman, Doug, 1U  
 Liu, Alice, 0H  
 Liu, Scige J., 5Q, 5V  
 Livas, Jeffrey C., 1K, 5A  
 Lizán, David, 0T  
 Llop-Sayson, Jorge, 1A  
 Lloro, Ivan, 0T  
 Lo, Amy, 25  
 Lomanowski, Bartosz A., 4U  
 Long, Joseph, 0F  
 Longval, Y., 58  
 López-Moreno, José Juan, 5B  
 Loreggia, Davide, 3D, 4Z, 5O, 6E  
 Lorenz, C., 1I  
 Lorenzo Alvarez, José, 0O, 0P, 0Q, 0V  
 Lotkin, G., 2R  
 Lowrance, Patrick J., 5Z  
 Lützgendorf, Nora, 0B, 3O, 44, 45, 46  
 Lunt, Sharon R., 49, 4C  
 Luo, G., 1I  
 Luo, Yujie, 6H  
 Lynch, Dana H., 1H  
 Lyon, Richard G., 2O  
 MacDonald, Robert, 2C  
 MacEwen, Howard A., 1O  
 Macías-Perez, Juan Francisco, 0T  
 Maciaszek, Thierry, 0O, 0T, 2R, 2U, 5J  
 Macintosh, Bruce A., 1T, 5M  
 Mackenty, John, 6I  
 Maes, Jeroen, 5B  
 Maestre, S., 58  
 Maffei, B., 58  
 Magrin, Demetrio, 28, 2A, 2Z, 30, 31, 32, 39, 51  
 Maiorano, Elena, 0O, 2T, 6O  
 Maire, J., 13  
 Maki, M., 0X  
 Malaguti, Giuseppe, 33  
 Malaguti, P., 1X  
 Malbet, Fabien, 2F, 5G  
 Maldonado, Carlos, 1P  
 Malvasio, L., 2A  
 Mandell, Avi M., 1A, 1U, 3L, 4R  
 Mandic, Milan, 18  
 Mann, Steven D., 08  
 Marafatto, Luca, 28, 2Z, 30, 31, 32, 39  
 Maresi, Luca, 6C  
 Margiotta, A., 0T, 2Q, 6O  
 Marinai, M., 39  
 Marois, C., 13  
 Marston, Anthony, 0B, 44  
 Martel, André R., 08  
 Martellato, Elena, 1O  
 Martignac, J., 0Q, 58  
 Martin, G., 5G  
 Martin, Laurent, 0T  
 Martín-Fleitas, J., 2E  
 Martlin, C., 5D  
 Marty, C., 58  
 Marty, W., 58  
 Masi, S., 58  
 Mason, Peter, 4J  
 Massey, R., 0Q  
 Massone, G., 4Z, 5O, 6E  
 Mather, J. C., 2L  
 Mathers, Naomi, 1Q  
 Matsuhara, Hideo, 0X, 2H, 2I, 3W  
 Matsumoto, Toshio, 4J, 59  
 Matsumura, Tomotake, 0X, 4H  
 Matsuo, Taro, 2I  
 Matsuoka, S., 0X  
 Matsuura, Shuji, 0X, 4J  
 Matthews, Gary W., 04, 07, 1J  
 Mauri, N., 0T, 2Q, 2T, 6O  
 Mawet, Dimitri, 4T  
 Mazoyer, Johan, 3C, 4T  
 McClure, S., 2R  
 McElwain, Michael W., 0F, 1A, 1U  
 McHarg, Matthew G., 1P  
 McKenney, C., 2R  
 Mechmech, Idriss, 3D, 4Z, 6E  
 Medinaceli, Eduardo, 0T, 2Q, 2T, 5R, 6O  
 Meftah, M., 0Z, 4G  
 Meixner, M., 0K  
 Melich, Radek, 3D  
 Mellier, Yannick, 0O, 0Q, 0T  
 Melnick, G. J., 0K  
 Mendillo, Christopher B., 6A  
 Mennesson, Bertrand E., 5M  
 Menten, K., 0K  
 Mentzell, J. E., 2L  
 Merkle, Frank, 0D  
 Meyer, Stephan, 0W  
 Meza, Luis, 0F  
 Micela, Giuseppina, 1X, 33, 34, 36  
 Michaelis, H., 51  
 Michau, Vincent, 4A  
 Middleton, Kevin, 33, 34  
 Midwinter, Calvin, 4D  
 Miko, L., 2R  
 Milam, S., 0K, 2L  
 Mima, S., 0X  
 Min, Michiel, 1X, 33  
 Minami, Y., 0X  
 Mirc, F., 58

