Front Matter: Volume 9915


Event: SPIE Astronomical Telescopes + Instrumentation, 2016, Edinburgh, United Kingdom
High Energy, Optical, and Infrared Detectors for Astronomy VII

Andrew D. Holland  
James Beletic  
Editors

26–29 June 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

Volume 9915  
Part One of Two Parts

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.
The papers included 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. The papers published in these proceedings 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 these proceedings:


ISSN: 0277-786X
ISBN: 9781510602090

ISSN: 1996-756X (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

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. 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
SPIEDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of 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 and print versions of the publication. SPIE uses a six-digit CID article numbering system structured as follows:

- 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.
# Contents

ix Authors  

xv Conference Committee  

xvii Introduction  

## Part One

<table>
<thead>
<tr>
<th>SESSION 1</th>
<th>DETECTOR PROGRAMMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>9915 02</td>
<td>The status of European Space Agency supported detector developments [9915-1]</td>
</tr>
<tr>
<td>9915 04</td>
<td>e2v CCD and CMOS sensors and systems designed for astronomical applications [9915-3]</td>
</tr>
<tr>
<td>9915 05</td>
<td>Leonardo (formerly Selex ES) infrared sensors for astronomy: present and future [9915-4]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SESSION 2</th>
<th>EM CCDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>9915 06</td>
<td>Development of the x-ray camera for the OGRE sub-orbital rocket [9915-5]</td>
</tr>
<tr>
<td>9915 07</td>
<td>The faint intergalactic-medium red-shifted emission balloon: future UV observations with EMCCDs [9915-6]</td>
</tr>
<tr>
<td>9915 08</td>
<td>The effect of proton radiation on the EMCCD for a low Earth orbit satellite mission [9915-7]</td>
</tr>
<tr>
<td>9915 0A</td>
<td>Cryogenic irradiation of an EMCCD for the WFIRST coronagraph: preliminary performance analysis [9915-242]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SESSION 3</th>
<th>IR SENSORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>9915 0B</td>
<td>MCT APD focal plane arrays for astronomy at CEA-LETI [9915-9]</td>
</tr>
<tr>
<td>9915 0C</td>
<td>Development activities on NIR large format MCT detectors for astrophysics and space science at CEA and SOFRADIR [9915-10]</td>
</tr>
<tr>
<td>9915 0D</td>
<td>Candidate 10 micron HgCdTe arrays for the NEOCam space mission [9915-11]</td>
</tr>
<tr>
<td>9915 0E</td>
<td>13 micron cutoff HgCdTe detector arrays for space and ground-based astronomy [9915-12]</td>
</tr>
<tr>
<td>9915 0F</td>
<td>Performance of science grade HgCdTe H4RG-15 image sensors [9915-13]</td>
</tr>
<tr>
<td>9915 0G</td>
<td>Mitigation of H2RG persistence with image illumination [9915-14]</td>
</tr>
<tr>
<td>Session 4</td>
<td>Radiation Damage Studies</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>9915 0H</td>
<td>Random telegraph signal (RTS) noise and other anomalies in the near-infrared detector systems for the Euclid mission [9915-20]</td>
</tr>
<tr>
<td>9915 0I</td>
<td>Mapping radiation-induced defects in CCDs through space and time [9915-16]</td>
</tr>
<tr>
<td>9915 0J</td>
<td>A study of the double-acceptor level of the silicon divacancy in a proton irradiated n-channel CCD [9915-15]</td>
</tr>
<tr>
<td>9915 0K</td>
<td>Radiation effects on the Gaia CCDs after 30 months at L2 [9915-17]</td>
</tr>
<tr>
<td>9915 0L</td>
<td>Charge transfer efficiency in a p-channel CCD irradiated cryogenically and the impact of room temperature annealing [9915-18]</td>
</tr>
<tr>
<td>9915 0M</td>
<td>The effect of radiation-induced traps on the WFIRST coronagraph detectors [9915-19]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 5</th>
<th>IR Detectors I</th>
</tr>
</thead>
<tbody>
<tr>
<td>9915 0N</td>
<td>Next-generation performance of SAPHIRA HgCdTe APDs [9915-22]</td>
</tr>
<tr>
<td>9915 0O</td>
<td>Towards the next generation of L-APD MOVPE HgCdTe arrays: beyond the SAPHIRA 320 x 256 [9915-21]</td>
</tr>
<tr>
<td>9915 0P</td>
<td>New progress in electron-injection detectors for NIR imagers with low noise and high frame rates [9915-23]</td>
</tr>
<tr>
<td>9915 0Q</td>
<td>RVS WFIRST sensor chip assembly development results [9915-24]</td>
</tr>
<tr>
<td>9915 0R</td>
<td>Progress on the characterization activities of new infrared detectors from Leonardo, UK at the UKATC [9915-25]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 6</th>
<th>CCDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>9915 0S</td>
<td>Status report on STA detectors and electronics for 2016 [9915-27]</td>
</tr>
<tr>
<td>9915 0U</td>
<td>Technology validation of the PLATO CCD at ESA [9915-29]</td>
</tr>
<tr>
<td>9915 0V</td>
<td>Characterization and acceptance testing of fully depleted thick CCDs for the large synoptic survey telescope [9915-30]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 7</th>
<th>Test and Characterisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>9915 0W</td>
<td>Performance of the first science grade (\lambda = 2.5\mu m) HAWAII 4RG-15 array in the laboratory and at the telescope [9915-31]</td>
</tr>
<tr>
<td>9915 0X</td>
<td>Integrated system tests of the LSST raft tower modules [9915-32]</td>
</tr>
<tr>
<td>9915 0Y</td>
<td>Development of low-noise CCD drive electronics for the world space observatory ultraviolet spectrograph subsystem [9915-33]</td>
</tr>
<tr>
<td>9915 0Z</td>
<td>Optical and dark characterization of the PLATO CCD at ESA [9915-34]</td>
</tr>
<tr>
<td>9915 10</td>
<td>On-ground characterization of the Euclid’s CCD273-based readout chain [9915-35]</td>
</tr>
<tr>
<td>9915 11</td>
<td>Performance overview of the Euclid infrared focal plane detector subsystems [9915-114]</td>
</tr>
</tbody>
</table>

