

SPIE. PHOTONICS
WEST

TECHNICAL PROGRAM

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 10939

WEDNESDAY 6 FEBRUARY

SESSION 8

LOCATION: ROOM 74 (SOUTH LOWER MEZZANINE) . WED 8:10 AM TO 10:00 AM

Tunable Lasers

Session Chair: **Luke J. Mawst**, Univ. of Wisconsin-Madison (USA)

8:10 am: **Hybrid integrated single-frequency diode laser with wide tunability around 1.5 μ m wavelength and sub-100 Hz intrinsic linewidth** (*Invited Paper*), Klaus-Jochen Boller, Univ. Twente (Netherlands) . . . [10939-34]

8:40 am: **Mode-hop free operation throughout lifetime confirmed in a 2 μ m distributed Bragg reflector laser for gas sensing**, Makoto Shimokozono, Takuya Kanai, Naoki Fujiwara, Hiroyuki Ishii, Yoshitaka Ohiso, NTT Corp. (Japan); Yuta Ueda, Nippon Telegraph and Telephone Corp. (Japan); Hideaki Matsuzaki, NTT Corp. (Japan) . . . [10939-35]

9:00 am: **Tunable external-cavity laser diode based on self-assembled InAs quantum dots for swept-source optical coherence tomography applications at 1100 nm**, Nobuhiko Ozaki, Wakayama Univ. (Japan) and Univ. of Glasgow (United Kingdom); David T. D. Childs, Aleksandr Boldin, Univ. of Glasgow (United Kingdom); Daigo Ikuno, Katsuya Onoue, Wakayama Univ. (Japan); Hirotsuka Ohsato, Eiichiro Watanabe, Naoki Ikeda, Yoshimasa Sugimoto, National Institute for Materials Science (Japan); Richard A. Hogg, Univ. of Glasgow (United Kingdom) . . . [10939-36]

9:20 am: **Tuning of a widely tunable monolithically integrated InP laser for optical coherence tomography**, Rastko Pajković, Sylwester Latkowski, Kevin A. Williams, Erwin A. J. M. Bente, Technische Univ. Eindhoven (Netherlands) . . . [10939-37]

9:40 am: **Tunable Y-branch dual-wavelength diode lasers in the VIS and NIR range for sensor applications**, Bernd Sumpf, Jörg Fricke, Arnim Ginolas, André Maassdorf, Martin Maiwald, Ferdinand-Braun-Institut (Germany); Andre Müller, Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (Germany); Mahmoud Tawfiq, Lara Sophie Theurer, Ferdinand-Braun-Institut (Germany); Nghiem T. Vu, Vietnam Academy of Science and Technology (Viet Nam); Hans Wenzel, Ferdinand-Braun-Institut (Germany) . . . [10939-38]

Coffee Break Wed 10:00 am to 10:30 am

SESSION 9

LOCATION: ROOM 74 (SOUTH LOWER MEZZANINE) WED 10:30 AM TO 12:10 PM

QCL Frequency Combs

Session Chair: **Sukhdeep Dhillon**, Lab. Pierre Aigrain (France)

10:30 am: **Quantum cascade laser optical frequency combs: broadband operation and emission control** (*Invited Paper*), Jérôme Faist, ETH Zurich (Switzerland) . . . [10939-39]

11:00 am: **Compressed pulses from a mid-infrared QCL frequency comb**, Matthew Singleton, Pierre Jouy, Matthias Beck, Jerome Faist, ETH Zurich (Switzerland) . . . [10939-40]

11:20 am: **Self-locked quantum cascade lasers solve a global optimization problem** (*Invited Paper*), Marco Piccardo, Paul Chevalier, Harvard Univ. (USA); Benedikt Schwarz, Technische Univ. Wien (Austria); Dmitry Kazakov, Harvard Univ. (USA); Yongrui Wang, Alexey Belyanin, Texas A&M Univ. (USA); Federico Capasso, Harvard Univ. (USA) . . . [10939-41]

11:50 am: **Physics and applications of harmonic frequency combs in quantum cascade lasers**, Yongrui Wang, Alexey Belyanin, Texas A&M Univ. (USA) . . . [10939-42]