Misawa, R., 58  
 Misselt, Karl, 4B, 5U  
 Mitsuda, K., 0X  
 Mizutani, Tadahito, 2H, 3W  
 Mogulsky, Valery, 28, 2Z, 30, 31  
 Molinari, Sergio, 1L, 2K, 5V  
 Mollet, Dominique, 3D  
 Moneti, A., 1X  
 Monsurrò, Pietro, 5S  
 Montel, J., 58  
 Montier, L., 58  
 Moon, Bongkon, 59  
 Moore, Douglas, 18  
 Moore, Dustin B., 09  
 Moore, James, 18  
 Mora, A., 2D, 2E  
 Morales Muñoz, Rafael, 5B  
 Morales, J. C., 1X  
 Morand, F., 0Z  
 Morford, Tracy, 4J  
 Morgan, Edward, 2C, 2X  
 Morgante, Gianluca, 0T, 2Q, 2T, 33, 34, 36, 5R, 60  
 Morrison, Jane E., 41  
 Morse, Jon A., 1J  
 Mosdorf, Michał, 3D  
 Moseley, S. H., 2L  
 Mosner, Peter, 0B, 0D, 44  
 Mot, B., 58  
 Mott, Brent, 0D  
 Mroczkowski, Mateusz, 3D  
 Mugnier, L. M., 3A  
 Mugnolo, R., 51  
 Munari, Matteo, 28, 2Z, 30, 31, 32, 39, 51  
 Mundy, L. G., 2L  
 Murakami, Naoshi, 3E  
 Murchison, B., 1I  
 Murray, N., 0Q  
 Musi, Paolo, 0O  
 Muzerolle, J., 44  
 Nagai, M., 0X  
 Nagasaki, T., 0X  
 Nagata, R., 0X  
 Najarro, Francisco, 3U  
 Nakagawa, Takao, 2H, 2I, 3W  
 Nakajima, M., 0X  
 Nakamura, S., 0X  
 Nakayasu, T., 1I  
 Naletto, Giampiero, 10  
 Namikawa, T., 0X  
 Narasaki, Katsuhiko, 3W  
 Narayanan, D., 0K  
 Narbonne, J., 58  
 Naruse, M., 0X  
 Nascimbeni, Valerio, 28, 31  
 Naylor, David A., 5E, 6F  
 N'Diaye, Mamadou, 1Y, 3C, 4A, 4T  
 Neefs, Eddy, 5B  
 Nelan, Edmund P., 0F, 5K  
 Nemat, Bijan, 19, 5G, 5M  
 Ngan, I., 2A  
 Nguyen, L., 2R  
 Nguyen, Tam, 2C  
 Nicastro, L., 2T, 60  
 Niclas, Mathieu, 0T, 2V  
 Nicolini, G., 4Z, 5O, 6E  
 Nicot, J-M., 58  
 Nielsen, Louise Dyregaard, 3O  
 Niemi, S., 0Q  
 Nishibori, Toshiyuki, 0X, 4H  
 Nishijo, K., 0X  
 Nishikawa, Jun, 3E  
 Nishino, H., 0X  
 Nisulescu, M., 5O  
 Noce, Vladimiro, 2Y, 36, 4Z, 50, 5O, 6E  
 Noda, A., 0X  
 Naguchi, T., 0X  
 Noriega-Crespo, Alberto, 4I  
 Norman, Colin, 4T  
 Novi, A., 39  
 Novicki, Megan C., 3K  
 Novo-Gradac, Kevin J., 08  
 Nowak, M., 4L  
 Ogawa, H., 0X  
 Ogawa, Hiroyuki, 2H, 3W  
 Ogburn, W., 0X  
 Oguri, S., 0X  
 Ohl, Ray G., 08  
 Ohnishi, Yosuke, 4J  
 Ohta, I., 0X  
 Okabayashi, Akinobu, 3W  
 Okada, N., 0X  
 Okamoto, A., 0X  
 Okamura, T., 0X  
 Okura, Y., 1I  
 Olczak, Gene, 40, 4E  
 Olivieri, A., 51  
 Ollivier, Marc, 1X, 33  
 O'Neill, Kevin, 3D, 4Z, 6E  
 Ossenkopf-Okada, V., 2K  
 Otani, C., 0X  
 Ottensamer, R., 2A, 2Y, 36  
 Oya, Masahito, 3E  
 Oyabu, Shinki, 2I, 3V  
 Özel, Feryal, 0N  
 Pace, Emanuele, 1X, 2Y, 33, 34, 36  
 Pachot, Charlotte, 0P  
 Padgett, D. L., 2L  
 Padilla, Cristóbal, 0T  
 Pagano, Isabella, 28, 2A, 2Y, 2Z, 30, 31, 32, 39  
 Pajot, F., 58  
 Paltani, S., 0U  
 Palumbo, P., 51  
 Pamplona, Tony, 0T  
 Pancrazzi, Maurizio, 2Y, 36, 4Z, 50, 5O, 6E  
 Paolinetti, R., 51  
 Papageorgiou, Andreas, 3R  
 Pareschi, Giovanni, 1L  
 Park, Sung-Joon, 59  
 Park, Won-Kee, 4J, 59  
 Park, Youngsik, 59

