

PROCEEDINGS OF SPIE

X-Ray, Optical, and Infrared Detectors for Astronomy IX

**Andrew D. Holland
James Beletic**
Editors

**14–22 December 2020
Online Only, United States**

Sponsored and Published by
SPIE

Volume 11454

Proceedings of SPIE 0277-786X, V. 11454

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

X-Ray, Optical, and Infrared Detectors for Astronomy IX, edited by Andrew D. Holland,
James Beletic, Proc. of SPIE Vol. 11454, 1145401 · © 2020 SPIE
CCC code: 0277-786X/20/\$21 · doi: 10.1117/12.2591721

Proc. of SPIE Vol. 11454 1145401-1

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.

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 these proceedings:

Author(s), "Title of Paper," in *X-Ray, Optical, and Infrared Detectors for Astronomy IX*, edited by Andrew D. Holland, James Beletic, Proceedings of SPIE Vol. 11454 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510636958
ISBN: 9781510636965 (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 © 2020, 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 \$21.00 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/20/\$21.00.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

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

**SPIE. DIGITAL
LIBRARY**

SPIDigitalLibrary.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 seven-digit CID article numbering system structured as follows:

- The first five 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

INDUSTRY INTRODUCTORY PRESENTATIONS

11454 02 **Enhanced silicon sensor capabilities at Teledyne e2v (Invited Paper)** [11454-1]

CAMERAS AND SIMULATION

11454 07 **Design of a large-format high-rate scientific CMOS camera** [11454-7]

11454 08 **Pyxel: the collaborative detection simulation framework** [11454-8]

RADIATION DAMAGE I

11454 09 **Comparison of proton and electron radiation effects on dark count rate in a CMOS SPAD sensor** [11454-9]

11454 0A **Impact of proton radiation on the Ariel AIRS CH1 HAWAII-1RG MWIR detector** [11454-10]

11454 0B **A study of the silicon divacancy defect in the E2V LSST CCD250 using the single trap pumping method** [11454-11]

CMOS FOR VISIBLE

11454 0E **Quantum efficiency of the CIS115 in a radiation environment** [11454-14]

11454 0F **Mitigating charge spill-back induced image lag with a multi-level transfer gate pulse in PPD image sensors** [11454-15]

11454 0G **Evaluation of scientific CMOS sensors for sky survey applications** [11454-17]

X-RAY SENSORS I

11454 0I **Development of a photon-counting near-fano-limited x-ray CMOS image sensor for THESEUS' SXI** [11454-19]

11454 0K **Developing the detector of x-ray imaging spectrometer for GEO-X mission** [11454-21]

RADIATION DAMAGE II

- 11454 0O **Experimental study of the influence of the CdZnTe substrate thickness on the response of infrared HgCdTe photodetectors under proton irradiation** [11454-25]
- 11454 0P **Proton radiation hardness of x-ray SOI pixel detectors with pinned depleted diode structure** [11454-26]
- 11454 0Q **Radiation damage testing status of the CCDs for the SMILE SXI** [11454-27]
- 11454 0S **Gaia CCDs: charge transfer inefficiency measurements between five years of flight** [11454-29]

X-RAY SENSORS II

- 11454 0T **Processing x-ray data on board the SMILE SXI** [11454-30]
- 11454 0U **Advanced DePFET concepts: super gq DePFET** [11454-31]

CRYOGENIC DETECTORS

- 11454 12 **Development of microwave multiplexer for the Super DIOS mission: 38 transition-edge sensor x-ray microcalorimeter readout with microwave multiplexing** [11454-40]
- 11454 14 **First operation of transition-edge sensors in space with the Micro-X sounding rocket** [11454-44]

TEST RESULTS

- 11454 18 **Development of an optical photon counting imager using a monolithic Geiger APD array** [11454-49]

CCDS I

- 11454 1A **Characterization of skipper CCDs for cosmological applications** [11454-51]
- 11454 1B **Germanium charge-coupled devices for hard x-ray astronomy** [11454-52]

CCDS II

- 11454 1C **Charge transfer effects in a CCD with a single polysilicon gate structure** [11454-53]
- 11454 1D **Design of a front-illuminated scientific CCD camera for space debris observation** [11454-55]
- 11454 1F **Developing the active trap model for CCD charge transfer optimisation in large-scale space missions** [11454-57]

QE IMPROVEMENT

- 11454 1G **Calibrating Teledyne-e2v's ultraviolet image sensor quantum efficiency processes** [11454-58]
- 11454 1H **Development of UV imaging detectors with atomic layer deposited microchannel plates and cross strip readouts** [11454-60]

