

## List of Publications – Dr. Tobias Fehenberger

### Patents

- [P3] D. Millar, **T. Fehenberger**, T. Koike-Akino, K. Kojima, and K. Parsons, “Short block length distribution matching algorithm,” US Patent 10,516,503, Jan. 2020. [[↗ patents.google.com/patent/US10541711B1](https://patents.google.com/patent/US10541711B1)]
- [P2] D. Millar, **T. Fehenberger**, T. Koike-Akino, K. Kojima, and K. Parsons, “Distribution matcher,” US Patent 10,516,503, Dec. 2019. [[↗ patents.google.com/patent/US10516503B1](https://patents.google.com/patent/US10516503B1)]
- [P1] D. Millar, **T. Fehenberger**, T. Koike-Akino, K. Kojima, and K. Parsons, “Partition based distribution matcher for probabilistic constellation shaping,” US Patent 10,069,519, Sep. 2018. [[↗ patents.google.com/patent/US10069519B1](https://patents.google.com/patent/US10069519B1)]

### Journal Papers

- [J17] **T. Fehenberger**, D. S. Millar, T. Koike-Akino, K. Kojima, K. Parsons, and H. Griesser, “Huffman-coded sphere shaping and distribution matching algorithms via lookup tables,” *IEEE/OSA Journal of Lightwave Technology*, vol. 38, no. 10, pp. 2826–2834, May 2020. [[doi:↗ 10.1109/JLT.2020.2987210](https://doi.org/10.1109/JLT.2020.2987210)]
- [J16] **T. Fehenberger**, D. S. Millar, T. Koike-Akino, K. Kojima, and K. Parsons, “Parallel-amplitude architecture and subset ranking for fast distribution matching,” *IEEE Transactions on Communications*, Jan. 2020. [[doi:↗ 10.1109/TCOMM.2020.2966693](https://doi.org/10.1109/TCOMM.2020.2966693)]
- [J15] Y. C. Gültekin, **T. Fehenberger**, A. Alvarado, and F. M. J. Willems, “Probabilistic shaping for finite blocklengths: distribution matching and sphere shaping,” *Entropy*, vol. 22, no. 581, pp. 1–31, May 2020. [[doi:↗ 10.3390/e22050581](https://doi.org/10.3390/e22050581)]
- [J14] **T. Fehenberger**, D. S. Millar, T. Koike-Akino, K. Kojima, K. Parsons, and H. Griesser, “Analysis of nonlinear fiber interactions for finite-length constant-composition sequences,” *IEEE/OSA Journal of Lightwave Technology*, vol. 38, no. 2, pp. 457–465, Jan 2020. [[doi:↗ 10.1109/JLT.2019.2937926](https://doi.org/10.1109/JLT.2019.2937926)]
- [J13] **T. Fehenberger**, D. S. Millar, T. Koike-Akino, K. Kojima, and K. Parsons, “Multiset-partition distribution matching,” *IEEE Transactions on Communications*, vol. 67, no. 3, pp. 1885–1893, Mar. 2019. [[doi:↗ 10.1109/TCOMM.2018.2881091](https://doi.org/10.1109/TCOMM.2018.2881091)]
- [J12] D. S. Millar, **T. Fehenberger**, T. Koike-Akino, K. Kojima, and K. Parsons, “Distribution matching for high spectral efficiency optical communication with multiset partitions,” *IEEE/OSA Journal of Lightwave Technology*, vol. 37, no. 2, pp. 517–523, Jan. 2019. [[doi:↗ 10.1109/JLT.2018.2887188](https://doi.org/10.1109/JLT.2018.2887188)]
- [J11] A. Alvarado, **T. Fehenberger**, B. Chen, and F. M. J. Willems, “Achievable information rates for fiber optics: applications and computations,” *IEEE/OSA Journal of Lightwave Technology*, vol. 36, no. 2, pp. 424–439, Jan. 2018. [[doi:↗ 10.1109/JLT.2017.2786351](https://doi.org/10.1109/JLT.2017.2786351)]
- [J10] **T. Fehenberger**, “Information rates of probabilistically shaped coded modulation for a multi-span fiber-optic communication system with 64QAM [invited],” *Optics Communications*, vol. 409, pp. 2–6, Feb. 2018. [[doi:↗ 10.1016/j.optcom.2017.07.039](https://doi.org/10.1016/j.optcom.2017.07.039)]
- [J9] J. Renner, **T. Fehenberger**, M. P. Yankov, F. Da Ros, S. Forchhammer, G. Böcherer, and N. Hanik, “Experimental comparison of probabilistic shaping methods for unrepeated fiber transmission,” *IEEE/OSA Journal of Lightwave Technology*, vol. 35, no. 22, pp. 4871–4879, Nov. 2017. [[doi:↗ 10.1109/JLT.2017.2752243](https://doi.org/10.1109/JLT.2017.2752243)]

