

# Aleksandra Foltynowicz

## EDUCATION

- Docent** (2018) Faculty of Science and Technology, Umeå University, Sweden
- Postdoctoral** JILA, University of Colorado at Boulder, CO, USA  
Advisor: Jun Ye  
*Cavity-enhanced optical frequency comb spectroscopy*
- PhD** (2009) Faculty of Science and Technology, Umeå University, Sweden  
Advisor: Ove Axner  
*“Fiber-laser-based noise-immune cavity-enhanced optical heterodyne molecular spectrometry”*  
available at <http://umu.diva-portal.org/smash/record.jsf?pid=diva2:214195>
- MSc** (2005) Department of Physics, Adam Mickiewicz University, Poznań, Poland  
Advisors: Ove Axner, Ryszard Naskręcki

## EMPLOYMENT

- 2018 - **Associate professor**  
Department of Physics, Umeå University, Sweden
- 2012 - 2017 **Assistant professor**  
Department of Physics, Umeå University, Sweden
- 2010 - 2012 **Postdoctoral research associate**  
JILA, University of Colorado at Boulder, CO, USA
- 2004 - 2009 **Graduate student**  
Department of Physics, Umeå University, Sweden

## RESEARCH GRANTS, SCHOLARSHIPS AND AWARDS

- 2019 Coblentz Award at ISMS2019
- 2017 - 2020 Swedish Research Council Project Grant
- 2016 Peter Werle Early Career Scientist Award at FLAIR2016
- 2016 - 2021 Knut and Alice Wallenberg Foundation Academy Fellow
- 2015 Kungliga Skytteanska Samfundets teknisk-naturvetenskapliga priset
- 2015 - 2016 Carl-Trygger Foundation equipment grant
- 2013 - 2016 Ingvar Carlsson Award 5 (Swedish Foundation for Strategic Research)
- 2013 - 2016 Swedish Research Council Junior Researcher Project Grant
- 2014 - 2015 Kempestiftelserna postdoctoral stipend
- 2013 - 2014 Carl-Trygger Foundation equipment grant
- 2013 Stiftelsen Lars Hiertas Minne equipment grant
- 2012 Swedish Research Council homing fellowship
- 2010 - 2011 Swedish Research Council postdoctoral fellowship
- 2010 The Wenner-Gren Foundations postdoctoral fellowship (declined)
- 2003 - 2004 European Physical Society university student fellowship

## SUPERVISION OF STUDENTS AND POSTDOCS

- Postdoctoral Matthias Germann, Vinicius Silva de Oliveira, Francisco Senna Vieira, Ibrahim Sadiék, Grzegorz Soboń, Lucile Rutkowski, Venkata Ramaiah Badarla, Chadi Abd Alrahman, Hsuan-Chen Chen
- Graduate Adrian Hjältén, Clayton Forssén (co-supervisor), Chuang Lu, Alexandra C. Johansson, Thomas Hausmaninger (co-supervisor), Amir Khodabakhsh

## PEER-REVIEWED PUBLICATIONS

1. *Stabilized all-fiber source for generation of tunable broadband  $f_{\text{CEO}}$ -free mid-IR frequency comb in the 7 – 9  $\mu\text{m}$  range*  
K. Krzempek, D. Tomaszewska, A. Gluszek, T. Martynkien, P. Mergo, J. Sotor, A. Foltynowicz, and G. Sobon  
Opt. Express **27**, 37435 (2019)
2. *Time-resolved continuous-filtering Vernier spectroscopy of  $\text{H}_2\text{O}$  and OH radical in a flame*  
C. Lu, F. Senna Vieira, F. M. Schmidt, and A. Foltynowicz  
Opt. Express **27**, 29521 (2019)
3. *Optical frequency comb photoacoustic spectroscopy*  
I. Sadiék, T. Mikkonen, M. Vainio, J. Toivonen, and A. Foltynowicz  
Phys. Chem. Chem. Phys. **20**, 27849-27855 (2018) arXiv 1809.02175
4. *Broadband calibration-free cavity-enhanced complex refractive index spectroscopy using a frequency comb*  
A. C. Johansson, L. Rutkowski, A. Filipsson, T. Hausmaninger, G. Zhao, O. Axner, and A. Foltynowicz  
Opt. Express **26**, 20633-20648 (2018) arXiv 1805.00799
5. *Optical frequency comb Faraday rotation spectroscopy*  
A. C. Johansson, J. Westberg, G. Wysocki, and A. Foltynowicz  
Appl. Phys. B **124**, 79 (2018) arXiv 1801.08399
6. *An experimental water line list at 1950 K in the 6250-6670  $\text{cm}^{-1}$  region*  
L. Rutkowski, A. Foltynowicz, F. M. Schmidt, A. C. Johansson, A. Khodabakhsh, A. A. Kyuberis, N. F. Zobov, O. L. Polyansky, S. N. Yurchenko, and J. Tennyson  
JQSRT **205**, 213-219 (2018) arXiv 1712.09406
7. *Optical frequency comb Fourier transform spectroscopy with sub-nominal resolution and precision beyond the Voigt profile*  
L. Rutkowski, P. Masłowski, A. C. Johansson, A. Khodabakhsh, and A. Foltynowicz  
JQSRT **204**, 63-73 (2017) arXiv 1612.04808
8. *Sensitive and broadband measurement of dispersion in a cavity using a Fourier transform spectrometer with kHz resolution*  
L. Rutkowski, A. C. Johansson, G. Zhao, T. Hausmaninger, A. Khodabakhsh, O. Axner, and A. Foltynowicz  
Opt. Express **25**, 21711-18 (2017) arXiv 1705.04729
9. *Mid-infrared continuous-filtering Vernier spectroscopy using a doubly resonant optical parametric oscillator*  
A. Khodabakhsh, L. Rutkowski, J. Morville, and A. Foltynowicz  
Appl. Phys. B **123**, 210 (2017) arXiv 1702.00396
10. *High-power frequency comb source tunable from 2.7 to 4.2  $\mu\text{m}$  based on difference frequency generation pumped by an Yb-doped fiber laser*  
G. Sobon, T. Martynkien, P. Mergo, L. Rutkowski, and A. Foltynowicz  
Opt. Lett. **42**, 1748-1751 (2017), editor's choice arXiv 1703.03277