Lunch/Exhibition Break Wed 12:10 pm to 1:40 pm

SESSION 10

LOCATION: ROOM 74 (SOUTH LOWER MEZZANINE) . . WED 1:40 PM TO 3:20 PM

MIR Lasers: Mode-Locking, Combs, and Frequency Noise

Session Chair: **Jerry R. Meyer**, U.S. Naval Research Lab. (USA)

1:40 pm: **Advances in development of the GaSb-based type-I quantum-well cascade-diode lasers: wavelength tuning and mode-locking** (*Invited Paper*), Leon Shterengas, Takashi Hosoda, Tao Feng, Jiang Jiang, Stony Brook Univ. (USA); Alexey Belyanin, Texas A&M Univ. (USA); Gela Kipshidze, Gregory Belenky, Stony Brook Univ. (USA) . . . [10939-43]

2:10 pm: **Passively mode-locked interband cascade lasers** (*Invited Paper*), Mahmood Bagheri, Clifford Fraz, Jet Propulsion Lab. (USA); Igor Vurgafman, U.S. Naval Research Lab. (USA); Jonas Westberg, Lukasz A. Sterczewski, Princeton Univ. (USA); Mathieu Fradet, Ivan Grudin, Jet Propulsion Lab. (USA); Chadwick L. Canedy, William W. Bewley, Chul Soo Kim, Charles D. Merritt, Jerry R. Meyer, U.S. Naval Research Lab. (USA); Gerard Wysocki, Princeton Univ. (USA) . . . [10939-44]

2:40 pm: **Repulsive intermode beat synchronization in interband cascade laser frequency combs**, Benedikt Schwarz, Johannes Hillbrand, Maximilian Beiser, Technische Univ. Wien (Austria); Anne Schade, Julius-Maximilians-Univ. Würzburg (Germany); Hermann Detz, Aaron M. Andrews, Technische Univ. Wien (Austria); Robert Weih, nanoplus Nanosystems and Technologies GmbH (Germany); Sven Höfling, Julius-Maximilians-Univ. Würzburg (Germany) . . . [10939-45]

3:00 pm: **Frequency noise characterization and stabilization of interband cascade lasers**, Simone Borri, Istituto Nazionale di Ottica (Italy); Mario Sicilliani de Cumis, Agenzia Spaziale Italiana (Italy); Silvia Viciani, Francesco D'Amato, Istituto Nazionale di Ottica (Italy); Anatoliy Savchenkov, Andrey Matsko, OEwaves, Inc. (USA); Paolo De Natale, Istituto Nazionale di Ottica (Italy) . . . [10939-46]

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

SESSION 11

LOCATION: ROOM 74 (SOUTH LOWER MEZZANINE) . . WED 3:50 PM TO 4:50 PM

QCL Frequency Combs and Mode Locking

Session Chair: **Marco Piccardo**, Harvard Univ. (USA)

3:50 pm: **Phase control of a terahertz quantum cascade laser using an optical injection phase-lock loop**, Reshma Anamari Mohandas, Univ. of Leeds (United Kingdom); Lalitha Ponnampalam, Univ. College London (United Kingdom); Lianhe H. Li, Univ. of Leeds (United Kingdom); Cyril C. Renaud, Alwyn J. Seeds, Univ. College London (United Kingdom); Paul Dean, Edmund H. Linfield, Giles A. Davies, Joshua R. Freeman, Univ. of Leeds (United Kingdom) . . . [10939-48]

4:10 pm: **Fourier limit pulse train from an active mode-locked quantum-cascade laser**, Valentino Pistori, Hanond Nong, Lab. Pierre Aigrain - ENS Paris (France); Pierre-Baptiste Vigneron, Raffaele Colombelli, Ctr. de Nanosciences et de Nanotechnologies (France); Katia Garrasi, Miriam S. Vitiello, NEST, Istituto Nanoscienze CNR (Italy); Lianhe H. Li, Edmund H. Linfield, Giles A. Davies, Univ. of Leeds (United Kingdom); Juliette Mangeney, Jérôme Tignon, Sukhdeep Dhillon, Lab. Pierre Aigrain - ENS Paris (France) . . . [10939-49]

4:30 pm: **Optomechanical control of quantum cascade laser frequency combs**, David Burghoff, Univ. of Notre Dame (USA) . . . [10939-50]

Repulsive intermode beat synchronization in interband cascade laser frequency combs