Parot, G., 58  
 Pascal, Sandrine, 0R, 2N  
 Pascale, Enzo, 1X, 33, 3R, 5H  
 Paschalis, Antonis, 3D  
 Pasian, Fabio, 0O  
 Pasqualini, L., 0T, 2Q  
 Pastor Morales, M. Carmen, 5B  
 Pastor, Carmen, 3U  
 Patauner, Christian, 1B, 6C  
 Patel, Manish R., 5B  
 Patočka, Karel, 3D  
 Patrízii, Laura, 0T, 2Q, 2T, 5R, 6O  
 Patterson, Keith D., 18, 3K  
 Pearson, C., 2K  
 Pekosh, J., 1I  
 Pellegrino, Joseph, 1N  
 Pellegrino, Sergio, 6D  
 Pelo, E., 1E  
 Penanen, Konstantin I., 08  
 Penforis, Yann, 1L  
 Penka, Daniela, 2M  
 Pereboom, H. P., 4F  
 Peresty, Radek, 3D  
 Perez, Mario R., 4R  
 Pérez-Lizán, David, 5W, 6Z  
 Pérot, E., 58  
 Perrin, Marshall D., 0F, 1A, 1Y, 3C, 4A, 5K, 5M  
 Peter, Gisbert, 28, 2A, 2Y  
 Petkovic, Michael, 1Q  
 Petrone, Peter, III, 20  
 Pezzuto, S., 2Y, 36  
 Philippon, A., 0Q  
 Piazza, Daniele, 1E, 28, 2A, 2Z, 30, 31, 32, 39  
 Piersanti, Osvaldo, 0O  
 Pilbratt, G. L., 1W, 1X  
 Pimentao, J., 58  
 Pinel, Jacques, 0O  
 Piotto, Giampaolo, 28  
 Pisano, G., 0X, 58  
 Plasson, P., 2Y  
 Plessier, J. Y., 2A  
 Pluzhnik, Eugene, 22, 5N, 66  
 Poberezhskiy, Ilya, 18, 19  
 Pommerol, A., 1E  
 Pompei, C., 39  
 Ponthieu, N., 58  
 Pontoppidan, K., 0K  
 Pope, A., 0K  
 Popowicz, Adam, 1R  
 Porpora, Daniel A., 3Y, 3Z  
 Portaluri, E., 39  
 Potin, S., 5G  
 Pottinger, Sabrina, 0O, 0Q  
 Powers, T., 2R  
 Prada, Camilo Mejia, 19, 3F  
 Pravdo, S., 2R  
 Preis, O., 5G  
 Previte, Anthony, 1Q  
 Prezelus, Sylvain, 0O  
 Prieto, Eric, 0P, 0T, 2M, 2R, 2U, 5J  
 Prigozhin, Gregory, 2C, 2X  
 Prigozhin, I., 2X  
 Primeau, Brian, 2C  
 Pucci, Mauro, 1B, 6C  
 Pueyo, Laurent, 1Y, 3C, 4A, 4T, 5K, 5M  
 Puig, L., 1W, 1X  
 Puig-Suari, Jordi, 1Q  
 Purica, M., 5O, 6E  
 Pyo, Jeonghyun, 59  
 Quiller, Trey, 1P  
 Qureshi, Atif, 1N  
 Racca, Giuseppe D., 0O, 0Q, 0T  
 Radzik, Bartłomiej, 3D  
 Ragazzoni, Roberto, 28, 2A, 2Z, 30, 31, 32, 39, 51  
 Raichs, Cayetano, 6Z  
 Rando, N., 29, 2A  
 Rapp, Robert, 0B  
 Rataj, Miroslaw, 1X, 33, 36, 3D  
 Ratti, F., 29, 2A  
 Rauer, Heike, 28, 2Z, 30, 31  
 Rausch, P., 68  
 Rauscher, Bernard J., 0J  
 Rawle, Timothy, 0B, 3O, 44, 45, 46  
 Ray, Tom, 1X, 33  
 Re, Cristina, 10  
 Rebeiz, G., 0X  
 Rebolo-López, Rafael, 6Z  
 Redding, David, 0J  
 Reed, Benjamin B., 1N  
 Reinlein, Claudia, 69  
 Reisenfeld, Sam, 1Q  
 Renaud, C., 0Z  
 Renotte, Etienne, 3D, 4Z, 50, 5O, 6E  
 Ressler, M. E., 41  
 Rest, Armin, 4B, 5U  
 Rhodes, David, 4C  
 Ribas, Ignasi, 1X, 33, 36  
 Riccardi, Armando, 1B, 6C  
 Richards, Michael C., 3K  
 Richards, P., 0X  
 Ricker, George, 2C, 2X  
 Rieder, Martin, 28, 2Z, 30, 31  
 Rieke, G. H., 41  
 Rieke, Marcia, 0E, 5U  
 Rigopoulou, D., 2K  
 Rinehart, S. A., 2L  
 Rioux, Norman M., 0H, 3L, 4R  
 Ristic, Bojan, 5B  
 Ristorcelli, I., 58  
 Rizzo, M. J., 2L  
 Robbeto, Massimo, 0E, 4B, 5U  
 Roberge, Aki, 1U, 2L, 3L, 4R  
 Robinson, Tyler D., 1U  
 Robles Muñoz, Nicolás, 5B  
 Rocchetto, M., 1X  
 Rochat, S., 5G  
 Roedel, Andreas, 0D  
 Rodríguez Gómez, Julio F., 5B  
 Rodriguez, L., 58  
 Roelfsema, Peter, 3U