11. *Detection of OH in an atmospheric flame at 1.5  $\mu\text{m}$  using optical frequency comb spectroscopy*  
L. Rutkowski, A. C. Johansson, D. Valiev, A. Khodabakhsh, A. Tkacz, F. M. Schmidt, and A. Foltynowicz  
Phot. Lett. Pol **8**, 110-112 (2016)
12. *Signal line shapes of Fourier transform cavity-enhanced frequency modulation spectroscopy with optical frequency combs*  
A. C. Johansson, L. Rutkowski, A. Khodabakhsh, and A. Foltynowicz  
J. Opt. Soc. Am. B **34**, 358-365 (2016)      arXiv 1609.06443
13. *Fourier transform and Vernier spectroscopy using an optical frequency comb at 3-5.4  $\mu\text{m}$*   
A. Khodabakhsh, V. Ramaiah-Badarla, L. Rutkowski, A. C. Johansson, K. F. Lee, J. Jiang, C. Mohr, M. E. Fermann, and A. Foltynowicz  
Opt. Lett. **41**, 2541 (2016)      arXiv 1603.09680
14. *Surpassing the path-limited resolution of a Fourier transform spectrometer with frequency combs*  
P. Maslowski, K. F. Lee, A. C. Johansson, A. Khodabakhsh, G. Kowzan, L. Rutkowski, A. A. Mills, C. Mohr, J. Jiang, M. E. Fermann, and A. Foltynowicz  
Phys. Rev. A **93**, 021802(R) (2016)      arXiv:1505.07706
15. *Noise-immune cavity-enhanced optical frequency comb spectroscopy: a sensitive technique for high-resolution broadband molecular detection*  
A. Khodabakhsh, A. C. Johansson, and A. Foltynowicz  
Appl. Phys. B **119**, 87-95 (2015)      arXiv 1410.8800
16. *Noise-immune cavity-enhanced optical frequency comb spectroscopy*  
A. Khodabakhsh, C. Abd Alrahman, and A. Foltynowicz  
Opt. Lett. **39**, 5034-5038 (2014)
17. *Cavity-enhanced optical frequency comb spectroscopy of high-temperature  $\text{H}_2\text{O}$  in a flame*  
C. Abd Alrahman, A. Khodabakhsh, F. M. Schmidt, Z. Qu, and A. Foltynowicz  
Opt. Express **22**, 13889-13895 (2014)      arXiv 1202.1216
18. *Use of etalon-immune-distances to reduce the influence of background signals in frequency modulation spectroscopy and NICE-OHMS*  
P. Ehlers, A. C. Johansson, I. Silander, A. Foltynowicz, and O. Axner  
J. Opt. Soc. Am B **31**, 2938-2945 (2014)
19. *Fiber-laser-based NICE-OHMS incorporating an optical circulator*  
P. Ehlers, J. Wang, I. Silander, A. Foltynowicz, and O. Axner  
Opt. Lett. **39**, 279-282 (2013)
20. *Optical measurement of the gas number density in a Fabry-Perot cavity*  
I. Silander, M. Zelan, O. Axner, F. Arrhen, L. Pendrill, and A. Foltynowicz,  
Meas. Sci. Instr. **24**, 105207 (2013)
21. *Cavity-enhanced optical frequency comb spectroscopy in the mid-infrared – application to trace detection of hydrogen peroxide*  
A. Foltynowicz, P. Maslowski, A. J. Fleisher, B. J. Bjork, and J. Ye  
Appl. Phys. B **110**, 163–175 (2013)
22. *Hydrogen peroxide enhanced nonthermal plasma effluent for biomedical applications*  
M. Golkowski, C. Golkowski, J. Leszczynski, R. Plimpton, P. Maslowski, A. Foltynowicz, J. Ye, and B. McCollister  
IEEE Trans. Plasma Sci. **40**, 1984-1991 (2012)
23. *Quantum-noise-limited optical frequency comb spectroscopy*  
A. Foltynowicz, T. Ban, P. Maslowski, F. Adler, and J. Ye  
Phys. Rev. Lett. **107**, 233002 (2011) *editors choice and selected for a Viewpoint in Physics*

