Österreichische Physikalische Gesellschaft

⟨S|P|S⟩ swiss physical society

Gemeinsame Jahrestagung in Innsbruck
30. August - 3. September 2021

Universität Innsbruck, Technik Campus

Joint Annual Meeting in Innsbruck
30 August - 3 September 2021

Programmübersicht
Program Overview

in Zusammenarbeit mit - in collaboration with

CHIPP Swiss Institute of Particle Physics

beyondC

universität innsbruck

Time	ID	KOND II: PHOTONICS *Chair: Gottfried Strasser, TU Wien*
16:30	111	**Giant Kerr nonlinearity of intersubband transitions – Origin of self-starting frequency combs** *Nikola Opačak [1], Sandro Dal Cin [1], Johannes Hillbrand [2], Gottfried Strasser [1] Benedikt Schwarz [1]* *[1] TU Wien, [2] ETH Zürich* Optical frequency combs refer to the emission of perfectly periodic waveforms of light. These waveforms can be formed due to optical nonlinearities that provide the coherent coupling of the amplitude and phase of the light. We show that Bloch gain serves as the physical origin of the linewidth enhancement factor and that it plays an essential role in the formation of quantum cascade laser combs. We develop a laser master equation to self-consistently include the Bloch gain. Our results explain the generation of self-starting combs in Fabry-Perot QCLs, and the emission of localized structures in ring resonators, akin to dissipative Kerr solitons.
16:45	112	**Optical injection locking enables coherent dual-comb spectroscopy** *Johannes Hillbrand [1], Mathieu Bertrand [1], Valentin Wittwer [2], Nikola Opačak [3], Filippos Kapsalidis [1], Benedikt Schwarz [3], Thomas Südmeyer [2], Mattias Beck [1], Jérôme Faist [1]* *[1] Institute for Quantum Electronics, ETH Zürich,* *[2] Laboratoire Temps-Fréquence, Institut de Physique, Université de Neuchâtel, Avenue de Bellevaux 51, CH-2000 Neuchâtel* *[3] Institute of Solid State Electronics, TU Wien* Mid-infrared dual-comb spectroscopy is emerging as powerful tool for broadband and high-speed molecular spectroscopy. Chip-scale frequency combs based on quantum cascade lasers (QCLs) have become an invaluable technology, because they are electrically pumped, have a small footprint and offer an unrivalled power per mode. However, the mutual drift of both combs over time limits the averaging time and thus the sensitivity. Here, we show that two QCL frequency combs can be fully synchronized by optical injection locking. A passive optical filter enables an optical link between the combs, which locks their offset frequencies and establishes phase-coherence. Hence, the achieved signal-to-noise ratio is enhanced by more than an order of magnitude.
17:00	113	**Phase locking of two free running Quantum Cascade Laser frequency combs** *Sandro Dal Cin [1], Johannes Hillbrand [2], Gottfried Strasser [1], Benedikt Schwarz [1]* *[1] TU Wien, [2] ETH Zürich* Dual comb spectroscopy using Quantum Cascade Laser (QCL) frequency combs, is a widely applied technique for identification of optical absorption features in the radio-frequency (RF) domain. Temperature fluctuations and electronic noise lead to often highly unstable heterodyne beating signals, hindering reproducible evaluation and analysis. We present a simple, yet reliable phase locking technique based on a dual feedback Optical Phase Locked Loop (OPLL), enabling locking bandwidths above 600 kHz for a heterodyne QCL frequency comb setup. A simplified theoretical model is applied to estimate the required parameters for the loop filters relying on a single measurement of the frequency modulation sensitivity of one frequency comb.
17:15	114	**Measuring the Linewidth Enhancement Factor of a Laser Frequency Comb** *Florian Pilat [1], Nikola Opačak [1], Dmitri Kazakov [2], Sandro Dal Cin [1], Georg Ramer [1], Bernhard Lendl [1], Federico Capasso [2], Benedikt Schwarz [1]* *[1] TU Wien, [2] John A. Paulson School of Engineering and Applied Sciences, Harvard University* The linewidth enhancement factor (LEF) is known as an important property of semiconductor lasers. Recently, it is gaining more interest due to its key role in frequency comb operation. However, as of yet existing techniques to measure the LEF are limited to sub-threshold bias or single-mode operation. Here, we introduce a novel and universally applicable method to directly obtain the spectrally resolved LEF of a running laser frequency comb. The technique utilizes a phase-sensitive single shot measurement scheme. We derive a theoretical model, which is investigated by extensive Maxwell-Bloch simulations and demonstrated in an experiment on a quantum cascade laser.