**SESSION 8  CMOS IMAGE SENSORS**

| 9915 12 | LGSD/NGSD: high speed visible CMOS imagers for E-ELT adaptive optics [9915-36] |
| 9915 13 | Fully depleted and backside biased monolithic CMOS image sensor [9915-38] |
| 9915 14 | A 9 megapixel large-area back-thinned CMOS sensor with high sensitivity and high frame-rate for the TAOS II program [9915-39] |
| 9915 15 | Electro-optic and radiation damage performance of the CIS115, an imaging sensor for the JANUS optical camera onboard JUICE [9915-40] |

**SESSION 9  QE IMPROVEMENTS AND CALIBRATION**

| 9915 17 | High accuracy measurements of the intrapixel sensitivity of VIS to LWIR astronomical detectors: experimental demonstration [9915-42] |
| 9915 1A | High fidelity point-spread function retrieval in the presence of electrostatic, hysteretic pixel response [9915-45] |

**SESSION 10  CMOS X-RAY SENSORS**

| 9915 1D | The HEXITEC hard x-ray pixelated CdTe imager for fast solar observations [9915-50] |

**Part Two**

**SESSION 11  IR DETECTORS II**

| 9915 1E | Comparison of persistence in spot versus flat field illumination and single pixel response on a Euclid HAWAII-2RG at ESTEC [9915-51] |
| 9915 1G | Large format array NIR detectors for future ESA astronomy missions: characterization and comparison [9915-53] |
| 9915 1H | Flexible focal plane arrays for UVOIR wide field instrumentation [9915-55] |
### POSTER SESSION