24. *Reduction of background signals in fiber-based NICE-OHMS*  
A. Foltynowicz, I. Silander, and O. Axner  
J. Opt. Soc. Am. B **28**, 2797-2805 (2011)
25. *Optical frequency comb spectroscopy*  
A. Foltynowicz, P. Maslowski, T. Ban, F. Adler, K. C. Cossel, T. C. Briles, and J. Ye  
Faraday Disc. **150**, 23-31 (2011)
26. *Mid-infrared Fourier transform spectroscopy with a broadband frequency comb*  
F. Adler, P. Maslowski, A. Foltynowicz, K. C. Cossel, T. C. Briles, I. Hartl, and J. Ye  
Opt. Express **18**, 21861-21872 (2010)
27. *Distributed-feedback-laser-based NICE-OHMS in the pressure-broadened regime*  
A. Foltynowicz, J. Wang, P. Ehlers, and O. Axner  
Opt. Express **18**, 18580-18591 (2010)
28. *Highly sensitive dispersion spectroscopy by probing the free spectral range of an optical cavity using dual-frequency modulation*  
F. M. Schmidt, W. Ma, A. Foltynowicz, and O. Axner  
Appl. Phys. B **101**, 497-509 (2010)
29. *Wavelength modulated noise-immune cavity-enhanced optical heterodyne molecular spectroscopy signal line shapes in the Doppler limit*  
A. Foltynowicz, W. Ma, F. M. Schmidt, and O. Axner  
J. Opt. Soc. Am. B **26**, 1384-1394 (2009)
30. *Characterization of fiber-laser-based sub-Doppler NICE-OHMS for trace gas detection*  
A. Foltynowicz, W. Ma, and O. Axner  
Opt. Express **16**, 14689-14702 (2008)
31. *Noise-immune cavity-enhanced optical heterodyne molecular spectroscopy: Current status and future potential*  
A. Foltynowicz, F. M. Schmidt, W. Ma, and O. Axner  
Appl. Phys. B **92**, 313-326 (2008)
32. *Sub-Doppler dispersion and noise-immune cavity-enhanced optical heterodyne molecular spectroscopy revised*  
O. Axner, W. Ma, and A. Foltynowicz  
J. Opt. Soc. Am. B **25**, 1166-1177 (2008)
33. *Doppler-broadened noise-immune cavity-enhanced optical heterodyne molecular spectroscopy signals from optically saturated transitions under low pressure conditions*  
A. Foltynowicz, W. Ma, F. M. Schmidt, and O. Axner  
J. Opt. Soc. Am. B **25**, 1156-1165 (2008)
34. *Theoretical description of Doppler-broadened noise-immune cavity-enhanced optical heterodyne molecular spectroscopy under optically saturated conditions*  
W. Ma, A. Foltynowicz, and O. Axner  
J. Opt. Soc. Am. B **25**, 1144-1155 (2008)
35. *Doppler-broadened fiber-laser-based NICE-OHMS - Improved detectability*  
F. M. Schmidt, A. Foltynowicz, W. Ma, T. Lock, and O. Axner  
Opt. Express **15**, 10822-10831 (2007)
36. *Fiber-laser-based noise-immune cavity-enhanced optical heterodyne molecular spectrometry for Doppler-broadened detection of C<sub>2</sub>H<sub>2</sub> in the parts per trillion range*  
F. M. Schmidt, A. Foltynowicz, W. Ma, and O. Axner  
J. Opt. Soc. Am. B **24**, 1392-1405 (2007)
37. *Wavelength modulation absorption spectrometry from optically pumped collision broadened atoms and molecules*  
A. Foltynowicz, F. M. Schmidt, J. Gustafsson, and O. Axner

- J. Quant. Spectrosc. Radiat. Transfer **108**, 220-238 (2007)
38. *Absorption spectrometry by narrowband light in optically saturated and pumped collision and Doppler broadened gaseous media under arbitrary optical thickness conditions*  
O. Axner, F. M. Schmidt, A. Foltynowicz, J. Gustafsson, N. Omenetto, and J. D. Winefordner  
Appl. Spectrosc. **60**, 1217-1240 (2006) cover
  39. *Wavelength modulation absorption spectrometry from optically saturated collision-broadened transitions.*  
F. M. Schmidt, A. Foltynowicz, M. Gustafsson, and O. Axner  
J. Quant. Spectrosc. Radiat. Transfer **94**, 225-254 (2005)

## BOOK CHAPTERS

1. *NICE-OHMS – Frequency modulation cavity-enhanced spectroscopy – Principles and performance.*  
O. Axner, P. Ehlers, A. Foltynowicz, I. Silander, and J. Wang  
Cavity-Enhanced Spectroscopy and Sensing, eds H.P. Loock, G. Gagliardi, Springer 2013
2. *Cavity-enhanced direct frequency comb spectroscopy.*  
P. Maslowski, K. C. Cossel, A. Foltynowicz, and J. Ye  
Cavity-Enhanced Spectroscopy and Sensing, eds H.P. Loock, G. Gagliardi, Springer 2013

## INVITED TALKS

1. *Optical frequency comb Fourier transform spectroscopy.*  
A. Foltynowicz  
74<sup>th</sup> International Symposium on Molecular Spectroscopy, Champaign-Urbana, IL, USA, Jun 2019
2. *Cavity-enhanced comb-based Fourier transform spectroscopy.*  
A. Foltynowicz  
13<sup>th</sup> International Used Meeting on Cavity Enhanced Spectroscopy, Madison, WI, USA, Jun 2019
3. *Precision Fourier transform spectroscopy using optical frequency combs.*  
A. Foltynowicz  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2019
4. *Precision Fourier transform spectroscopy using optical frequency combs. (within ‘Spectroscopy for bright future’)*  
A. Foltynowicz, L. Rutkowski, A. C. Johansson, A. Filipsson, and A. Khodabakhsh  
25<sup>th</sup> Colloquium on High Resolution Molecular Spectroscopy, Helsinki, Finland, Sept 2017
5. *Optical frequency comb spectroscopy for gas metrology and trace gas detection.*  
P. Maslowski, G. Kowzan, D. Charczun, D. Lisak, R. Trawinski, L. Rutkowski, A. C. Johansson, A. Khodabakhsh, A. Foltynowicz, K. F. Lee, and M. E. Fermann (SW4J.5)  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2017
6. *Optical frequency comb spectroscopy*  
A. Foltynowicz  
Optics and Photonics in Sweden, Linköping, Sweden, Nov 2016
7. *Cavity-enhanced Fourier transform and Vernier spectroscopy with optical frequency combs*  
L. Rutkowski, A. Khodabakhsh, A. C. Johansson, V. Ramaiah-Badarla, and A. Foltynowicz  
Frontiers in Optics, Rochester, NY, Oct 2016
8. *Cavity-enhanced optical frequency combs spectroscopy in the near- and mid-infrared*  
A. Foltynowicz, A. Khodabakhsh, L. Rutkowski, A. C. Johansson, and V. Ramaiah-Badarla

Laser Applications to Chemical, Security and Environmental Analysis (LACSEA), Heidelberg, Germany, Jul 2016