Joint Annual Meeting in Innsbruck 2021

Schedule Tuesday 31.08.2021

TIME	*Rooms*			TIME
	A (ground floor)	B (first floor)	C (ground floor)	
08:00	*Registration*			08:00
	PLENARY SESSION			
09:00				09:00
09:10				09:10
09:20				09:20
09:30				09:30
09:40				09:40
09:50				09:50
10:00	**Conference Opening**			10:00
10:10	1 Ulrike Diebold (p)			10:10
10:20				10:20
10:30				10:30
10:40				10:40
10:50	2 Luciano Rezzola (p)			10:50
11:00				11:00
11:10				11:10
11:20				11:20
11:30	**GENERAL ASSEMBLY**			11:30
11:40	ÖPG			11:40
11:50				11:50
12:00				12:00
12:10				12:10
12:20				12:20
12:30	***Lunch***	***Lunch***	***Lunch***	12:30
	KOND	**FAKT - TASK**	**Surfaces, Interfaces and Thin Films**	
13:30	101 Oleksandr Dobrovolskiy	301 Elena Graverini	201 Dominik Steiner	13:30
13:45	102 Andrii Chumak	302 Annarita Buonaura	202 Marco Thaler	13:45
14:00	103 Qi Wang	303 Andreas Crivellin	203 Jan Eric Beckord	14:00
14:15	104 Walter Hahn	304 Davide Lancierini	204 Anton Tamtögl	14:15
14:30	105 Santa Pile	305 Michele Atzeni	205 Lukas Ludescher	14:30
14:45	106 Gediminas Simutis	306 Zhenzi Wang	206 Dominik Kreil	14:45
15:00	107 Alexey Sapozhnik	307 Vadym Denysenko	207 Alexina Ollier	15:00
15:15	108 Phoebe Tengdin	308 Martina Ferrillo	208 Helga Böhm	15:15
15:30	109 Mark Fischer	309 Federica Riti	209 Rimah Darawish	15:30
15:45	110 Tuan Pham	310 Emmerich Kneringer	210 Jung-Ching Liu	15:45
16:00	***Coffee Break***	***Coffee Break***	***Coffee Break***	16:00
16:15				16:15
16:30	111 Nikola Opačak	311 Luc Schnell	211 Mert Taskin	16:30
16:45	112 Johannes Hillbrand	312 Fiona Kirk	212 Jesús Redondo	16:45
17:00	113 Sandro Dal Cin	313 Jan Lüdtke	213 Ali Rafsanjani Abbasi	17:00
17:15	114 Florian Pilat	314 Josef Leutgeb	214 Lena Haager	17:15
17:30	115 Hedwig Knötig	329 Benjamin Koch	215 Panukorn Sombut	17:30
17:45	116 Urban Senica	315 Sonia Amina Bouchiba	216 Margareta Wagner	17:45
18:00	117 Martin Franckié	316 Veronica Soelund Kirsebom	217 Martin Setvin	18:00
18:15	118 Bo Meng	317 Marie Bachmayer	218 Igor Sokolović	18:15
18:30	119 Miriam Giparakis	318 Martin Andersson	219 Federico Stramaglia	18:30
18:45	120 Ronald Meisels	319 Christoph Regner		18:45
19:00	***Poster Session***	***Poster Session***	***Poster Session***	19:00
19:15	***and Apéro***	***and Apéro***	***and Apéro***	19:15
19:30				19:30
19:45				19:45
20:00				20:00
20:15				20:15
20:30				20:30

(p) = Plenary talk, (i) = Invited talk

320 *cancelled*

Joint Annual Meeting in Innsbruck 2021

Schedule Tuesday 31.08.2021

TIME	*Rooms* D (first floor)	E (ground floor)	F (first floor)	TIME
08:00	*Registration*			08:00
09:00				09:00
09:10				09:10
09:20				09:20
09:30				09:30
09:40				09:40
09:50				09:50
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11:00				11:00
11:10				11:10
11:20				11:20
11:30		**GENERAL ASSEMBLY**		11:30
11:40		SPS		11:40
11:50				11:50
12:00				12:00
12:10				12:10
12:20				12:20
12:30	***Lunch***	***Lunch***	***Lunch***	12:30
	Biophysics, Medical Physics and Soft Matter	**Atomic Physics and Quantum Optics**	**History and Philosophy of Physics**	
13:30	701 Andreas Frutiger (i)	401 Clemens Staudinger	81 Michael Wiescher	13:30
13:45		402 Cosetta Baroni		13:45
14:00	702 Mia Kvåle Løvmo	403 Elisa Soave	82 Franz Sachslehner	14:00
14:15	703 Christof Aegerter	404 Deborah Capecchi	83 Heinz Krenn	14:15
14:30	704 Christian Edwin Ritzer	406 Milena Horvath		14:30
14:45	705 Stefanie Kaser	407 Joaquin Minguzzi	84 Reinhard Folk	14:45
15:00		408 Alexander Baumgärtner		15:00
15:15		409 Rui Lin		15:15
15:30				15:30
15:45				15:45
16:00	***Coffee Break***	***Coffee Break***	***Coffee Break***	16:00
16:15			**Quantum Information and ...**	16:15
16:30	711 Stefan Rotter (i)	411 Helmut Ritsch	501 Maximilian Zanner	16:30
16:45		412 Florian Kappe	502 Robert Keil	16:45
17:00	713 Geoffroy Aubry	413 Benedikt Limbacher	503 Max Rossmannek	17:00
17:15	714 Andrea Lopez-Incera	414 Fangjia Zhu	504 Philip Schmidt	17:15
17:30	715 Axel Kreuter	415 Alexander Schlager	505 Tristan Kraft	17:30
17:45		416 Roman Messner	506 Matteo Mazzanti	17:45
18:00		417 Zhixin Wang	507 Caroline de Groot	18:00
18:15		418 Jakub Drs	508 Marco Valentini	18:15
18:30			509 Claire L. Edmunds	18:30
18:45				18:45
19:00	***Poster Session and Apéro***	***Poster Session and Apéro***	***Poster Session and Apéro***	19:00
19:15				19:15
19:30				19:30
19:45				19:45
20:00				20:00
20:15				20:15
20:30				20:30

(i) = Invited talk

712 *cancelled*	405 *cancelled*

22.08.2021