- [J8] M. P. Yankov, F. Da Ros, E. P. da Silva, **T. Fehenberger**, L. Barletta, D. Zibar, L. K. Oxenløwe, M. Galili, and S. Førchhammer, “Nonlinear phase noise compensation in experimental WDM systems with 256QAM,” *IEEE/OSA Journal of Lightwave Technology*, vol. 35, no. 8, pp. 1204–1210, Apr. 2017. [doi:↗ [10.1109/JLT.2016.2644860](https://doi.org/10.1109/JLT.2016.2644860)]
- [J7] T. A. Eriksson, **T. Fehenberger**, and W. Idler, “Characterization of nonlinear fiber interactions using multidimensional mutual information over time and polarization,” *IEEE/OSA Journal of Lightwave Technology*, vol. 35, no. 6, pp. 2256–2266, Mar. 2017. [doi:↗ [10.1109/JLT.2016.2645078](https://doi.org/10.1109/JLT.2016.2645078)]
- [J6] **T. Fehenberger**, A. Alvarado, G. Böcherer, and N. Hanik, “On probabilistic shaping of quadrature amplitude modulation for the nonlinear fiber channel,” *IEEE/OSA Journal of Lightwave Technology*, vol. 34, no. 22, pp. 5063–5073, Nov. 2016. [doi:↗ [10.1109/JLT.2016.2594271](https://doi.org/10.1109/JLT.2016.2594271)]
- [J5] T. A. Eriksson, **T. Fehenberger**, P. Andrekson, M. Karlsson, N. Hanik, and E. Agrell, “Impact of 4D channel distribution on the achievable rates in coherent optical communication experiments,” *IEEE/OSA Journal of Lightwave Technology*, vol. 34, no. 9, pp. 2256–2266, May 2016. [doi:↗ [10.1109/JLT.2016.2528550](https://doi.org/10.1109/JLT.2016.2528550)]
- [J4] **T. Fehenberger**, D. Lavery, R. Maher, A. Alvarado, P. Bayvel, and N. Hanik, “Sensitivity gains by mismatched probabilistic shaping for optical communication systems,” *IEEE Photonics Technology Letters*, vol. 28, no. 7, pp. 786–789, Apr. 2016. [doi:↗ [10.1109/LPT.2015.2514078](https://doi.org/10.1109/LPT.2015.2514078)]
- [J3] M. P. Yankov, **T. Fehenberger**, L. Barletta, and N. Hanik, “Low-complexity tracking of laser and nonlinear phase noise in WDM optical fiber systems,” *IEEE/OSA Journal of Lightwave Technology*, vol. 33, no. 23, pp. 4975–4984, Dec. 2015. [doi:↗ [10.1109/JLT.2015.2493202](https://doi.org/10.1109/JLT.2015.2493202)]
- [J2] **T. Fehenberger**, A. Alvarado, P. Bayvel, and N. Hanik, “On achievable rates for long-haul fiber-optic communications,” *Optics Express*, vol. 23, no. 7, pp. 9183–9191, Apr. 2015. [doi:↗ [10.1364/OE.23.009183](https://doi.org/10.1364/OE.23.009183)]
- [J1] S. Kilmurray, **T. Fehenberger**, P. Bayvel, and R. I. Killey, “Comparison of the nonlinear transmission performance of quasi-Nyquist WDM and reduced guard interval OFDM,” *Optics Express*, vol. 20, no. 4, pp. 4198–4205, Feb. 2012. [doi:↗ [10.1364/OE.20.004198](https://doi.org/10.1364/OE.20.004198)]