9. *High-resolution optical frequency comb spectroscopy*  
A. Foltynowicz, L. Rutkowski, A.C. Johansson, and A. Khodabakhsh  
23rd International Conference on Spectral Line Shapes, Toruń, Poland, Jun 2016
10. *Broadband molecular detection with cavity-enhanced optical frequency comb spectroscopy*  
A. Foltynowicz, A. Khodabakhsh, C. Abd Alrahman, A. C. Johansson  
Light, Energy and the Environment Congress: Optics and Photonics for Energy & the Environment (E2), Canberra, Australia, Dec 2014
11. *Optical frequency comb spectroscopy*  
A. Foltynowicz  
Swedish Physical Society AMO Physics section meeting, Lund, Sweden, Jun 2013
12. *Cavity-enhanced direct frequency comb spectroscopy for human breath analysis*  
P. Maslowski, A. Foltynowicz, A. J. Fleisher, B. J. Bjork, and J. Ye  
2012 International Breath Analysis Meeting, Sonoma, CA, USA, Oct 2012
13. *Optical frequency comb as a new tool for broadband high resolution spectroscopy*  
P. Maslowski, A. Foltynowicz, T. Ban, K. C. Cossel, and J. Ye  
21st International Conference on Spectral Line Shapes, St. Petersburg, Russia, Jun 2012
14. *Frequency comb spectroscopy and applications*  
A. Foltynowicz, P. Maslowski, T. Ban, F. Adler, K. C. Cossel, and J. Ye  
Field Laser Applications in Industry and Research, Murnau, Germany, Sept 2011
15. *Direct frequency comb spectroscopy: time and frequency domain approach*  
T. Ban, A. Foltynowicz, P. Maslowski, D. Aumiler, G. Pichler, and J. Ye  
43<sup>rd</sup> Congress of the European Group on Atomic Systems, Fribourg, Switzerland, Jun 2011
16. *Cavity-enhanced optical frequency comb spectroscopy*  
A. Foltynowicz, P. Maslowski, T. Ban, F. Adler, K. C. Cossel, and J. Ye  
Cavity Enhanced Spectroscopy, Kingston, ON, Canada, Jun 2011
17. *Noise-immune cavity-enhanced optical heterodyne molecular spectroscopy (NICE-OHMS): a laser-based cavity-enhanced spectroscopic technique for sensitive detection of gases*  
O. Axner, J. Wang, P. Ehlers, I. Silander, A. Foltynowicz, W. Ma  
Cavity Enhanced Spectroscopy, Kingston, ON, Canada, Jun 2011
18. *Broadband direct frequency comb spectroscopy in the mid-infrared*  
P. Maslowski, A. Foltynowicz, F. Adler, K. C. Cossel, T. C. Briles, T. Ban, and J. Ye  
Conference on Lasers and Electro-Optics, Baltimore, Md, USA, May 2011

## CONFERENCE CONTRIBUTIONS

1. *Mid-infrared comb-based Fourier transform spectroscopy of halogenated volatile organic compounds*  
I. Sadiiek, A. Hjältén, M. Stuhr, C. Lu, F. Senna Vieira, and A. Foltynowicz (oral SM1M.8)  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2020
2. *Sub-Doppler double-resonance spectroscopy of methane using a frequency comb probe*  
A. Foltynowicz, L. Rutkowski, I. Silander, A. C. Johansson, V. Silva de Oliveira, O. Axner, G. Soboń, T. Martynkien, P. Mergo, and K. K. Lehmann (oral STU4N.1)  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2020
3. *Towards a transferable standard for nitrous oxide isotopomer ratio*  
I. Sadiiek, A. Hjältén, M. Stuhr, G. Friedrichs, and A. Foltynowicz (oral STU4N.4)  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2020
4. *Robust, fast and sensitive near-infrared continuous-filtering Vernier spectrometer*

- F. Senna Vieira, C. Lu, I. Silander, A. Głuszek, G. Soboń<sup>2</sup>, and A. Foltynowicz (oral SM1M.5)  
 Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2020
5. *Measurement of high-resolution spectra of HVOCs using comb-based Fourier transform spectroscopy.*  
 I. Sadiiek, A. Hjältén, and A. Foltynowicz (oral)  
 26th Colloquium on High Resolution Molecular Spectroscopy, Dijon, France, Aug 2019
  6. *Cavity-enhanced complex refractive index spectroscopy using an optical frequency comb.*  
 A. C. Johansson, A. Filipsson, T. Hausmaninger, G. Zhao, O. Axner, A. Foltynowicz, L. Rutkowski (poster)  
 26th Colloquium on High Resolution Molecular Spectroscopy, Dijon, France, Aug 2019
  7. *Optical frequency comb photoacoustic spectroscopy.*  
 I. Sadiiek, A. Hjältén, A. Foltynowicz, T. Mikkonen, J. Toivonen, M. Vainio (poster)  
 26th Colloquium on High Resolution Molecular Spectroscopy, Dijon, France, Aug 2019
  8. *Sub-Doppler double-resonance spectroscopy of methane using a frequency comb probe.*  
 A. Foltynowicz, I. Silander, A. C. Johansson, O. Axner, K. K. Lehmann, L. Rutkowski, G. Soboń, T. Martynkiem, P. Mergo (poster)  
 26th Colloquium on High Resolution Molecular Spectroscopy, Dijon, France, Aug 2019
  9. *Time-resolved continuous-filtering Vernier spectroscopy in a flame.*  
 C. Lu, F. Senna Vieira, F. M. Schmidt, and A. Foltynowicz (oral CH-13.1)  
 CLEO/EU-EQEC, Munich, Germany, Jun 2019
  10. *Optical frequency comb photoacoustic spectroscopy.*  
 I. Sadiiek, T. Mikkonen, M. Vainio, J. Toivonen, and A. Foltynowicz (oral CH-3.4)  
 CLEO/EU-EQEC, Munich, Germany, Jun 2019
  11. *Precise comb-based Fourier transform spectroscopy for line parameter retrieval.*  
 A. C. Johansson, L. Rutkowski, P. Maslowski, A. Filipsson, T. Hausmaninger, G. Zhao, O. Axner, and A. Foltynowicz (oral ED-4.3)  
 CLEO/EU-EQEC, Munich, Germany, Jun 2019
  12. *Highly birefringent microstructured silica fibers for broadband soliton self-frequency shift.*  
 T. Martynkien, K. Stefańska, F. Senna Vieira, C. Lu, A. Foltynowicz, P. Mergo, J. Sotor, G. Soboń (poster)  
 CLEO/EU-EQEC, Munich, Germany, Jun 2019
  13. *Comb-based Fourier transform spectroscopy as a platform for measurements of high-resolution spectra of HVOCs.*  
 I. Sadiiek, A. Hjältén, and A. Foltynowicz (oral)  
 13<sup>th</sup> International Used Meeting on Cavity Enhanced Spectroscopy, Madison, WI, USA, Jun 2019
  14. *Optical frequency comb photoacoustic spectroscopy.*  
 I. Sadiiek, T. Mikkonen, M. Vainio, J. Toivonen, and A. Foltynowicz (poster)  
 13<sup>th</sup> International Used Meeting on Cavity Enhanced Spectroscopy, Madison, WI, USA, Jun 2019
  15. *Continuous-filtering Vernier spectroscopy in a flame.*  
 F. Senna Vieira, C. Lu, F. M. Schmidt, and A. Foltynowicz (poster)  
 13<sup>th</sup> International Used Meeting on Cavity Enhanced Spectroscopy, Madison, WI, USA, Jun 2019
  16. *Optical frequency comb photoacoustic spectroscopy.*  
 I. Sadiiek, T. Mikkonen, M. Vainio, J. Toivonen, and A. Foltynowicz (oral SW3L.5)  
 Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2019
  17. *Near-infrared continuous-filtering Vernier spectroscopy in a flame.*