Roellig, T., 0K  
 Rohrbach, Scott O., 08  
 Roloff, V., 1E  
 Rolt, Stephen, 4U, 4V  
 Romoli, Marco, 4Z, 50, 5O, 6E  
 Rosato, Pierluigi, 0O  
 Rosset, Cyrille, 0T  
 Rossin, Christelle, 0R, 0T  
 Roudil, G., 58  
 Rouzé, M., 0Z  
 Rowlands, Neil, 13, 4D  
 Rozemeijer, Hans, 0O  
 Rudolph, Andreas, 0O  
 Rumler, Peter, 0B, 0D  
 Saavedra Criado, Gonzalo, 0O  
 Saccoccio, M., 58  
 Safa, F., 29  
 Sahlmann, J., 2E  
 Saint-Pe, M., 5G  
 Saito, K., 11  
 Saitto, Antonio, 5S  
 Sakai, S., 0X  
 Sakon, Itsuki, 0K, 2I, 3V  
 Sakurai, Yuki, 0X, 4H  
 Salabert, D., 0Z  
 Salatino, M., 58  
 Salvador, Lucas, 3D  
 Salvignol, Jean-Christophe, 0O, 0P, 0Q, 0T, 0V  
 Sanchez, Patrice, 0R, 0T  
 Sánchez-Prieto, Sebastián, 5W  
 Sandstrom, K., 0K  
 Sankar, Shannon R., 1K, 5A  
 Sano, Kei, 4J  
 Sanz Mesa, Rosario, 5B  
 Sarajlic, M., 38  
 Sarkar, Subhajit, 1X, 3R  
 Sato, N., 0X  
 Sato, Yoichi, 0X, 2H, 3W  
 Sauerwein, Timothy, 2C, 2X  
 Sauvage, Jean-François, 3A, 3C  
 Sauvage, Marc, 0O, 1L  
 Savini, Giorgio, 2K, 58  
 Savransky, Dmitry, 1T, 1U  
 Scaramella, Roberto, 0O  
 Schade, D., 13  
 Schiminovich, David, 0J  
 Schirra, Florent, 5J  
 Schisano, E., 5V  
 Schistad, Robert, 2V  
 Schlawin, Everett, 0E  
 Schmidt, Micha, 0O  
 Schmitz, N., 51  
 Schmoll, Jürgen, 4V  
 Schmutz, W., 0Z  
 Schneider, A., 1I  
 Schnell, Andrew, 0G  
 Schweitzer, Hagen, 50  
 Schweitzer, Mario, 28, 2Z, 30, 31  
 Sciortino, A., 0Q  
 Scott, D., 0K  
 Secroun, Aurélia, 0T, 5J  
 Segawa, Y., 0X  
 Seidel, Gregor, 0T  
 Seiffert, Michael, 0T, 2R  
 Sekiguchi, S., 0X  
 Sekimoto, Yutaro, 0X, 4H  
 Sekine, M., 0X  
 Seljak, U., 0X  
 Selsis, F., 1X  
 Sepulveda, J., 1I  
 Serpell, E., 2D  
 Serra, Benoit, 0T, 5J  
 Servaye, Jean-Sébastien, 3D, 4Z, 50, 5O, 6E  
 Shaklan, Stuart B., 1S, 1U, 1Y  
 Shao, Mike, 2F, 5G  
 Shaw, Benjamin J. R., 4V  
 Sheikh, David A., 6J  
 Sherwin, B., 0X  
 Shi, Fang, 18, 63  
 Shibai, Hiroshi, 2H, 2I, 3W  
 Shields, Joel, 18  
 Shimizu, T., 0X  
 Shin, Goo-Hwan, 59  
 Shinozaki, Keisuke, 0X, 2H, 3W  
 Shipley, Ann, 3I  
 Shirahata, Mai, 4J  
 Shiri, Ron, 20  
 Short, Alex, 0O, 0P, 0Q, 0V  
 Shu, S., 0X  
 Sias, Marco, 0O  
 Siccardi, F., 56  
 Sicilia, Daniela, 28, 2Z, 30, 31  
 Sidick, Erkin, 18  
 Siegler, Nicholas, 1S  
 Sierra-Roig, C., 36  
 Simioni, Emanuele, 10  
 Simonella, O., 58  
 Sirbu, Dan, 22, 3G, 3J, 5N, 66  
 Sirianni, Marco, 0B, 3O, 44, 45, 46, 6I  
 Sirignano, Chiara, 0T, 2Q, 2T, 5R, 60  
 Sironi, Giorgia, 1L  
 Sirri, Gabriele, 0T, 2Q, 2T, 5R, 60  
 Sivaramakrishnan, Anand, 1Y, 48  
 Skottfelt, J., 0Q  
 Smadja, Gerard, 5J  
 Smith, Daniel, 3H, 3K  
 Smith, David Alan, 0G  
 Smith, Erin C., 4R  
 Smith, J. Scott, 09  
 Smith, Koby Z., 0C, 42  
 Snodgrass, Stephen, 0D  
 Solheim, Bjarte G. B., 2V  
 Sordet, M., 38  
 Sørensen, Anton Norup, 0T, 2U  
 Sortino, Francesca, 0T, 2T, 60  
 Sosey, M., 5D  
 Soummer, Rémi, 0F, 1Y, 3C, 4A, 4T, 5K, 5M  
 Southworth, R., 29  
 Sozzetti, Alessandro, 2F  
 Speckmaier, Max, 0D