INFRA RED DETECTORS II

- 11454 1K **Persistence and dark current characterization on HgCdTe short wave infrared imagers for astronomy at CEA and Lynred** [11454-64]
- 11454 1N **Characterisation, performance, and operational aspects of the H4RG-15 near infrared detectors for the MOONS instrument** [11454-67]
- 11454 1P **Characterization of the optical properties of the buried contact of the JWST MIRI Si: as infrared blocked impurity band detectors** [11454-69]

POST-DEADLINE

- 11454 1U **X-ray analysis of the EMCCD point-source response** [11454-147]

POSTER SESSION

- 11454 1Y **Detector systems engineering for extremely large instruments** [11454-71]
- 11454 1Z **The simulation framework of the timing-based localization for future all-sky gamma-ray observations with a fleet of CubeSats** [11454-73]
- 11454 20 **Design of second version driver and readout ASICs for scientific CCD detectors** [11454-74]
- 11454 22 **Characterization of a high efficiency silicon photomultiplier for millisecond to sub-microsecond astrophysical transient searches** [11454-79]

- 11454 23 **Tiny-box: a tool for the versatile development and characterization of low noise fast x-ray imaging detectors** [11454-80]
- 11454 25 **Detection systems for high time resolution astrophysics: based on advances in lidar technologies** [11454-83]
- 11454 26 **A smartphone-based arbitrary scene projector for detector testing and instrument performance evaluation** [11454-84]
- 11454 27 **MCRC V1: development of integrated readout electronics for next generation x-ray CCD detectors for future satellite observatories** [11454-85]
- 11454 28 **LWIR quantum efficiency measurements using a calibrated MCT photodiode read by a cryo-HEMT-based amplifier** [11454-86]
- 11454 2C **Initial assessment of monocrystalline silicon solar cells as large-area sensors for precise flux calibration** [11454-90]
- 11454 2D **Surface features in U-band of ITL devices for the LSST telescope** [11454-91]
- 11454 2E **Remote monitor and control implementation via an optical digital link** [11454-92]
- 11454 2G **Suitability of COTS InGaAs detectors for ground-based exoplanet detections around nearby M-dwarfs** [11454-94]
- 11454 2J **PANIC-4K: upgrade with a HAWAII-4RG array** [11454-99]
- 11454 2M **Monte Carlo simulations of hyper-velocity particulate mechanics within silicon micropore optics** [11454-102]
- 11454 2N **First proton and gamma radiation of the MCT NIR European astronomy large format array detector** [11454-104]
- 11454 2O **Detector architecture of the wide-field infrared transient explorer (WINTER) InGaAs camera** [11454-105]
- 11454 2P **The characteristic of Teledyne e2v CIS 113 CMOS sensors** [11454-106]
- 11454 2S **Study on possible proton-induced background of LaBr₃(Ce) scintillator in a low-Earth orbit** [11454-109]
- 11454 2T **Design of an extended area blackbody for calibration of near infrared sky brightness monitor in the Antarctic** [11454-110]
- 11454 2U **Design of the electronic system for a 2×2 mosaic CCD camera** [11454-111]
- 11454 2V **On-the-fly data pipeline for image processing enabling real-time persistence correction** [11454-112]

- 11454 2Y **Design of a test platform for scientific CMOS cameras** [11454-115]
- 11454 2Z **Multiplexable frequency retuning of MKID arrays using their non-linear kinetic inductance**
[11454-116]
- 11454 30 **Optimization of a CCD-in-CMOS TDI detector's operating clock voltages by Taguchi based Grey relational analysis** [11454-117]
- 11454 31 **ROIC glow reduction in very low flux short wave infra-red focal plane arrays for astronomy**
[11454-118]
- 11454 32 **Classification of bad pixels of the Hawaii-2RG detector of the ASTROnomical NearInfraRed CAMera** [11454-119]
- 11454 35 **Signal nonlinearity measurements and corrections in MWIR and LWIR HgCdTe H2RG arrays for NEO Surveyor** [11454-123]
- 11454 37 **Instrument development with infrared APD arrays** [11454-125]
- 11454 38 **X-ray photon counting performance of front-illuminated scientific CMOS image sensor**
[11454-126]
- 11454 39 **Laboratory measurements of instrumental signatures of the LSST camera focal plane**
[11454-127]
- 11454 3C **Panoramic SETI: on-sky results from prototype telescopes and instrumental design** [11454-130]
- 11454 3E **Measuring the impact of CCD gate width on the brighter-fatter effect** [11454-132]
- 11454 3J **Performance advantages of buffered mode operation of HxRG near infrared detectors**
[11454-138]
- 11454 3L **Design of a test platform with a cryocooler for InGaAs FPA** [11454-141]

