

PROCEEDINGS OF SPIE

Anomaly Detection and Imaging with X-Rays (ADIX) VIII

Amit Ashok
Joel A. Greenberg
Michael E. Gehm
Editors

3–4 May 2023
Orlando, Florida, United States

Sponsored and Published by
SPIE

Volume 12531

Proceedings of SPIE 0277-786X, V. 12531

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

Anomaly Detection and Imaging with X-Rays (ADIX) VIII, edited by Amit Ashok, Joel A. Greenberg,
Michael E. Gehm, Proc. of SPIE Vol. 12531, 1253101 · © 2023 SPIE
0277-786X · doi: 10.1117/12.2690838

Proc. of SPIE Vol. 12531 1253101-1

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 *Anomaly Detection and Imaging with X-Rays (ADIX) VIII*, edited by Amit Ashok, Joel A. Greenberg, Michael E. Gehm, Proc. of SPIE 12531, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510661769
ISBN: 9781510661776 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time)
SPIE.org
Copyright © 2023 Society of Photo-Optical Instrumentation Engineers (SPIE).

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 fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center 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.

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: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE 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

v *Conference Committee*

SYSTEM DESIGN, DEVELOPMENT, AND EVALUATION

- 12531 02 **CT results using an inverse Compton x-ray source (Invited Paper)** [12531-1]
- 12531 03 **Performance of a high-throughput full-tunnel XRD checked baggage scanning system**
[12531-2]
- 12531 04 **Classifiers for material discrimination with dual modality x-ray transmission and coherent x-ray diffraction system** [12531-3]
- 12531 05 **Unique opportunities to sample parameter space using physics-based synthetic x-ray data**
[12531-4]

ALGORITHMS I

- 12531 08 **Intra-class data augmentation with deep generative models of threat objects in baggage radiographs** [12531-8]

ALGORITHMS II

- 12531 09 **Developing a comprehensive, adaptive system for large-scale x-ray images (Invited Paper)**
[12531-9]
- 12531 0A **Simulation and information-theoretic analysis of hybrid CT+XRD imaging system** [12531-10]
- 12531 0B **Progressive sequential imaging on x-ray baggage inspection systems** [12531-11]
- 12531 0C **Position independence for consistent effective atomic number (Z_{eff}) estimation in dual-energy x-rays** [12531-12]
- 12531 0D **3D threat image projection through dual-energy decomposition** [12531-13]

X-RAY PHASE

12531 0F **Spectrally responsive edge illumination x-ray phase contrast imaging (XPCI)** [12531-15]

12531 0G **Spectral gratings-based phase-contrast imaging for materials characterization** [12531-16]

12531 0I **Asymmetric illumination x-ray differential phase contrast imaging** [12531-18]

X-RAY DETECTORS AND APPLICATIONS

12531 0J **Low-cost XRD detector technology which scales to large FoV (Invited Paper)** [12531-19]

12531 0L **Detector comparison for high-resolution 3D x-ray diffraction imaging for biospecimen analysis**
[12531-21]

POSTER SESSION

12531 0M **Semi-supervised anomaly detection algorithm based on KL divergence (SAD-KL)** [12531-22]

Conference Committee

Symposium Chairs

Tien Pham, The MITRE Corporation (United States)
Douglas R. Droege, L3Harris Technologies, Inc. (United States)

Symposium Co-chairs

Augustus W. Fountain III, University of South Carolina (United States)
Teresa L. Pace, L3Harris Technologies, Inc. (United States)

Program Track Chair

Ann Marie Raynal, Sandia National Laboratories (United States)

Conference Chairs

Amit Ashok, Wyant College of Optical Sciences (United States)
Joel A. Greenberg, Duke University (United States)
Michael E. Gehm, Duke University (United States)

Conference Program Committee

Mark A. Anastasio, University of Illinois (United States)
Gonzalo R. Arce, University of Delaware (United States)
David Coccarelli, QuadriDox, Inc. (United States)
Mini Das, University of Houston (United States)
Edward D. Franco, Rapiscan Systems Laboratories (United States)
Christopher W. Gregory, Smiths Detection, Inc. (United States)
Tim E. Harvey, Salient Guard (United States)
Harry E. Martz, Lawrence Livermore National Laboratory
(United States)
Joseph A. O'Sullivan, Washington University in St. Louis (United States)
Sean Pang, CREOL, The College of Optics and Photonics, University of
Central Florida (United States)
Lei Tian, Boston University (United States)
Laura Waller, University of California, Berkeley (United States)
Sharene Young, U.S. Department of Homeland Security
(United States)
Yunhui Zhu, Virginia Polytechnic Institute and State University
(United States)