Spergel, David, 0W  
 Spiga, Daniele, 28, 2Z, 30, 31  
 Spitler, Lee, 1Q  
 Spolyar, Douglas, 2F  
 Spurio, M., 0T, 2Q  
 Stadler, E., 5G  
 Stagnaro, Luca, 0O  
 Staguhn, J. G., 2L  
 Stahl, H. Philip, 0G  
 Stanco, L., 0T, 2Q, 2T, 60  
 Stansberry, John, 0E, 0F  
 St-Antoine, Jonathan, 47  
 Stapelfeldt, Karl R., 1A, 1S, 1U, 2L  
 Stark, Christopher C., 0F, 0H, 1U, 1Y, 3L  
 Stauffer, John, 5Z  
 Steinbuch, M., 4F  
 Steller, M., 2A, 2Y  
 Stephen, John, 2Q, 2T, 5R, 60  
 St. Laurent, Kathryn E., 1Y  
 Stockman, Yvan, 3D  
 Stompor, R., 0X  
 Stoneking, Eric, 3L  
 Stover, John, 3H  
 Strada, Paolo, 0O, 0P, 0T, 0V, 2R  
 Stuhlinger, Martin, 0B  
 Su, K. Y. L., 0K  
 Subedi, Hari, 64  
 Sudiwala, Rashmi V., 5H  
 Suematsu, Y., 1I  
 Sugai, Hajime, 0X, 4H  
 Sugita, Hiroyuki, 0X, 2H, 3W  
 Sukegawa, T., 1I  
 Sullivan, Joseph F., 0B  
 Suntharalingam, Vyshnavi, 2C, 2X  
 Surace, Jason A., 5Z  
 Suzuki, A., 0X  
 Suzuki, J., 0X  
 Suzuki, Toyooki, 0X, 2I  
 Swindells, I., 0Q  
 Szafraniec, M., 0Q  
 Taccola, Matteo, 50  
 Tajima, O., 0X  
 Takada, S., 0X  
 Takakura, S., 0X  
 Takano, K., 0X  
 Takatori, S., 0X  
 Takei, Y., 0X  
 Takeuchi, S., 2H  
 Takeyama, Norihide, 4J  
 Tamura, Motohide, 3E  
 Tan, B. K., 2K  
 Tanabe, D., 0X  
 Tanaka, Yosuke, 3E  
 Tang, Hong, 18, 1A  
 Tapie, P., 58  
 Tatry, P., 2D  
 Tauber, J., 58  
 Tavrov, Alexander, 54  
 Taylor, William, 1X, 33  
 Telfer, Randal, 09, 0F, 40, 4E  
 Tennyson, J., 1X  
 Tenti, M., 0T, 2Q, 2T, 60  
 te Plate, Maurice B. J., 0B, 0D  
 Texter, Scott, 03  
 Thayer, Carolyn, 2C, 2X  
 Thibault, Simon, 13, 47  
 Thizy, Cédric, 0T, 3D, 4Z, 50, 5O, 6E  
 Thomas, C., 0U  
 Thomas, Nicolas, 1E, 2A, 52  
 Thomas, Sandrine J., 22  
 Thorat, P., 2D  
 Tielens, X., 2K  
 Tilquin, Andre, 5J  
 Tinetti, Giovanna, 1X, 33  
 Tintori, Matteo, 1B, 6C  
 Toledo-Mareo, Rafael, 0T, 5W, 62  
 Tomaru, T., 0X  
 Tomita, N., 0X  
 Tommasino, Pasquale, 5S  
 Toon, Geoffrey, 5C  
 Torre, J.-P., 58  
 Torres Redondo, Josefina, 3U  
 Torvanger, Oyvind, 2V  
 Toulouse-Aastrup, Corinne, 0T  
 Tournois, Severine C., 09  
 Traub, Wesley A., 1S, 5C  
 Trauger, John, 5C  
 Travaglini, R., 0T, 2Q  
 Trébuchet, P., 4L  
 Trifiletti, Alessandro, 5S  
 Trifoglio, Massimo, 0T, 2Q, 2T, 5R, 60  
 Truong, Tuan, 18  
 Tsumura, Kohji, 2I, 4J  
 Tsunematsu, Shoji, 3W  
 Tubío-Araujo, Óscar, 62  
 Tucker, C., 2R, 58  
 Turck, K., 2R  
 Turck-Chièze, S., 0Z  
 Turella, A., 5I  
 Turin, P., 0X  
 Turrini, D., 1X  
 Ulmer, M. P., 1I  
 Uozumi, S., 0X  
 Utsunomiya, S., 0X  
 Uzawa, Y., 0X  
 Vaillon, Ludovic, 0O  
 Valenti, Jeff, 3O  
 Valenziano, Luca, 0T, 2Q, 2T, 5R, 60  
 Valieri, C., 2T  
 Vallée, Philippe, 47  
 Valsecchi, Giuseppe, 1L  
 Van Aken, Dirk, 5H  
 Van Campen, Julie M., 08  
 Vandaele, Ann Carine, 5B  
 Vandenbussche, Bart, 1X, 33  
 Vanderbei, Robert J., 1Y, 3G, 3J  
 Vanderspek, Roland, 2C, 2X  
 Vannucci, Antonello, 5S  
 van Ruymbeke, M., 0Z  
 Vasisht, Gautam, 5M