- C. Lu, F. Senna Vieira, F. M. Schmidt, and A. Foltynowicz (oral SM2N.5)  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2019
18. *Broadband calibration-free cavity-enhanced complex refractive index spectroscopy using an optical frequency comb.*  
A. C. Johansson, L. Rutkowski, A. Filipsson, T. Hausmaninger, G. Zhao, O. Axner, and A. Foltynowicz (oral)  
Field Laser Applications in Industry and Research, Assisi, Italy, Sept 2018
  19. *CO<sub>2</sub> line parameter retrieval beyond the Voigt profile using comb-based Fourier transform spectroscopy.*  
A. C. Johansson, A. Filipsson, L. Rutkowski, P. Maslowski, and A. Foltynowicz (poster)  
Field Laser Applications in Industry and Research, Assisi, Italy, Sept 2018
  20. *Optical frequency comb Faraday rotation spectroscopy.*  
A. C. Johansson, J. Westberg, G. Wysocki, and A. Foltynowicz (poster)  
Field Laser Applications in Industry and Research, Assisi, Italy, Sept 2018
  21. *Optical frequency comb photoacoustic spectroscopy.*  
I. Sadiq, T. Mikkonen, T. Tomberg, F. Senna Vieira, J. Karhu, M. Vainio, J. Toivonen and A. Foltynowicz (poster)  
Field Laser Applications in Industry and Research, Assisi, Italy, Sept 2018
  22. *Near-infrared continuous-filtering Vernier spectroscopy in a flame.*  
C. Lu, F. Senna Vieira, A. C. Johansson, F. M. Schmidt, and A. Foltynowicz (poster)  
Field Laser Applications in Industry and Research, Assisi, Italy, Sept 2018
  23. *An experimental water line list at 1950 K in the 1.5-1.6  $\mu\text{m}$  region.*  
L. Rutkowski, A. Foltynowicz, F. M. Schmidt, A. C. Johansson, A. Khodabakhsh, A. A. Kyuberis, N. F. Zobov, O. L. Polyansky, S. N. Yurchenko, and J. Tennyson (poster)  
Field Laser Applications in Industry and Research, Assisi, Italy, Sept 2018
  24. *Broadband calibration-free complex refractive index spectroscopy in a cavity using a comb-based Fourier transform spectrometer*  
A. C. Johansson, L. Rutkowski, A. Filipsson, T. Hausmaninger, G. Zhao, O. Axner, and A. Foltynowicz  
International Symposium on Molecular Spectroscopy, Champaign-Urbana, IL, Jun 2018
  25. *CO<sub>2</sub> line parameter retrieval beyond the Voigt profile using comb-based Fourier transform spectroscopy*  
A. C. Johansson, A. Filipsson, L. Rutkowski, P. Maslowski, and A. Foltynowicz  
International Symposium on Molecular Spectroscopy, Champaign-Urbana, IL, Jun 2018
  26. *Broadband complex refractive index spectroscopy via measurement of cavity modes (STu3P.4)*  
A. C. Johansson, L. Rutkowski, A. Filipsson, T. Hausmaninger, G. Zhao, O. Axner, and A. Foltynowicz  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2018
  27. *CO<sub>2</sub> line parameter retrieval beyond the Voigt profile using comb-based Fourier transform spectroscopy (STu3P.6)*  
A. C. Johansson, A. Filipsson, L. Rutkowski, P. Maslowski, and A. Foltynowicz  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2018
  28. *Optical frequency comb Faraday rotation spectroscopy (JW2A.165)*  
A. C. Johansson, J. Westberg, G. Wysocki, and A. Foltynowicz  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2018
  29. *Broadband molecular spectroscopy via probing of cavity modes using a frequency-comb-based Fourier transform spectrometer*