## Conference Papers

- [C29] **T. Fehenberger**, “Short-length probabilistic shaping: improved methods and mitigation of fiber nonlinearities,” in *International Zurich Seminar on Information and Communication (IZS)*, Zurich, Switzerland, Feb. 2020.
- [C28] **T. Fehenberger**, H. Griesser, and J.-P. Elbers, “Fiber nonlinearity mitigation by short-length probabilistic constellation shaping for pilot-aided signaling,” in *Proc. 21. ITG Symposium on Photonic Networks*, Leipzig, Germany, May 2020.
- [C27] **T. Fehenberger**, “On the impact of finite-length probabilistic shaping on fiber nonlinear interference,” in *Proc. Signal Processing in Photonic Communications (SPPCom)*, Montreal, Canada, Jul. 2020.
- [C27] **T. Fehenberger**, H. Griesser, and J.-P. Elbers, “Mitigating fiber nonlinearities by short-length probabilistic shaping,” in *Proc. Optical Fiber Communication Conference (OFC)*, San Diego, CA, USA, Mar. 2020. [doi:↗ [10.1364/OFC.2020.Th1I.2](https://doi.org/10.1364/OFC.2020.Th1I.2)]

- [C26] **T. Fehenberger**, “Short-length probabilistic shaping: improved methods and mitigation of fiber nonlinearities [invited],” in *Proc. International Zurich Seminar on Information and Communication (IZS)*, Zurich, Switzerland, Feb. 2020.
- [C25] **T. Fehenberger**, D. S. Millar, T. Koike-Akino, K. Kojima, and K. Parsons, “Mapping strategies for shortlength probabilistic shaping,” in *Proc. European Conference on Optical Communications (ECOC)*, Dublin, Ireland, Sep. 2019.
- [C24] D. S. Millar, **T. Fehenberger**, T. Yoshida, T. Koike-Akino, K. Kojima, N. Suzuki, and K. Parsons, “Huffman coded sphere shaping with short length and reduced complexity,” in *Proc. European Conference on Optical Communications (ECOC)*, Dublin, Ireland, Sep. 2019.
- [C23] **T. Fehenberger** and A. Alvarado, “Analysis and optimisation of distribution matching for the nonlinear fibre channel,” in *Proc. European Conference on Optical Communications (ECOC)*, Dublin, Ireland, Sep. 2019.
- [C22] **T. Fehenberger**, D. S. Millar, T. Koike-Akino, K. Kojima, and K. Parsons, “Partition-based probabilistic shaping for fiber-optic communication systems [invited],” in *Proc. Optical Fiber Communication Conference (OFC)*, San Diego, CA, USA, Mar. 2019. [doi:[10.1364/OFC.2019.M4B.3](https://doi.org/10.1364/OFC.2019.M4B.3)]