Vassigh, Kenny K., 1H  
 Vavrek, Roland, 0K, 0O, 0V  
 Veach, T., 2L  
 Veenendaal, Ian T., 5E, 6F  
 Venot, O., 1X  
 Ventura, Sandro, 0T, 2Q, 2T, 5R  
 Verlaan, A. L., 37  
 Vernani, D., 1E  
 Verpoort, Sven, 1L, 68  
 Vertolli, Nello, 5Q  
 Vettore, Christian, 1B, 6C  
 Vieira, J., 0K  
 Vikhlinin, Alexey, 0N  
 Vila, M. Begoña, 08  
 Villasenor, Joel, 2C, 2X  
 Viotto, Valentina, 28, 2A, 2Z, 30, 31, 32, 39  
 Viti, S., 2K  
 Vives, Sébastien, 0R, 0T, 2N, 2V  
 Volk, Kevin, 4D  
 Voyton, Mark F., 04, 07  
 Wachter, Stefanie, 0T  
 Waczynski, Augustyn, 0T, 2R  
 Wada, Takehiko, 0X, 2I, 3V, 4J  
 Walczak, Tomasz, 3D  
 Waldman, Mark, 4E  
 Waldmann, I. P., 1X  
 Walker, David, 5E, 6F  
 Wallace, James Kent, 18, 63, 6D  
 Wang, F., 2R  
 Wang, Shiang-Yu, 4J  
 Wang, Xu, 18, 63  
 Warfield, Keith R., 0G  
 Warner, Gerry, 4D  
 Warwick, Steven, 25, 3H, 3I, 3K  
 Watanabe, H., 0X  
 Wawer, P., 36  
 Weber, C., 2R  
 Webster, Chris, 5C  
 Weidmann, Guenter, 6B  
 Weigel, T., 1E  
 Wells, Conrad, 40, 49, 4C, 4E  
 Wells, Martyn, 4N  
 Welsh, Andria L., 0F  
 Westbrook, B., 0X  
 Westerhoff, Thomas, 6B  
 Westerman, Solomon, 1Q  
 Whitehorn, N., 0X  
 Whitman, Tony L., 04, 0C, 40, 49, 4E  
 Wiedner, M., 2K  
 Wieser, Matthias, 28, 2Z, 30, 31  
 Wildi, F. P., 38  
 Wilkes, Belinda, 1J  
 Williams, J., 2R  
 Willis, Dewey, 3L  
 Wilson, Daniel W., 18  
 Wimmer, Carolin, 0T  
 Winter, Calvin, 5E  
 Wittrock, Ulrich, 1L, 68  
 Witvoet, G., 4F  
 Wolkenberg, P., 1X  
 Woods, Deborah F., 2C, 2X  
 Wright, E., 0K  
 Wright, G. S., 1X, 41  
 Wright, Raymond H., 0B  
 Xompero, Marco, 1B, 6C  
 Yamada, Y., 0X  
 Yamagishi, Mitsuyoshi, 2I  
 Yamamoto, R., 0X  
 Yamasaki, N., 0X  
 Yamashita, T., 0X  
 Yamawaki, Toshihiko, 2H, 3W  
 Yan, X., 1I  
 Yassin, G., 2K  
 Ye, S., 1I  
 Ygouf, Marie, 4A, 5M  
 Yoshida, M., 0X  
 Yoshida, T., 0X  
 Yotsumoto, K., 0X  
 Young, Zion, 1H  
 Zacchei, Andrea, 0O  
 Zak, Dean, 08  
 Zapatero-Osorio, M. R., 1X  
 Zarzycka, Alicja, 3D  
 Zemcov, Michael, 4J  
 Zhai, C., 5G  
 Zhelem, Ross, 1Q  
 Zhou, Hanying, 19, 3F  
 Zhou, Julia, 08, 4D  
 Zhu, P., 0Z  
 Zhukov, Andrei, 3D  
 Zielinski, Thomas P., 09, 0F, 42  
 Ziethe, Ruth, 1E, 52  
 Zimmerman, Neil T., 0F, 1Y, 5M, 64  
 Zingales, T., 1X  
 Zmuidzinas, J., 0K  
 Zoli, A., 2T, 60  
 Zoubian, Julien, 5J  
 Zuccaro Marchi, Alessandro, 1B, 6C  
 Zuluaga-Ramírez, Pablo, 3U  
 Zusi, M., 51