- A. C. Johansson, L. Rutkowski, G. Zhao, T. Hausmaninger, A. Khodabakhsh, A. Filipsson, O. Axner, and A. Foltynowicz  
25<sup>th</sup> Colloquium on High Resolution Molecular Spectroscopy, Helsinki, Finland, Sept 2017
30. *Line parameter retrieval beyond the Voigt profile using comb-based Fourier transform spectroscopy*  
A. Filipsson, A. C. Johansson, L. Rutkowski, P. Maslowski, A. Khodabakhsh, and A. Foltynowicz  
25<sup>th</sup> Colloquium on High Resolution Molecular Spectroscopy, Helsinki, Finland, Sept 2017
31. *Measurement of H<sub>2</sub>O and OH Spectra in an Atmospheric Flame using Optical Frequency Comb Spectroscopy*  
L. Rutkowski, A. Khodabakhsh, A. C. Johansson, D. M. Valiev, F. M. Schmidt, L. Lodi, O. L. Polyansky, S. Yurchenko, J. Tennyson, and A. Foltynowicz  
25<sup>th</sup> Colloquium on High Resolution Molecular Spectroscopy, Helsinki, Finland, Sept 2017
32. *Broadband precision spectroscopy and multispecies detection using optical frequency combs*  
A. Khodabakhsh, L. Rutkowski, A. C. Johansson, G. Soboń, A. Filipsson, C. Lu, and A. Foltynowicz  
OPTO:2017, Warsaw, Poland, Jul 2017
33. *Broadband and high resolution direct measurement of cavity resonances*  
L. Rutkowski, A. C. Johansson, A. Khodabakhsh, and A. Foltynowicz  
Conference on Lasers and Electro-Optics – European Quantum Electronics Conference, Munich, Germany, Jun 2017
34. *Cavity-enhanced continuous-filtering Vernier spectroscopy at 3.3 μm using a femtosecond optical parametric oscillator*  
A. Khodabakhsh, L. Rutkowski, J. Morville, A. C. Johansson, G. Sobon, and A. Foltynowicz  
Conference on Lasers and Electro-Optics – European Quantum Electronics Conference, Munich, Germany, Jun 2017
35. *High-power broadband source tunable from 2.8 to 4 μm based on difference frequency generation*  
G. Soboń, T. Martynkien, P. Mergo, M. Marangoni, and A. Foltynowicz  
Conference on Lasers and Electro-Optics – European Quantum Electronics Conference, Munich, Germany, Jun 2017
36. *Detection of OH and H<sub>2</sub>O in an atmospheric flame by near-infrared optical frequency comb spectroscopy*  
L. Rutkowski, A. C. Johansson, A. Khodabakhsh, D. Valiev, L. Lodi, S. Yurchenko, O. L. Polyansky, J. Tennyson, F. M. Schmidt, and A. Foltynowicz  
Conference on Lasers and Electro-Optics – European Quantum Electronics Conference, Munich, Germany, Jun 2017
37. *Faraday rotation spectroscopy using an optical frequency comb*  
A. C. Johansson, J. Westberg, A. Khodabakhsh, L. Rutkowski, G. Wysocki, and A. Foltynowicz  
Conference on Lasers and Electro-Optics – European Quantum Electronics Conference, Munich, Germany, Jun 2017
38. *Direct broadband measurement of cavity modes using a mechanical Fourier transform spectrometer with kHz resolution*  
L. Rutkowski, A. C. Johansson, G. Zhao, T. Hausmaninger, A. Khodabakhsh, and A. Foltynowicz  
Cavity Enhanced Spectroscopy, Egmont aan Zee, the Netherlands, Jun 2017

39. *Mid-infrared cavity-enhanced continuous-filtering Vernier spectroscopy using a femtosecond optical parametric oscillator*  
A. Khodabakhsh, L. Rutkowski, J. Morville, G. Sobon, C. Lu and A. Foltynowicz  
Cavity Enhanced Spectroscopy, Egmont aan Zee, the Netherlands, Jun 2017
40. *Line parameter retrieval beyond the Voigt profile using comb-based Fourier transform spectroscopy*  
A. C. Johansson, L. Rutkowski, P. Masłowski, A. Filipsson, A. Khodabakhsh, and A. Foltynowicz  
Cavity Enhanced Spectroscopy, Egmont aan Zee, the Netherlands, Jun 2017
41. *Detection of OH in an atmospheric flame using near-infrared cavity-enhanced optical frequency comb spectroscopy*  
L. Rutkowski, A. Khodabakhsh, A. C. Johansson, D. Valiev, F. M. Schmidt, and A. Foltynowicz  
Cavity Enhanced Spectroscopy, Egmont aan Zee, the Netherlands, Jun 2017
42. *Mechanical Fourier transform spectrometer with kHz resolution (SW4J.6)*  
L. Rutkowski, A. C. Johansson, A. Khodabakhsh, and A. Foltynowicz  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2017
43. *Continuous-filtering Vernier spectroscopy at 3.3  $\mu\text{m}$  using a femtosecond optical parametric oscillator (SW1L.5)*  
A. Khodabakhsh, L. Rutkowski, J. Morville, and A. Foltynowicz  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2017
44. *Near-infrared Fourier transform cavity-enhanced optical frequency comb spectroscopy*  
A. Khodabakhsh, L. Rutkowski, P. Masłowski, F. M. Schmidt, and A. Foltynowicz  
Light, Energy and the Environment Congress: Fourier Transform Spectroscopy (FTS), Leipzig, Germany, Nov 2016
45. *Fourier transform and Vernier spectroscopy with a mid-Infrared optical frequency comb*  
A. Khodabakhsh, V. Ramaiah-Badarla, L. Rutkowski, A. C. Johansson, K. F. Lee, J. Jiang, C. Mohr, M. E. Fermann, and A. Foltynowicz  
Light, Energy and the Environment Congress: Fourier Transform Spectroscopy (FTS), Leipzig, Germany, Nov 2016
46. *Fourier-transform-based noise-immune cavity-enhanced optical frequency comb spectroscopy*  
A. C. Johansson, A. Khodabakhsh, L. Rutkowski, and A. Foltynowicz  
Light, Energy and the Environment Congress: Fourier Transform Spectroscopy (FTS), Leipzig, Germany, Nov 2016
47. *Detection of H<sub>2</sub>O and OH in a flame by optical frequency comb spectroscopy*  
L. Rutkowski, A. C. Johansson, A. Khodabakhsh, D. M. Valiev, L. Lodi, O. L. Polyansky, S. Yurchenko, J. Tennyson, F. M. Schmidt, and A. Foltynowicz  
Optics and Photonics in Sweden, Linköping, Sweden, Nov 2016
48. *Fourier Transform spectroscopy and Vernier spectroscopy using a mid-infrared optical frequency comb*  
A. Khodabakhsh, V. Ramaiah-Badarla, L. Rutkowski, A. C. Johansson, K. F. Lee, J. Jiang, C. Mohr, M. E. Fermann, and A. Foltynowicz  
Optics and Photonics in Sweden, Linköping, Sweden, Nov 2016
49. *Noise-immune cavity-enhanced optical frequency comb spectroscopy*  
A. C. Johansson, A. Khodabakhsh, L. Rutkowski, and A. Foltynowicz  
Optics and Photonics in Sweden, Linköping, Sweden, Nov 2016
50. *Optical frequency comb Fourier transform spectroscopy with resolution beyond the path difference limit*

