

Photonics West

2019

TECHNICAL PROGRAM

Conferences and Courses

2-7 February 2019

BIOS Expo

2-3 January 2019

Photonics West Exhibition

5-7 February 2019

The Moscone Center
San Francisco, USA

spie.org/pw

CONFERENCE 10934

SESSION 9

LOCATION: ROOM 209 (SOUTH LEVEL TWO) MON 10:30 AM TO 12:10 PM

New Directions in Precision Metrology I

Session Chair: Avi Pe'er, Bar-Ilan Univ. (Israel)

10:30 am: **Speckle-based spectrometer** (*Invited Paper*), Hui Cao, Yale Univ. (USA) [10934-38]

10:55 am: **High-speed mid-infrared detectors** (*Invited Paper*), Johannes Hillbrand, Benedikt Schwarz, Hermann Detz, Aaron Maxwell Andrews, Gottfried Strasser, Technische Univ. Wien (Austria) [10934-102]

11:20 am: **Super phase oscillations** (*Invited Paper*), John C. Howell, The Hebrew Univ. of Jerusalem (Israel) [10934-41]

11:45 am: **Advances in using orbital-angular-momentum beams for sensing and imaging applications** (*Invited Paper*), Alan E. Willner, The Univ. of Southern California (USA) [10934-39]

Lunch Break Mon 12:10 pm to 1:40 pm

SESSION 10

LOCATION: ROOM 209 (SOUTH LEVEL TWO) MON 1:40 PM TO 3:20 PM

New Directions in Precision Metrology II

Session Chair: John C. Howell, The Hebrew Univ. of Jerusalem (Israel)

1:40 pm: **The spectrum of the vacuum as a primary reference for radiometry** (*Invited Paper*), Samuel Lemieux, Robert W. Boyd, Univ. of Ottawa (Canada) [10934-42]

2:05 pm: **Recent developments in advanced techniques for gravitational-wave detection** (*Invited Paper*), Yanbei Chen, Caltech (USA) [10934-43]

2:30 pm: **Gravitational decoherence and gravitational-wave function collapse** (*Invited Paper*), Angelo Bassi, Univ. degli Studi di Trieste (Italy) [10934-44]

2:55 pm: **Squeezing enhanced Raman spectroscopy** (*Invited Paper*), Yoad Michael, Michael Rosenbluh, Avi Pe'er, Bar-Ilan Univ. (Israel) . [10934-45]

Coffee Break Mon 3:20 pm to 3:50 pm

SESSION 11

LOCATION: ROOM 209 (SOUTH LEVEL TWO) MON 3:50 PM TO 6:25 PM

New Directions in Precision Metrology III

Session Chair: Angelo Bassi, Univ. degli Studi di Trieste (Italy)

3:50 pm: **Precision metrology within AFRL** (*Keynote Presentation*), Gretchen R. Phelps, Air Force Research Lab. (USA) [10934-46]

4:40 pm: **Internally cooled rare-earth-doped microparticles for precision metrology** (*Invited Paper*), Wm. Randall Babbitt, Montana State Univ. (USA) [10934-47]

5:05 pm: **Measuring gas thermodynamic properties with an optical frequency comb** (*Invited Paper*), Andre N. Luiten, The Univ. of Adelaide (Australia) [10934-48]

5:30 pm: **Tailoring of amplification spectrum using DC-field for high-precision two-wave mixing adaptive interferometry with CdTe** (*Invited Paper*), Konstantin Shcherbin, Institute of Physics (Ukraine); Marvin B. Klein, Intelligent Optical Systems, Inc. (USA); Dean R. Evans, Air Force Research Lab. (USA) [10934-50]

5:45 pm: **Solid-state characterization of CdTe:Sn as a medium for adaptive interferometry** (*Invited Paper*), Konstantin Shcherbin, Serguey G. Odoulov, Institute of Physics (Ukraine); Dean R. Evans, Air Force Research Lab. (USA); François Ramaz, Bernard Briat, Institut Langevin, ESPCI (France) [10934-49]

6:10 pm: **GPS-steered green laser pointer: a convenient and accurate optical frequency reference**, Hongquan Li, Lingfang W. Wang, Stanford Univ. (USA); Brian H. Kolner, Univ. of California, Davis (USA); Karel E. Urbanek, Scott Lambert, Leo W. Hollberg, Stanford Univ. (USA) [10934-104]

TUESDAY 5 FEBRUARY

SESSION 12

LOCATION: ROOM 209 (SOUTH LEVEL TWO) TUE 8:00 AM TO 10:05 AM

Entanglement-Enhanced Precision Metrology I

Joint Session with Conferences 10933 and 10934

Session Chair: Eliahu Cohen, Univ. of Ottawa (Canada)

8:00 am: **Time as the precious resource in quantum metrology: concurrent state preparation and sensing** (*Invited Paper*), William J. Munro, NTT Basic Research Labs. (Japan); Anthony Hayes, Univ. of Sussex (United Kingdom); Shane Dooley, National Institute of Informatics (Japan); Jacob Dunningham, Univ. of Sussex (United Kingdom); Kae Nemoto, National Institute of Informatics (Japan) [10933-1]

8:25 am: **Achieving the Heisenberg limit in quantum metrology using quantum error correction** (*Invited Paper*), Liang Jiang, Sisi Zhou, Mengzhen Zhang, Yale Univ. (USA); John Preskill, Caltech (USA) . . . [10934-51]