# Conference Committee

## *Symposium Chairs*

**Colin Cunningham**, UK Astronomy Technology Centre  
(United Kingdom)

**Masanori Iye**, National Astronomical Observatory of Japan (Japan)

## *Symposium Co-chairs*

**Allison A. Barto**, Ball Aerospace & Technologies Corporation  
(United States)

**Suzanne K. Ramsay**, European Southern Observatory (Germany)

## *Conference Chairs*

**Howard A. MacEwen**, Reviresco LLC (United States)

**Giovanni G. Fazio**, Harvard-Smithsonian Center for Astrophysics  
(United States)

**Makenzie Lystrup**, Ball Aerospace & Technologies Corporation  
(United States)

## *Conference Program Committee*

**Natalie Batalha**, NASA Ames Research Center (United States)

**Beth A. Biller**, The Royal Observatory, Edinburgh (United Kingdom)

**James B. Breckinridge**, Breckinridge Associates (United States)

**Richard W. Capps**, Jet Propulsion Laboratory (United States)

**Mark Clampin**, NASA Goddard Space Flight Center (United States)

**Mattheus W. M. de Graauw**, P.N. Lebedev Physical Institute  
(Russian Federation)

**Lee D. Feinberg**, NASA Goddard Space Flight Center (United States)

**Andreas Glindemann**, European Southern Observatory (Germany)

**Qian Gong**, NASA Goddard Space Flight Center (United States)

**James C. Green**, University of Colorado at Boulder (United States)

**Matthew J. Griffin**, Cardiff University (United Kingdom)

**Astrid Heske**, European Space Research and Technology Center  
(Netherlands)

**Robert A. Laskin**, Jet Propulsion Laboratory (United States)

**David T. Leisawitz**, NASA Goddard Space Flight Center (United States)

**Charles F. Lillie**, Lillie Consulting (United States)

**Jean-Pierre Maillard**, Institut d'Astrophysique de Paris (France)

**Gary W. Matthews**, Harris Corporation (United States)

**Takao Nakagawa**, Japan Aerospace Exploration Agency (Japan)

**Jim M. Oschmann Jr.**, Ball Aerospace & Technologies Corporation (United States)  
**Ronald S. Polidan**, Northrop Grumman Aerospace Systems (United States)  
**David C. Redding**, Jet Propulsion Laboratory (United States)  
**Aki Roberge**, NASA Goddard Space Flight Center (United States)  
**Giorgio Savini**, University College London (United Kingdom)  
**Bernard D. Seery**, NASA Goddard Space Flight Center (United States)  
**Nicholas Siegler**, Jet Propulsion Laboratory (United States)  
**H. Philip Stahl**, NASA Marshall Space Flight Center (United States)  
**Giovanna Tinetti**, University College London (United Kingdom)  
**Edward C. Tong**, Harvard-Smithsonian Center for Astrophysics (United States)  
**Gillian S. Wright**, UK Astronomy Technology Centre (United Kingdom)  
**Toru Yamada**, Japan Aerospace Exploration Agency (Japan)

