

PROCEEDINGS OF SPIE

Quantum Information Science, Sensing, and Computation XII

**Eric Donkor
Michael Hayduk**
Editors

**27 April – 8 May 2020
Online Only, United States**

Sponsored and Published by
SPIE

Volume 11391

Proceedings of SPIE 0277-786X, V. 11391

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

Quantum Information Science, Sensing, and Computation XII, edited by Eric Donkor,
Michael Hayduk, Proc. of SPIE Vol. 11391, 1139101 · © 2020 SPIE
CCC code: 0277-786X/20/\$21 · doi: 10.1117/12.2572754

Proc. of SPIE Vol. 11391 1139101-1

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 *Quantum Information Science, Sensing, and Computation XII*, edited by Eric Donkor, Michael Hayduk, Proceedings of SPIE Vol. 11391 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

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

ISBN: 9781510635593
ISBN: 9781510635609 (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

SESSION 1 QUANTUM COMPUTING I

11391 05 **Toward mobile free-space optical QKD: characterization of a polarization-based receiver**
[11391-21]

SESSION 2 QUANTUM COMPUTING II

11391 06 **Practical numerical integration on NISQ devices** [11391-4]

SESSION 3 QUANTUM SENSORS, QUANTUM SYSTEMS

11391 0A **Quantum Fisher information matrix of a single qutrit in Xi or cascade configuration** [11391-8]

11391 0B **A hybrid quantum enabled RBM advantage: convolutional autoencoders for quantum image compression and generative learning** [11391-9]

11391 0C **GaN laser diodes for quantum sensors and optical atomic clocks** [11391-10]

11391 0D **Wavefront design for improved performance by entangled systems** [11391-12]

SESSION 4 QKD, CRYPTOGRAPHY, AND SECURE COMMUNICATION

11391 0G **A semi-quantum extended B92 protocol and its analysis** [11391-15]

SESSION 5 QUANTUM INFORMATION SCIENCE

11391 0I **Approximate graph spectral decomposition with the Variational Quantum Eigensolver**
[11391-17]

11391 0J **Quantum central limit theorem and statistical hypothesis testing in discrete quantum walk**
[11391-18]

11391 0L **Objective function maximization by machine learning for gate-model quantum computers**
[11391-20]