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>9915 J</td>
<td>Electron multiplying CMOS as Shack-Hartmann wavefront sensor</td>
<td>[9915-37]</td>
</tr>
<tr>
<td>9915 K</td>
<td>Shutter heating system of Antarctic bright star survey telescope</td>
<td>[9915-56]</td>
</tr>
<tr>
<td>9915 L</td>
<td>Scientific CCD controller for the extreme environment at Antarctic</td>
<td>[9915-57]</td>
</tr>
<tr>
<td>9915 M</td>
<td>Back-illuminated large area frame transfer CCDs for space-based hyper-spectral imaging applications</td>
<td>[9915-58]</td>
</tr>
<tr>
<td>9915 N</td>
<td>Large format array controller (aLFA-C): tests and characterisation at ESA</td>
<td>[9915-59]</td>
</tr>
<tr>
<td>9915 O</td>
<td>Low temperature performance of a commercially available InGaAs image sensor</td>
<td>[9915-60]</td>
</tr>
<tr>
<td>9915 P</td>
<td>Noise optimization of the source follower of a CMOS pixel using BSIM3 noise model</td>
<td>[9915-61]</td>
</tr>
<tr>
<td>9915 Q</td>
<td>Measuring extended red sensitivity in a 1.7μm-cutoff HgCdTe detector array</td>
<td>[9915-62]</td>
</tr>
<tr>
<td>9915 S</td>
<td>DCDS weighted averaging theory and development for improved noise filtering in scientific CCD applications</td>
<td>[9915-64]</td>
</tr>
<tr>
<td>9915 T</td>
<td>NUV performance of e2v large BiCMOS array for CASTOR</td>
<td>[9915-66]</td>
</tr>
<tr>
<td>9915 U</td>
<td>Infrared APD characterization at NRC</td>
<td>[9915-67]</td>
</tr>
<tr>
<td>9915 W</td>
<td>NIR camera and spectrograph SWIMS for TAO 6.5m telescope: array control system and its performance</td>
<td>[9915-69]</td>
</tr>
<tr>
<td>9915 Y</td>
<td>Characterization of H2RG IR detectors for the Euclid NISP instrument</td>
<td>[9915-71]</td>
</tr>
<tr>
<td>9915 20</td>
<td>Evaluating noise performance of the IUCAA sidecar drive electronics controller (ISDEC) based system for TMT on-instrument wavefront sensing (OIWFS) application</td>
<td>[9915-73]</td>
</tr>
<tr>
<td>9915 21</td>
<td>ESA’s CCD test bench for the PLATO mission</td>
<td>[9915-75]</td>
</tr>
<tr>
<td>9915 22</td>
<td>Experiments with synchronized sCMOS cameras</td>
<td>[9915-76]</td>
</tr>
<tr>
<td>9915 23</td>
<td>A project plans to develop two ASICs for CCD controller</td>
<td>[9915-77]</td>
</tr>
<tr>
<td>9915 24</td>
<td>IDSAC-IUCAA digital sampler array controller</td>
<td>[9915-78]</td>
</tr>
<tr>
<td>9915 25</td>
<td>Measuring the effective pixel positions for the HARPS3 CCD</td>
<td>[9915-79]</td>
</tr>
<tr>
<td>9915 26</td>
<td>ISDEC-2 and ISDEC-3 controllers for HAWAII detectors</td>
<td>[9915-80]</td>
</tr>
<tr>
<td>9915 28</td>
<td>Silicon photomultipliers as readout elements for a Compton effect polarimeter: the COMPASS project</td>
<td>[9915-82]</td>
</tr>
<tr>
<td>Page</td>
<td>Title</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>9915 29</td>
<td>Comparing simulations and test data of a radiation damaged CCD for the Euclid mission [9915-83]</td>
<td></td>
</tr>
<tr>
<td>9915 2A</td>
<td>Simplified charge transfer inefficiency correction in CCDs by trap-pumping [9915-84]</td>
<td></td>
</tr>
<tr>
<td>9915 2B</td>
<td>MeV-level electron and gamma ray sensitivites of modern far ultraviolet sensitive microchannel plate detectors [9915-85]</td>
<td></td>
</tr>
<tr>
<td>9915 2C</td>
<td>Further performance evaluation of 5.3 μm cut-off Hawaii-2RG detectors [9915-86]</td>
<td></td>
</tr>
<tr>
<td>9915 2D</td>
<td>A novel reflectometer for relative reflectance measurements of CCDs [9915-87]</td>
<td></td>
</tr>
<tr>
<td>9915 2G</td>
<td>Second generation large area microchannel plate flat panel phototubes [9915-91]</td>
<td></td>
</tr>
<tr>
<td>9915 2H</td>
<td>Positional calibrations of the germanium double sided strip detectors for the Compton spectrometer and imager [9915-92]</td>
<td></td>
</tr>
<tr>
<td>9915 2I</td>
<td>Signal dependence of inter-pixel capacitance in hybridized HgCdTe H2RG arrays for use in James Webb space telescope's NIRcam [9915-93]</td>