*Session Chairs*

- 1 JWST I  
**Gillian S. Wright**, UK Astronomy Technology Centre (United Kingdom)
- 2 JWST II  
**Jim M. Oschmann Jr.**, Ball Aerospace & Technologies Corporation (United States)
- 3 JWST III  
**James B. Breckinridge**, Breckinridge Associates (United States)
- 4 NASA Large Mission Concepts  
**Matthew J. Griffin**, Cardiff University (United Kingdom)
- 5 NASA Mission Studies: Joint Session with Conferences 9904 and 9905  
**Mario R. Perez**, NASA Headquarters (United States)  
**Howard A. MacEwen**, Reviresco LLC (United States)
- 6 Euclid  
**Beth A. Biller**, The Royal Observatory, Edinburgh (United Kingdom)
- 7 Deep Surveys  
**Mattheus W. M. de Graauw**, P.N. Lebedev Physical Institute (Russian Federation)
- 8 Solar System Studies  
**Mark Clampin**, NASA Goddard Space Flight Center (United States)
- 9 WFIRST I  
**Nicholas Siegler**, Jet Propulsion Laboratory (United States)

- 10 WFIRST II  
**Gary W. Matthews**, Harris Corporation (United States)
- 11 Technologies  
**H. Philip Stahl**, NASA Marshall Space Flight Center (United States)
- 12 Systems I  
**Howard A. MacEwen**, Reviresco LLC (United States)
- 13 Systems II  
**Lee D. Feinberg**, NASA Goddard Space Flight Center (United States)
- 14 In-Space Servicing  
**Jean-Pierre Maillard**, Institut d'Astrophysique de Paris (France)
- 15 Nanosats and CubeSats  
**Charles F. Lillie**, Lillie Consulting (United States)
- 16 Exoplanets I  
**David B. Gallagher**, Jet Propulsion Laboratory (United States)
- 17 Exoplanets II  
**David C. Redding**, Jet Propulsion Laboratory (United States)
- 18 Exoplanets III  
**Howard A. MacEwen**, Reviresco LLC (United States)
- 19 Exoplanets IV  
**Makenzie Lystrup**, Ball Aerospace (United States)
- 20 Astrometry  
**Makenzie Lystrup**, Ball Aerospace (United States)
- 21 IR Systems  
**Giovanni G. Fazio**, Harvard-Smithsonian Center for Astrophysics  
(United States)



## Introduction

This conference met throughout the duration of the SPIE Astronomical Telescopes and Instrumentation Conference 2016 in Edinburgh, Scotland, United Kingdom. It was part of a series of annual conferences addressing systems and technologies in the optical, infrared, and millimeter wavelength region that are held alternately in the Eastern and Western hemispheres, the preceding conference having been held in 2014 in Montreal, Quebec, Canada.

Many of the presentations addressed major milestones in the space telescope development that have recently passed or are rapidly approaching. In particular:

- NASA is currently preparing foundational material for the 2020 Astrophysics Decadal Survey that the National Academies of Science will be starting in about two years. One of the major efforts underway in this project is a set of four community mission concept studies to be presented to the Survey team. The objectives, technologies, approach, teaming, and current status and progress of each of the four Science Technology Definition Teams (STDTs) were presented in a joint session with Conference 9905, Space Telescopes and Instrumentation 2016: Ultraviolet to Gamma Ray.
- The James Webb Space Telescope (JWST) is well along in construction and testing, and is scheduled for launch in October 2018. The current status and development plans for this program were discussed in detail during three oral presentation sessions and in a number of Poster Papers.
- The Euclid dark universe mission of the European Space Agency (ESA) passed its Preliminary Design Review in December 2015, and is ramping up into development, construction, and testing phases. The status of this program was summarized during an oral presentation session and a number of Poster Papers.
- Finally, major technology development efforts for NASA's Wide Field InfraRed Space Telescope (WFIRST) are well underway in preparation for an expected program initiation once funding pressures from the JWST program have eased in the 2017–2018 time frame. Several of these projects were presented during the conference, again both orally and in poster formats.

In addition to the presentations related directly to specific, identifiable programs, there were a number of projects and studies of concepts and technologies in earlier stages of development that were addressed during the conference. This included brief discussion of aspects of systems, some currently operational, some

in various stages of development (including those with technology development well underway), and some still very much in the early concept development stages. A major topic under this heading was the development and testing of coronagraphic technology (both internal and external) for exoplanet detection and characterization (indeed, four oral presentation sessions were devoted to this topic). Other topics addressed under this general heading included infrared technologies and systems (notably for the far infrared); astrometry; deep surveys; new system concepts; advanced telescope technologies; very small satellites; and in-space assembly and servicing for space telescopes.

**Howard A. MacEwen**  
**Giovanni G. Fazio**  
**Makenzie Lystrup**