- L. Rutkowski, A. C. Johansson, A. Khodabakhsh, P. Maslowski, G. Kowzan, K. F. Lee, A. Mills, C. Mohr, J. Jiang, M. E. Fermann, and A. Foltynowicz  
Field Laser Applications in Industry and Research, Aix-les-Bains, France, Sept 2016
51. *Fourier-transform-based cavity-enhanced optical frequency comb spectroscopy*  
A. C. Johansson, L. Rutkowski, A. Khodabakhsh, and A. Foltynowicz  
Field Laser Applications in Industry and Research, Aix-les-Bains, France, Sept 2016
  52. *Measurement of H<sub>2</sub>O and OH in a flame by optical frequency comb spectroscopy*  
L. Rutkowski, A. Khodabakhsh, A. C. Johansson, D. M. Valiev, L. Lodi, Z. Qu, R. Ghorbani, O. L. Polyansky, J. Tennyson, F. M. Schmidt, and A. Foltynowicz  
Field Laser Applications in Industry and Research, Aix-les-Bains, France, Sept 2016
  53. *Fourier transform spectroscopy and Vernier spectroscopy using an optical frequency comb in the 3-5.4 μm range*  
A. Khodabakhsh, V. Ramaiah-Badarla, L. Rutkowski, A. C. Johansson, K. F. Lee, J. Jiang, C. Mohr, M. E. Fermann, and A. Foltynowicz  
Field Laser Applications in Industry and Research, Aix-les-Bains, France, Sept 2016
  54. *Noise-immune cavity-enhanced optical frequency comb spectroscopy*  
A. C. Johansson, L. Rutkowski, A. Khodabakhsh, and A. Foltynowicz  
23rd International Conference on Spectral Line Shapes, Toruń, Poland, Jun 2016
  55. *Optical frequency comb spectroscopy of H<sub>2</sub>O and OH in a flame*  
L. Rutkowski, A. Khodabakhsh, A. C. Johansson, D. M. Valiev, L. Lodi, Z. Qu, R. Ghorbani, O. L. Polyansky, J. Tennyson, F. M. Schmidt, and A. Foltynowicz  
23rd International Conference on Spectral Line Shapes, Toruń, Poland, Jun 2016
  56. *Optical frequency comb spectroscopy at 3.2-5.4 μm*  
A. Khodabakhsh, V. Ramaiah-Badarla, A. C. Johansson, L. Rutkowski, and A. Foltynowicz  
23rd International Conference on Spectral Line Shapes, Toruń, Poland, Jun 2016
  57. *Optical frequency comb spectroscopy at 3.3 and 5.2 μm by a Tm: fiber-laser-pumped optical parametric oscillator (JF2K.6)*  
A. Khodabakhsh, V. Ramaiah-Badarla, L. Rutkowski, A. C. Johansson, K. F. Lee, J. Jiang, C. Mohr, M. E. Fermann, and A. Foltynowicz  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, Jun 2016
  58. *Optical frequency comb Fourier transform spectroscopy with resolution beyond the path difference limit (SW4H.1)*  
L. Rutkowski, A. C. Johansson, A. Khodabakhsh, P. Maslowski, G. Kowzan, K. F. Lee, A. Mills, C. Mohr, J. Jiang, M. E. Fermann, and A. Foltynowicz  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, Jun 2016
  59. *Measurement of H<sub>2</sub>O and OH in a flame by optical frequency comb spectroscopy (SW4H.8)*  
L. Rutkowski, A. Khodabakhsh, A. C. Johansson, D. Valiev, L. Lodi, Z. Qu, R. Ghorbani, O. Polyanski, Y. Jin, J. Tennyson, F. M. Schmidt and A. Foltynowicz  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, Jun 2016
  60. *Fourier transform spectroscopy with resolution beyond the optical path limit*  
P. Maslowski, G. Kowzan, K. F. Lee, M. E. Fermann, A. Foltynowicz, A. C. Johansson, A. Khodabakhsh, and L. Rutkowski  
High Resolution Molecular Spectroscopy, 24th Colloquium, Dijon, France, Aug 2015
  61. *Optical frequency comb Fourier transform spectroscopy with resolution exceeding the limit set by the optical path difference*  
A. Foltynowicz, L. Rutkowski, A. C. Johansson, A. Khodabakhsh, P. Maslowski, G. Kowzan, K. Lee, and M. E. Fermann  
International Symposium on Molecular Spectroscopy, Champaign-Urbana, IL, June 2015
  62. *Noise-immune cavity-enhanced optical frequency comb spectroscopy*