Paper 10939-45

Time: 2:40 PM - 3:00 PM

Author(s): Benedikt Schwarz, Johannes Hillbrand, Maximilian Beiser, Technische Univ. Wien (Austria); Anne Schade, Julius-Maximilians-Univ. Würzburg (Germany); Hermann Detz, Aaron M. Andrews, Technische Univ. Wien (Austria); Robert Weih, nanoplus Nanosystems and Technologies GmbH (Germany); Sven Höfling, Julius-Maximilians-Univ. Würzburg (Germany)

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Integrated photonics will reduce cost and enable hand-held battery driven sensing instruments. Aiming for all-chip integrated spectrometers, we present the generation of low-dissipation optical frequency comb utilizing interband cascade lasers. We discuss why ICLs should be considered as fast gain media and why passive mode-locking is difficult or even impossible to be achieved. We applying shifted-wave interference Fourier transform spectroscopy to show that ICL frequency combs naturally favor repulsive intermode beat synchronization with the same chirped FM character recently found in QCL combs. We show first evidence of multiple normal modes of the intermodal beats and picosecond pulse generation.

Frequency noise characterization of interband cascade lasers

Paper 10939-46

Time: 3:00 PM - 3:20 PM

Author(s): Simone Borri, Istituto Nazionale di Ottica (Italy); Mario Siciliani de Cumis, Agenzia Spaziale Italiana (Italy); Silvia Viciani, Istituto Nazionale di Ottica (Italy); Naota Akikusa, Hamamatsu Photonics, Development Bureau Laser Device R&D Group (Japan); Francesco D'Amato, Paolo De Natale, Istituto Nazionale di Ottica (Italy)

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Coffee Break 3:20 PM - 3:50 PM

Session 11: QCL Frequency Combs and Mode Locking

Wednesday 6 February 2019

3:50 PM - 4:50 PM


Location: Room 74 (South Lower Mezzanine)

Session Chair: [Marco Piccaro](#), Harvard Univ. (United States)**Phase control of a terahertz quantum cascade laser using an optical injection phase-lock loop**

Paper 10939-48

Time: 3:50 PM - 4:10 PM


Author(s): Reshma Anamari Mohandas, Univ. of Leeds (United Kingdom); Lalitha Ponnampalam, Univ. College London (United Kingdom); Lianhe H. Li, Univ. of Leeds (United Kingdom); Cyril C. Renaud, Alwyn J. Seeds, Univ. College London (United Kingdom); Paul Dean, Edmund H. Linfield, Giles A. Davies, Joshua R. Freeman, Univ. of Leeds (United Kingdom)

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Fourier limit pulse train from an active mode-locked quantum-cascade laser

Paper 10939-49

Time: 4:10 PM - 4:30 PM

Author(s): Valentino Pistore, Hanond Nong, Lab. Pierre Aigrain - ENS Paris (France); Pierre-Baptiste Vigneron, Raffaele Colombelli, Ctr. de Nanosciences et de Nanotechnologies (France); Katia Garrasi, Miriam S. Vitiello, NEST, Istituto Nanoscienze CNR (Italy); Lianhe H. Li, Edmund H. Linfield, Giles A. Davies, Univ. of Leeds (United Kingdom); Juliette Mangeney, Jérôme Tignon, Sukhdeep Dhillon, Lab. Pierre Aigrain - ENS Paris (France)

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Optomechanical control of quantum cascade laser frequency combs

Paper 10939-50

Time: 4:30 PM - 4:50 PM

Author(s): David Burghoff, Univ. of Notre Dame (United States); Ningren Han, Massachusetts Institute of Technology (United States); Filippos Kapsalidis, ETH Zurich (Switzerland); Nathan Henry, Johns Hopkins University (United States); Mattias Beck, ETH Zurich (Switzerland); Jacob Khurgin, Johns Hopkins University (United States); Jerome Faist, ETH Zurich (Switzerland); Qing Hu, Massachusetts Institute of Technology (United States)

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Session PWed: Posters-Wednesday

Wednesday 6 February 2019

6:00 PM - 8:00 PM

Location: Marriott Marquis Hotel, Golden Gate Ballroom

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field.

Poster Setup: Wednesday 10:00 AM – 5:00 PM 

View poster presentation guidelines and set-up instructions at

<http://spie.org/PWPPosterGuidelines>**Bistability in a monolithic two-section quantum dot semiconductor laser**

Paper 10939-64