<td></td>
</tr>
<tr>
<td>9915 2J</td>
<td>Design and development of hard x-ray imaging detector using scintillator and Si photomultiplier [9915-94]</td>
<td></td>
</tr>
<tr>
<td>9915 2K</td>
<td>A generic FPGA-based detector readout and real-time image processing board [9915-95]</td>
<td></td>
</tr>
<tr>
<td>9915 2L</td>
<td>Characterization of an ultraviolet imaging detector with high event rate ROIC (HEROIC) readout [9915-96]</td>
<td></td>
</tr>
<tr>
<td>9915 2M</td>
<td>Radiation testing of CID arrays [9915-97]</td>
<td></td>
</tr>
<tr>
<td>9915 2N</td>
<td>Characterizing persistence in JWST NIRCam flight detectors [9915-98]</td>
<td></td>
</tr>
<tr>
<td>9915 2O</td>
<td>CCD emulator design for LSST camera [9915-100]</td>
<td></td>
</tr>
<tr>
<td>9915 2P</td>
<td>A microwave kinetic inductance detector for the DAG telescope [9915-101]</td>
<td></td>
</tr>
<tr>
<td>9915 2Q</td>
<td>Single event effects in 0.18μm CMOS image sensors [9915-102]</td>
<td></td>
</tr>
<tr>
<td>9915 2T</td>
<td>Front-end and slow control electronics for large area SiPMs used for the single mirror Small Size Telescope (SST-1M) of the Cherenkov Telescope Array (CTA) [9915-105]</td>
<td></td>
</tr>
<tr>
<td>9915 2U</td>
<td>Persistence characterization and data calibration scheme for the RSS-NIR H2RG detector on SALT [9915-106]</td>
<td></td>
</tr>
<tr>
<td>9915 2V</td>
<td>Detector control and data acquisition for the wide field infrared survey telescope (WFIRST) with a custom ASIC [9915-107]</td>
<td></td>
</tr>
<tr>
<td>9915 2X</td>
<td>RVS large format arrays for astronomy [9915-109]</td>
<td></td>
</tr>
<tr>
<td>9915 2Y</td>
<td>Low voltage electron multiplying CCD in a CMOS process [9915-111]</td>
<td></td>
</tr>
<tr>
<td>9915 2Z</td>
<td>A temperature controller board for the ARC controller [9915-112]</td>
<td></td>
</tr>
</tbody>
</table>
Implementation of an FPGA-based DCDS video processor for CCD imaging
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, Asier, 0K
Acharya, Y. B., 2J
Aguilar, J. A., 2T
Aliş, Sinan, 2P
Alkire, Greg, 2V
Allanwood, E. A. H., 15
Alvarez, Domingo, 2C
Amman, M., 2H
Antillogus, Pierre, 0X, 1A
Arkun, Erdem, 0F
Astier, Pierre, 1A
Atkinson, Dani E., 0N, 0W
Atkinson, David, 0R
Auyeung, John, 0F
Azzollini, R., 10
Baker, Ian M., 05, 0N, 0O, 0R
Barbier, Rémi, 0H, 11, 1E, 1J, 1Y
Barkhouser, Robert H., 2D
Barnes, Keith, 05, 0R
Baum, Stefi, 2I
Baumgartner, Wayne H., 1D
Beam, Carey, 2M
Beaton, Alexander, 1T
Beaufort, Thierry, 0K, 0U, 0Z, 1E, 1G, 21
Beckmann, Udo, 2C
Beletic, James W., 0F
Bender, Chad, 1Q
Beuvill, Eric, 2X
Bezawada, Naidu, 0R
Bharal, Rupali, 26
Bhaskaran, Suraj, 2M
Billotta, S., 2B
Blinik, W., 2T
Blank, Richard, 0W
Blase, Ryan C., 2B
Blocki, J., 2T
Blommaert, Sander, 0U, 0Z, 1E, 1G, 1N, 21
Boe, Raymond, 2X
Bogacz, L., 2T
Boggs, Kasey, 0S
Boggs, S., 2H
Bonnefois, A., 17
Borkowski, J., 2T
Boulade, Olivier, 0B, 0C, 17
Bradley, Scott, 2L
Brandonisio, A., 28
Breathnauer, Gregory, 0S
Bryson, Ian, 0R
Bugnet, Henri, 2Q
Bulik, T., 2T
Burgon, Ross, 0A
Burse, Mahesh P., 20, 24, 26
Burt, D., 0L
Bush, Nathan, 0A, 0I, 0M
Butler, Bart, 0U, 0Z, 1E, 1G, 1N, 21
Butor, C., 1J
Cabrera, Mario S., 0D, 0E
Cadoux, F., 2T
Cagiano, S., 11
Caillat, Laurence, 1Y
Carmody, Micheal, 0F
Castelein, Pierre, 0C
Catalano, O., 2B
Cervera, Cyril, 0C
Chattopadhyay, Sabyasachi, 20, 24
Chen, J., 11
Chen, Jie, 1K, 1L
Cheng, Edward, 0Q, 2V
Cheung, S., 11
Chiang, Jim, 0V
Chillal, Kalpesh, 24, 26
Chiu, J. L, 2H
Cho, H., 11
Chordia, Pravin, 20, 24, 26
Chorier, Philippe, 0C
Christe, Steven D., 1D
Christov, A., 2T
Ciapponi, Alessandra, 02
Cillis, A., 11
Clapp, Matthew, 0Y, 1S
Clarke, Andrew S., 13
Clément, Jean-Claude, 0H, 11, 1Y
Content, David, 0Q, 2V
Conversi, Luca, 0H
Cooke, Chathan M., 2B
Copperwheat, Chris M., 22
Cordrey-Gale, Matthew, 2Q
Corrales, Elizabeth, 0Q, 2X
Costa, E., 28
Côté, Patrick, 1T
Craven, C. A., 2G
Cropper, M., 10
Crouzet, Pierre-Elie, 02, 1E, 1G
Crowley, Cian, 0K
Culver, Harry, 2V
Curtyo, M., 2T