8:50 am: **Single-photon quantum metrology** (*Invited Paper*), Thomas Gerrits, National Institute of Standards and Technology (USA) [10934-52]

9:15 am: **Recent progress in multiphoton quantum technologies** (*Invited Paper*), Omar Magana-Loaiza, Louisiana State Univ. (USA) . [10934-53]

9:40 am: **Toward a quantum enhanced holometer: preliminary results of a power-recycled 2D optical cavity at INRIM** (*Invited Paper*), Elena Losero, Siva Pradyumna, Fabio Saccomandi, Massimo E. Zucco, Paolo Tralna, Ivano Ruo Berchera, Ivo Pietro Degiovanni, Marco Genovese, Istituto Nazionale di Ricerca Metrologica (Italy) [10934-54]

Coffee Break Tue 10:05 am to 10:30 am

SESSION 13

LOCATION: ROOM 209 (SOUTH LEVEL TWO) TUE 10:30 AM TO 12:10 PM

Entanglement-Enhanced Precision Metrology II

Joint Session with Conferences 10933 and 10934

Session Chair: Thomas Gerrits, National Institute of Standards and Technology (USA)

10:30 am: **Experimental validation of new bounds on nonlocal correlations** (*Invited Paper*), Eliahu Cohen, Univ. of Ottawa (Canada) [10933-2]

10:55 am: **Using interaction-based readouts to approach the ultimate limit of detection noise robustness for quantum-enhanced metrology in collective spin systems** (*Invited Paper*), Simon Haine, Univ. of Sussex (United Kingdom) [10934-55]

11:20 am: **From quantum coherence to nonclassicality and metrological power** (*Invited Paper*), Kok Chuan Bobby Tan, Hyunseok Jeong, Seoul National Univ. (Korea, Republic of); Tyler Volkoff, Konkuk Univ. (Korea, Republic of); Hyukjoon Kwon, Seoul National Univ. (Korea, Republic of) and Imperial College London (United Kingdom) [10934-56]

11:45 am: **Super-resolution enhancement by quantum image scanning microscopy** (*Invited Paper*), Ron Tenne, Uri Rossman, Batel Rephael, Weizmann Institute of Science (Israel); Yonatan Israel, Weizmann Institute of Science (Israel) and Stanford Univ. (USA); Alexander Krupinski-Ptaszek, Radek Lapkiewicz, Univ. of Warsaw (Poland); Yaron Silberberg, Dan Oron, Weizmann Institute of Science (Israel) [10934-57]

Lunch/Exhibition Break Tue 12:10 pm to 1:30 pm

Session 9: New Directions in Precision Metrology I

Monday 4 February 2019

10:30 AM - 12:10 PM

Location: Room 209 (South Level Two)

Session Chair: [Avi Pe'er](#), Bar-Ilan Univ. (Israel)

Speckle-based spectrometer *(Invited Paper)*

Paper 10934-38

Time: 10:30 AM - 10:55 AM

Author(s): Hui Cao, Yale Univ. (United States)

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High-speed mid-infrared detectors *(Invited Paper)*

Paper 10934-102

Time: 10:55 AM - 11:20 AM

Author(s): Johannes Hillbrand, Benedikt Schwarz, Hermann Detz, Aaron Maxwell Andrews, Gottfried Strasser, Technische Univ. Wien (Austria)

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We demonstrate high-frequency operation of both QCDs and QWIPs connected to a monolithic coplanar transmission line without air-bridge. A single-period QCD with more than 0.8 A/W responsivity at 300K paves the way towards sensitive multiheterodyne detection at room-temperature.

Super phase oscillations *(Invited Paper)*

Paper 10934-41

Time: 11:20 AM - 11:45 AM

Author(s): John C. Howell, The Hebrew Univ. of Jerusalem (Israel)

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Advances in using orbital-angular-momentum beams for sensing and imaging applications *(Invited Paper)*

Paper 10934-39

Time: 11:45 AM - 12:10 PM

Author(s): Alan E. Willner, The Univ. of Southern California (United States)

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Lunch Break 12:10 PM - 1:40 PM

Session 10: New Directions in Precision Metrology II

Monday 4 February 2019

1:40 PM - 3:20 PM

Location: Room 209 (South Level Two)

Session Chair: [John C. Howell](#), The Hebrew Univ. of Jerusalem (Israel)

The spectrum of the vacuum as a primary reference for radiometry *(Invited Paper)*

Paper 10934-42

Time: 1:40 PM - 2:05 PM

Author(s): Samuel Lemieux, Robert W. Boyd, Univ. of Ottawa (Canada)


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Recent developments in advanced techniques for gravitational-wave detection *(Invited Paper)*

Paper 10934-43

Time: 2:05 PM - 2:30 PM

Author(s): Yanbei Chen, Caltech (United States)


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Gravitational decoherence and gravitational-wave function collapse *(Invited Paper)*

Paper 10934-44

Time: 2:30 PM - 2:55 PM

Author(s): Angelo Bassi, Univ. degli Studi di Trieste (Italy)


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Squeezing enhanced Raman spectroscopy *(Invited Paper)*

Paper 10934-45

Time: 2:55 PM - 3:20 PM

Author(s): Yoad Michael, Michael Rosenbluh, Avi Pe'er, Bar-Ilan Univ. (Israel)

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Coffee Break 3:20 PM - 3:50 PM