

PROCEEDINGS OF SPIE

***Advances in Photonics of Quantum  
Computing, Memory, and  
Communication XII***

**Philip R. Hemmer  
Alan L. Migdall  
Zameer Ul Hasan**  
*Editors*

**5–7 February 2019  
San Francisco, California, United States**

*Sponsored and Published by*  
SPIE

**Volume 10933**

Proceedings of SPIE 0277-786X, V. 10933

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 [SPIEDigitalLibrary.org](http://SPIEDigitalLibrary.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 *Advances in Photonics of Quantum Computing, Memory, and Communication XII*, edited by Philip R. Hemmer, Alan L. Migdall, Zameer Ul Hasan, Proceedings of SPIE Vol. 10933 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510625082

ISBN: 9781510625099 (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](http://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 \$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](http://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/\$18.00.

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**

[SPIEDigitalLibrary.org](http://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 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 *Authors*  
vii *Conference Committee*

---

## ENTANGLEMENT-ENHANCED PRECISION METROLOGY IV: JOINT SESSION WITH CONFERENCES 10933 AND 10934

---

- 10933 05 **Photon-number-resolving transition-edge sensors for the metrology of photonic microstructures based on semiconductor quantum dots (Invited Paper)** [10933-4]
- 10933 06 **Time dependent metrology: improving precision through coherent control (Invited Paper)** [10933-5]

---

## ENTANGLEMENT AND CIRCUITS

---

- 10933 09 **Technological advances on Si and Si<sub>3</sub>N<sub>4</sub> low-losses waveguide platforms for nonlinear and quantum optics applications** [10933-8]
- 10933 0B **Towards fast and scalable trapped-ion quantum logic with integrated photonics** [10933-10]
- 10933 0C **Deterministic two-photon controlled phase gate by exploiting nonlinear pi-phase shift in photonic molecule generations** [10933-11]

---

## QUANTUM COMMUNICATION AND NETWORKS

---

- 10933 0F **A post-processing-free single-photon random number generator with ultra-low latency** [10933-14]
- 10933 0G **Improved reconciliation for continuous-variable quantum key distribution** [10933-15]
- 10933 0J **Hyper-entanglement signals in quantum optical circuits** [10933-18]

---

## QUANTUM MEMORY

---

- 10933 0N **Towards highly-efficient single-photon storage based on electromagnetically induced transparency (Invited Paper)** [10933-22]
- 10933 0P **Spatial multiplexing in a cavity-enhanced quantum memory (Invited Paper)** [10933-24]

**POSTER SESSION**

---

- 10933 0V **Quantum state tomography of ultrafast optical pulses at telecom wavelength by broadband balanced homodyne detection** [10933-30]
- 10933 0W **Parallel preparation of a set of arbitrary path-polarization hyperentangled states** [10933-31]
- 10933 0X **Quantum walks in quasi-periodic arrays of waveguides** [10933-32]
- 10933 0Z **Single-channel Hadamard gate by exploiting frequency conversion of single-photon Raman scattering in chiral quantum nanophotonics** [10933-34]