- [C21] D. S. Millar, **T. Fehenberger**, T. Koike-Akino, K. Kojima, and K. Parsons, “Coded modulation for next-generation optical communications [invited],” in *Proc. Optical Fiber Communication Conference (OFC)*, San Diego, CA, USA, Mar. 2018. [doi:[10.1364/OFC.2018.Tu3C.3](https://doi.org/10.1364/OFC.2018.Tu3C.3)]
- [C20] A. Alvarado, G. Liga, **T. Fehenberger**, and L. Schmalen, “On the design of coded modulation for fiber optical communications [invited],” in *Proc. Signal Processing in Photonic Communications (SPPCom)*, New Orleans, LA, USA, Jul. 2017. [doi:[10.1364/SPPCOM.2017.SpM4F.2](https://doi.org/10.1364/SPPCOM.2017.SpM4F.2)]
- [C19] **T. Fehenberger**, A. Alvarado, G. Böcherer, and N. Hanik, “On the impact of probabilistic shaping on SNR and information rates in multi-span WDM systems,” in *Proc. Optical Fiber Communication Conference (OFC)*, Los Angeles, CA, USA, Mar. 2017. [doi:[10.1364/OFC.2017.M3C.4](https://doi.org/10.1364/OFC.2017.M3C.4)]
- [C18] **T. Fehenberger**, M. Mazur, T. A. Eriksson, M. Karlsson, and N. Hanik, “Experimental analysis of correlations in the nonlinear phase noise in optical fiber systems,” in *Proc. European Conference on Optical Communications (ECOC)*, Düsseldorf, Germany, Sep. 2016.
- [C17] T. A. Eriksson and **T. Fehenberger**, “Mutual information characterization of nonlinear fiber channels [invited],” in *Proc. European Conference on Optical Communications (ECOC)*, Düsseldorf, Germany, Sep. 2016.
- [C16] A. Alvarado, L. Szczecinski, **T. Fehenberger**, M. Paskov, and P. Bayvel, “Improved soft-decision forward error correction via post-processing of mismatched log-likelihood ratios,” in *Proc. European Conference on Optical Communications (ECOC)*, Düsseldorf, Germany, Sep. 2016.
- [C15] M. P. Yankov, F. D. Ros, E. P. da Silva, **T. Fehenberger**, L. Barletta, D. Zibar, L. K. Oxenløwe, M. Galili, and S. Forchhammer, “Experimental study of nonlinear phase noise and its impact on WDM systems with DP-256QAM,” in *Proc. European Conference on Optical Communications (ECOC)*, Germany, Sep. 2016.
- [C14] R. Maher, D. Lavery, G. Liga, M. Paskov, A. Alvarado, **T. Fehenberger**, and P. Bayvel, “Capacity approaching transmission using probabilistic shaping and DBP for PFE constrained submarine optical links,” in *Proc. European Conference on Optical Communications (ECOC)*, Düsseldorf, Germany, Sep. 2016.