- L. Rutkowski, A. Khodabakhsh, A. C. Johansson, and A. Foltynowicz  
International Symposium on Molecular Spectroscopy, Champaign-Urbana, IL, June 2015
63. *Optical frequency comb Fourier transform spectroscopy with resolution beyond the optical path limit*  
A. Foltynowicz, L. Rutkowski, A. C. Johansson, A. Khodabakhsh, P. Maslowski, G. Kowzan, K. Lee, and M. E. Fermann  
Cavity Enhanced Spectroscopy, Boulder, CO, USA, Jun 2015
  64. *Cavity-enhanced optical frequency comb spectroscopy of high-temperature water in a flame*  
A. Khodabakhsh, L. Rutkowski, A. C. Johansson, Y. Jin, Z. Qu, R. Ghorbani, F. M. Schmidt, and A. Foltynowicz  
Cavity Enhanced Spectroscopy, Boulder, CO, USA, Jun 2015
  65. *Noise-immune cavity-enhanced optical frequency comb spectroscopy*  
L. Rutkowski, A. Khodabakhsh, A. C. Johansson, and A. Foltynowicz  
Cavity Enhanced Spectroscopy, Boulder, CO, USA, Jun 2015
  66. *Cavity-enhanced optical frequency comb spectroscopy of high-temperature water in a flame (STh40.2)*  
A. Khodabakhsh, Z. Qu, C. Abd Alrahman, A. C. Johansson, L. Rutkowski, F. M. Schmidt, and A. Foltynowicz  
Conference on Lasers and Electro-Optics, San Jose, CA, USA, May 2015
  67. *Fourier-transform-based noise-immune cavity-enhanced optical frequency comb spectroscopy (SM10.6)*  
A. Khodabakhsh, A. C. Johansson, L. Rutkowski, and A. Foltynowicz  
Conference on Lasers and Electro-Optics, San Jose, Ca, USA, May 2015
  68. *Fourier-transform cavity-enhanced optical frequency comb spectroscopy*  
A. Foltynowicz, A. Khodabakhsh, and A. C. Johansson  
2<sup>nd</sup> Stakeholder Workshop on Traceability of Spectral Reference Line Data, Braunschweig, Germany, Oct 2014
  69. *Noise-immune cavity-enhanced optical frequency comb spectroscopy*  
A. Khodabakhsh, C. Abd Alrahman, and A. Foltynowicz  
Field Laser Applications in Industry and Research, Florence, Italy, May 2014
  70. *Cavity-enhanced optical frequency comb spectroscopy of H<sub>2</sub>O and CO<sub>2</sub> in a flame*  
C. Abd Alrahman, A. Khodabakhsh, F. M. Schmidt, Z. Qu, and A. Foltynowicz  
Field Laser Applications in Industry and Research, Florence, Italy, May 2014
  71. *Optical measurement of the gas number density in a Fabry–Perot cavity*  
I. Silander, M. Zelan, O. Axner, F. Arrhén, L. Pendrill, and A. Foltynowicz  
Field Laser Applications in Industry and Research, Florence, Italy, May 2014
  72. *Fourier-transform cavity-enhanced optical frequency comb spectroscopy*  
A. Foltynowicz, C. Abd Alrahman, A. Khodabakhsh  
Cavity Enhanced Spectroscopy, Naples, Italy, Jun 2013
  73. *Cavity-enhanced direct frequency comb spectroscopy in the mid-infrared*  
A. J. Fleisher, B. J. Bjork, K. C. Cossel, A. Foltynowicz, P. Maslowski, and J. Ye  
Gordon Research Conference on Atomic and Molecular Interactions, Easton, MA, USA, Jul 2012
  74. *Developments in cavity-enhanced direct frequency comb spectroscopy*  
B. J. Bjork, A. Foltynowicz, A. J. Fleisher, P. Maslowski, and J. Ye  
43rd Annual DAMOP Meeting, Anaheim, CA, USA, Jun 2012
  75. *Mid-infrared frequency comb spectrometer based on an optical parametric oscillator*  
F. Adler, P. Maslowski, A. Foltynowicz, K. C. Cossel, S. A. Diddams, and J. Ye

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P. Maslowski, A. Foltynowicz, F. Adler, K. C. Cossel, T. Ban, T. C. Briles, and J. Ye  
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F. Adler, P. Maslowski, A. Foltynowicz, K. C. Cossel, T. C. Briles, and J. Ye  
Frontiers in Optics, Rochester, NY, USA, Oct 2010
78. *Broadband direct frequency comb spectroscopy in the mid-IR*  
P. Maslowski, A. Foltynowicz, F. Adler, K. C. Cossel, T. C. Briles, and J. Ye  
21<sup>st</sup> International Conference on High Resolution Spectroscopy, Poznan, Poland, Sept 2010
79. *Applications of cavity-enhanced direct frequency comb spectroscopy*  
A. Foltynowicz, P. Maslowski, F. Adler, K. C. Cossel, T. C. Briles, and J. Ye  
21<sup>st</sup> International Conference on High Resolution Spectroscopy, Poznan, Poland, Sept 2010
80. *Fiber-laser-based NICE-OHMS for trace gas detection*  
A. Foltynowicz, W. Ma, and O. Axner  
Ohio State University International Symposium on Molecular Spectroscopy, Columbus, OH, USA, Jun 2009
81. *Fiber-laser-based NICE-OHMS for ultra-sensitive trace species detection*  
A. Foltynowicz, F. M. Schmidt, W. Ma, and O. Axner  
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A. Foltynowicz, F. M. Schmidt, W. Ma, and O. Axner  
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83. *Fiber-laser-based NICE-OHMS and trace gas detection*  
A. Foltynowicz, F. M. Schmidt, W. Ma, and O. Axner  
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84. *A scrutiny of NICE-OHMS for trace species detection*  
A. Foltynowicz, F. M. Schmidt, W. Ma, and O. Axner  
Tunable Diode Laser Spectroscopy, Reims, France, Jul 2007
85. *Fiber-laser-based NICE-OHMS for ultra-sensitive trace species detection*  
F. M. Schmidt, A. Foltynowicz, W. Ma, and O. Axner  
Tunable Diode Laser Spectroscopy, Reims, France, Jul 2007