

PROCEEDINGS OF SPIE

Infrared Remote Sensing and Instrumentation XXVII

Marija Strojnik
Gabriele E. Arnold
Editors

12–14 August 2019
San Diego, California, United States

Sponsored and Published by
SPIE

Volume 11128

Proceedings of SPIE 0277-786X, V. 11128

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

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 *Infrared Remote Sensing and Instrumentation XXVII*, edited by Marija Strojnik, Gabriele E. Arnold, Proceedings of SPIE Vol. 11128 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510629493

ISBN: 9781510629509 (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 © 2019, 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/19/\$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

vii	<i>Authors</i>
ix	<i>Conference Committee</i>
xi	<i>Introduction</i>

PLANETS, MOONS AND MINOR BODIES I

11128 02	Spaceborne VIR spectroscopy of small planetary bodies and inherent clues to their composition: a review and discussions of future requirements (Invited Paper) [11128-1]
----------	---

PLANETS, MOONS AND MINOR BODIES II

11128 03	Compact calibration source for thermal infrared Fourier-transform spectrometer [11128-5]
11128 04	The VenSpec suite on the ESA EnVision mission to Venus (Invited Paper) [11128-6]
11128 05	Image inverting interferometer for extra-solar planet detection [11128-7]

INFRARED AND ENABLING TECHNOLOGY

11128 06	Alternative spectral windows for photonic services distribution (Invited Paper) [11128-8]
11128 08	Resonant tunneling diode photon number resolving single-photon detectors [11128-10]
11128 09	Threshold wavelength extension with dark current reduction in infrared detectors (Invited Paper) [11128-11]

INFRARED AND ENABLING INSTRUMENTS

11128 0C	A low-cost interferometric fiber optic gyro for autonomous driving [11128-14]
----------	--

INTERFEROMETRY FOR SPACE EXPLORATION: FOURIER TRANSFORM AND SIMULATIONS

- 11128 OF **Feasibility of planet detection in two-planet solar system with rotationally-shearing interferometer (Invited Paper)** [11128-44]
- 11128 OG **Interferometer with single-axis robot: design, alignment and performance (Invited Paper)** [11128-45]
- 11128 OH **Two-coordinate pointing and tracking system for an infrared Fourier-transform spectrometer** [11128-46]

NASA LIDAR

- 11128 OJ **Optical system design and integration of the Global Ecosystem Dynamics Investigation Lidar** [11128-18]
- 11128 OL **The Global Ecosystem Dynamics Investigation (GEDI) Lidar laser transmitter** [11128-20]

SPECIAL REPORTS ON QUANTUM REMOTE SENSING

- 11128 OM **Developing causal interpretations for high and low level light used in quantum remote sensing (Invited Paper)** [11128-21]
- 11128 ON **Generating 2D maps from Fock to Poissonian states on variant maps using random sequences (Invited Paper)** [11128-22]

QUANTUM REMOTE SENSING

- 11128 OQ **Efficient stimulation technology for the tight oil reservoir** [11128-24]
- 11128 OR **Quantum remote sensing secure direct communication** [11128-25]
- 11128 OS **Research on quantum remote sensing science and technology** [11128-26]

POSTER SESSION

- 11128 OT **The newly improved set-up at the Planetary Spectroscopy Laboratory (PSL)** [11128-2]
- 11128 OU **The mercury radiometer and thermal infrared imaging spectrometer (MERTIS) onboard Bepi Colombo: first inflight calibration results (Invited Paper)** [11128-3]
- 11128 OV **SIMBIO-SYS Near Earth Commissioning Phase: a step forward toward Mercury** [11128-4]

- 11128 OW **Scope of using ballistic photons for applications in biological tissue** [11128-27]
- 11128 OX **Characterization of modified agave fructans used as drug carriers to the colon by spectroscopy techniques** [11128-28]
- 11128 OY **Risley prism scanner for biological tissue inspection with ballistic photons** [11128-29]
- 11128 OZ **Design, manufacturing and testing of a CPV + T based on a Cassegrain: trough configuration** [11128-30]
- 11128 11 **Experimental study of inner structure in Infrared supercontinuum generation pumped by multi-pulse dynamics** [11128-32]
- 11128 12 **Numerical study of a spherical to plane wave diffuser for shock wave in solids** [11128-33]
- 11128 13 **3D shape measurement by two-steps temporal phase unwrapping: hybrid method** [11128-34]
- 11128 15 **Ex-vivo characterization of human healthy colon and colorectal cancer by multispectral Mueller polarimetric imaging and its polar decomposition** [11128-37]
- 11128 16 **Rotationally-shearing interferometer: preliminary results with a simulator solar system** [11128-38]
- 11128 19 **One-dimensional Eigenvalue distributions of random sequences for FFT non-stationary randomness** [11128-41]
- 11128 1A **Processing algorithms for quantum remote sensing image data** [11128-42]