- [C13] **T. Fehenberger** and N. Hanik, “Multi-dimensional demappers for optical fiber systems with soft-decision forward error correction [invited],” in *Proc. International Conference on Transparent Optical Networks (ICTON)*, Trento, Italy, Jul. 2016.
- [C12] T. A. Eriksson, A. Lorences-Riesgo, P. Johannisson, **T. Fehenberger**, P. A. Andrekson, and M. Karlsson, “Achievable rates comparison for phase-conjugated twin-waves and PM-QPSK,” in *Proc. Optoelectronics and Communications Conference (OECC)*, Niigata, Japan, Jul. 2016.
- [C11] **T. Fehenberger**, T. A. Eriksson, A. Alvarado, M. Karlsson, E. Agrell, and N. Hanik, “Improved achievable information rates by optimized four-dimensional demappers in optical transmission experiments,” in *Proc. Optical Fiber Communication Conference (OFC)*, Anaheim, CA, USA, Mar. 2016. [doi:[10.1364/OFC.2016.W1I.4](https://doi.org/10.1364/OFC.2016.W1I.4)]
- [C10] **T. Fehenberger**, M. P. Yankov, L. Barletta, and N. Hanik, “Compensation of XPM interference by blind tracking of the nonlinear phase in WDM systems with QAM input,” in *Proc. European Conference on Optical Communications (ECOC)*, Valencia, Spain, Sep. 2015. [doi:[10.1109/ECOC.2015.7341782](https://doi.org/10.1109/ECOC.2015.7341782)]
- [C9] T. A. Eriksson, **T. Fehenberger**, N. Hanik, P. Andrekson, M. Karlsson, and E. Agrell, “Four-dimensional estimates of mutual information in coherent optical communication experiments,” in *Proc. European Conference on Optical Communications (ECOC)*, Valencia, Spain, Sep. 2015. [doi:[10.1109/ECOC.2015.7342028](https://doi.org/10.1109/ECOC.2015.7342028)]
- [C8] **T. Fehenberger**, N. Hanik, T. A. Eriksson, P. Johannisson, and M. Karlsson, “On the impact of carrier phase estimation on phase correlations in coherent fiber transmission,” in *Proc. Tyrrhenian International Workshop on Digital Communications (TIWDC)*, Florence, Italy, Sep. 2015. [doi:[10.1109/TIWDC.2015.7323331](https://doi.org/10.1109/TIWDC.2015.7323331)]
- [C7] **T. Fehenberger** and N. Hanik, “Analysis of forward error correction and achievable rates for optical fiber systems [invited],” in *Proc. International Conference on Transparent Optical Networks (ICTON)*, Budapest, Hungary, Jul. 2015. [doi:[10.1109/ICTON.2015.7193358](https://doi.org/10.1109/ICTON.2015.7193358)]
- [C6] **T. Fehenberger**, G. Böcherer, A. Alvarado, and N. Hanik, “LDPC coded modulation with probabilistic shaping for optical fiber systems,” in *Proc. Optical Fiber Communication Conference (OFC)*, Los Angeles, CA, USA, Mar. 2015. [doi:[10.1364/OFC.2015.Th2A.23](https://doi.org/10.1364/OFC.2015.Th2A.23)]
- [C5] **T. Fehenberger** and N. Hanik, “Digital back-propagation of a superchannel: Achievable rates and adaptation of the GN model,” in *Proc. European Conference on Optical Communications (ECOC)*, Cannes, France, Sep. 2014. [doi:[10.1109/ECOC.2014.6963935](https://doi.org/10.1109/ECOC.2014.6963935)]
- [C4] **T. Fehenberger**, F. Kristl, C. Behrens, A. Ehrhardt, A. Gladisch, and N. Hanik, “Estimates of constrained coded modulation capacity for optical networks,” in *Proc. 15. ITG Symposium on Photonic Networks*, Leipzig, Germany, May 2014. [on IEEEXplore [↗](#) ]
- [C3] **T. Fehenberger** and N. Hanik, “Information quality (IQ) factor as soft-decision decoding threshold for optical communications,” in *Proc. European Conference on Optical Communications (ECOC)*, London, UK, Sep. 2013. [doi:[10.1049/cp.2013.1632](https://doi.org/10.1049/cp.2013.1632)]
- [C2] **T. Fehenberger** and N. Hanik, “Comparison of performance limits by mutual information and practical realizations for optical long-haul coded modulation communication systems [invited],” in *Proc. International Conference on Transparent Optical Networks (ICTON)*, Cartagena, Spain, Jun. 2013. [doi:[10.1109/ICTON.2013.6602943](https://doi.org/10.1109/ICTON.2013.6602943)]

- [C1] S. Kilmurray, **T. Fehenberger**, P. Bayvel, and R. Killey, “Nonlinear transmission performance of reduced guard interval OFDM and quasi-Nyquist WDM,” in *Proc. Signal Processing in Photonic Communications (SPPCom)*, Colorado Springs, CO, USA, Jun. 2012.  
[doi:↗ [10.1364/SPPCOM.2012.SpTu1A.3](https://doi.org/10.1364/SPPCOM.2012.SpTu1A.3)]

## Theses

- [T2] **T. Fehenberger**, “Analysis and optimization of coded modulation for nonlinear fiber-optic communication systems,” PhD thesis, Sep. 2017.
- [T1] **T. Fehenberger**, “Investigations into the nonlinear channel capacity limits,” Diploma Thesis, Dec. 2011.

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