Proc. of SPIE Vol. 9915 991501-9
Song, Qian, 23
Soonthorntham, Boonrucksar, 22
Sottile, G., 28
Sowinski, M., 2T
Stadler, Eric, 12
Starr, Barry, 0Q, 2X
Stawarz., Ł., 2T
Steele, Iain A., 22
Stefanov, Konstantin D., 13, 15, 2Q, 2Y
Stodulska, M., 2T
Stodulski, M., 2T
Strada, Paolo, 0H, 11, 1E
Stubbs, Christopher, 0X, 1A
Sun, Quan, 23
Swift, Nick, 12
Szafraniec, Magdalena, 10
Takacs, Peter, 0V
Takahashi, Hidenori, 1W
Tamura, Naoyuki, 0F
Tan, Chee Leong, 0P
Tateuchi, Ken, 1W
Tedesco, J., 2G
Ter Haar, Joerg, 1E, 1G, 1N
Terao, Yasunori, 1W
Terrien, Ryan C., 1Q
Theobald, C., 10
Thompson, Samantha, 25
Tilquin, André, 1Y
Todo, Soya, 1W
Tomsick, J., 2H
Toscano, S., 2T
Tracy, Christopher, 2X
Troyano Pujadas, I., 2T
Tseng, C. H., 2H
Tucker, C., 11
Tulloch, Simon, 2C, 2Z, 30
Turck, K., 11
Tutt, James H., 06
Tyson, Anthony, 1A
Uchida, Tomohisa, 1O
Ulmer, Melville P., 0P
Vadawale, S. V., 2J
Vampola, John, 2X
Van Berg, R., 0X
van der Biezen, John, 1N
Van der Luijt, Cornelis, 0U, 0Z, 1E, 1G, 1N, 21
Van Duinkerken, Gertjan, 1E
Van Winckel, H., 1P
Verhoeve, Peter, 0U, 0Z, 21
Viale, T., 17
Visser, Ivo, 0U, 0Z, 1E, 1G, 1N, 21
von Ballmoos, P., 2H
Waczynski, Augustyn, 0Q, 11
Walter, Christopher, 1A
Walter, R., 2T
Waltham, Nick, 0Y, 1S
Walton, D., 10
Wang, F., 11
Wang, Jian, 1K, 1L
Wang, Jian-min, 1L
Wang, Shiang-Yu, 14
Warmbier, Eric A., 0N
Weatherill, Daniel P., 06
Weber, C., 11
Wei, Mingzhi, 23
Weller, Harald, 0R
Wen, Yiting, 0Q
Wheaton, Skylar, 0P
Więcek, M., 2T
Williams, J., 11
Wilson, Matt, 1D
Wilson-Hodge, Colleen, 1D
Wolf, Marsha, 2U
Wollack, Edward, 2V
Wong, Andre, 0D
Wood, Daniel, 0I, 0J, 0L
Yang, C. Y., 2H
Yelikenci, F. Korhan, 2P
Yerli, Sinan K., 2P
Yesilyaprak, Cahit, 2P
Yoshida, Michitoshi, 1O
Zagdański, A., 2T
Zanatta, Jean-Paul, 0C
Zandian, Mojid, 0F, 0W
Zhao, Hong-fei, 1K, 1L
Zhao, Yuheng, 23
Ziętara, K., 2T
Zoglauer, A., 2H
Żychowski, P., 2T
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

Andrew D. Holland, e2v Centre for Electronic Imaging at The Open University (United Kingdom)
James Beletic, Teledyne Imaging Sensors (United States)

Conference Program Committee

Megan E. Eckart, NASA Goddard Space Flight Center (United States)
Gert Finger, European Southern Observatory (Germany)
Michael E. Hoenk, Jet Propulsion Laboratory (United States)
Paul Jorden, e2v technologies plc (United Kingdom)
Didier D. Martin, European Space Research and Technology Centre (Netherlands)
Satoshi Miyazaki, National Astronomical Observatory of Japan (Japan)
Peter C. Moore, National Optical Astronomy Observatory (United States)
S. Harvey Moseley, NASA Goddard Space Flight Center (United States)
Robert H. Philbrick, Ball Aerospace & Technologies Corporation (United States)
Roger M. Smith, California Institute of Technology (United States)
Tadayuki Takahashi, Japan Aerospace Exploration Agency (Japan)
Hiroshi Tsunemi, Osaka University (Japan)
Session Chairs

1  Detector Programmes
   Andrew D. Holland, e2v Centre for Electronic Imaging
   (United Kingdom)

2  EM CCDs
   Michael E. Hoenk, Jet Propulsion Laboratory (United States)

3  IR Sensors
   James W. Beletic, Teledyne Imaging Sensors (United States)

4  Radiation Damage Studies
   Andrew D. Holland, e2v Centre for Electronic Imaging
   (United Kingdom)

5  IR Detectors I
   Gert Finger, European Southern Observatory (Germany)

6  CCDs
   Paul R. Jorden, e2v technologies plc (United Kingdom)

7  Test and Characterisation
   Nick Nelms, ESA/ESTEC (Netherlands)

8  CMOS Image Sensors
   Andrew D. Holland, e2v Centre for Electronic Imaging
   (United Kingdom)
   James W. Beletic, Teledyne Imaging Sensors (United States)

9  QE Improvements and Calibration
   Andrew D. Holland, e2v Centre for Electronic Imaging
   (United Kingdom)

10 CMOS X-ray Sensors
    Hiroshi Tsunemi, Osaka University (Japan)

11 IR Detectors II
    James W. Beletic, Teledyne Imaging Sensors (United States)
Introduction

Astronomical Telescopes and Instrumentation once again combined the visible, infrared, and high energy detector sessions into a single conference; High Energy, Optical, and Infrared Detectors for Astronomy VII. This combination resulted in a rich variety of applications and detectors being presented by the community. This combination also provided an excellent overview of the leverage of detector technologies and methods across the photon energy spectrum, where many of the detection techniques and methodologies are common. Sessions were also held into associated readout electronics and radiation damage which are important for many applications.

Over ninety papers were presented over four days and attendance was high through the conference sometimes exceeding 160 attendees. This reflects on the excellence of presented material, the presenting authors, and the relevance of the conference to present-day astronomy.

The presentations covered detector performance, both theoretical, simulations and experimental, detectors in instruments and camera systems, sophisticated new controllers and software, packaging of very large detector mosaics, radiation testing, and the future direction of sensor technologies.

Over the years, proceedings like these have been an invaluable output and record of SPIE meetings. They represent a current snapshot of detector technologies. This year’s conference had several talks on CCDs covering optical and x-ray bands, and included a session on electron-multiplying CCD technology and applications. This year we saw an increase in the number of contributions detailing the continued development and improvement of both CMOS imagers, for the optical, and with new developments for their use in x-ray detection. Many results were “hot off the press”, with some being taken just days before the conference, which helps maintain the vitality of these events. We hope the detailed information presented here will contribute to further advancements in all detector technologies.

Such a successful meeting could not have taken place without the support and help of many people, especially all of you whose names appear on the papers collected here. We acknowledge the valuable advice and assistance for structuring the conference and chairing the sessions given to us by the Program Committee and would especially like to thank Jim Beletic, Gert Finger, Paul Jorden, Peter Verhoeve, Michael Hoenk and Hiroshi Tsunemi for their assistance in chairing some of the sessions.

Finally, we hope that you enjoy the written proceedings as an accurate record of the conference, and look forward to seeing you in Austin in 2018.

Andrew D. Holland
James Beletic