RICK FRITSCHEK

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EDUCATION

Dr.-Ing. in Electrical Engineering
Technische Universität Berlin   September 2012 - June 2018

M.Sc. in Electrical Engineering
Technische Universität Berlin   October 2010 - May 2012

B.Sc. in Electrical Engineering
Hochschule Furtwangen   October 2006 - March 2010

EXPERIENCE

Freie Universität Berlin   Oktober 2019 - Present
Postdoctoral Researcher at the Heisenberg Communications and Information Theory Group   *Berlin, Germany*

· I am a principal investigator of the DFG-funded project "Machine Learning for Phyiscal Layer Security" (joint project with Rafael Schaefer from TU Berlin)

Technische Universität Berlin   May 2019 - September 2019
Postdoctoral Researcher at the Information Theory and Applications Chair   *Berlin, Germany*

· Research topic: Deep learning for end-to-end wireless communication and security

Freie Universität Berlin   July 2018 - April 2019
Postdoctoral Researcher at the Heisenberg Communications and Information Theory Group   *Berlin, Germany*

· Research topic: Deep learning for end-to-end wireless communication and security
· Designed an end-to-end deep learning communication system which achieves information theoretic security, using TensorFlow and a novel loss function which mimics coset codes (accepted at ICC19, arxiv.org/abs/1810.12655)
· Created a neural network channel encoder, optimized by a recently introduced neural estimator of mutual information and thereby circumventing the missing channel density problem (arxiv.org/abs/1903.02865)
· Teaching assistant for Physical Layer Security (2018)

Freie Universität Berlin   October 2015 - June 2018
Research Associate at the Heisenberg Communications and Information Theory Group   *Berlin, Germany*

· Research topics: Physical layer security for multi-user channels and secret key generation over wireless channels
· Created a framework for deterministic secret key generation over AWGN channels
· Teaching assistant for Physical Layer Security (2015, 2016, 2017)

Technische Universität Berlin   September 2012 - September 2015
Research Associate at the Communications and Information Theory Group   *Berlin, Germany*

· Research topics: Deterministic models for interference networks and channel capacity approximations
· Proved a constant-gap capacity approximation for the interfering MAC with number theoretic methods
· Teaching assistant for Information Theory (2012, 2013)

Karlsruher Institut für Technologie   September 2009 - December 2009
Undergraduate Researcher   *Karlsruhe, Germany*

· Simulation of radiation inside the interim storage facility for nuclear waste in Philippsburg using MCNP5
· Reduced the overall simulation time by factor 100, with a novel use of surface sources

SKILLS

· Languages: German (native), English (proficient)
· Technical: Information Theory, Physical Layer Security, Machine/Deep Learning (see postdoc project)
· Programming: Python (TensorFlow, Keras, scikit-learn, Pandas), Latex, Matlab, C/C++, MCNP5

Talks
· Conference talks at CNS 2017 (Las Vegas), ISIT 2016 (Barcelona), ISIT 2015 (Hong Kong), ICC 2014 (Sydney)
· Technische Universität München, "Multiuser GDoF Gains in Cellular Networks: Achievable Rates and Upper Bounds beyond the Interference Channel Regimes"
· Ruhr-Universität Bochum, "Deterministic Models for Physical Layer Security and Key Generation Analysis"

Organizing
· Special session on Machine Learning for Physical Layer Security and Privacy at IEEE ICASSP 2020 (with Rafael Schaefer and Gerhard Wunder)

Referee
· IEEE Transactions on {Information Theory, Wireless Communications, Information Forensics and Security}
· Conferences: ISIT, ICASSP, ICC, Globecom, ITW, EuCNC, EUSIPCO, PIMRC, VTC

Grants
· DFG-funded project "Machine Learning for Physical LAyer Security", Budget: 200k Euro for 2 Years

Publications: First author of 10 peer-reviewed publications and one book chapter (https://bit.ly/2VoknrH)

Publications (as first author)

[1] **R. Fritschek**, Rafael F. Schaefer, G. Wunder. Deep Learning for Channel Coding via Neural Mutual Information Estimation In *IEEE 20th International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, Cannes, France, 2019.

[2] **R. Fritschek**, Rafael F. Schaefer, G. Wunder. Deep learning for the Gaussian wiretap channel. In *IEEE International Conference on Communications (ICC)*, Shanghai, China, 2019.

[3] **R. Fritschek** and G. Wunder. On the Gaussian multiple access wiretap channel and the Gaussian wiretap channel with a helper: Achievable schemes and upper bounds. In IEEE Transactions on Information Forensics and Security, 2018. (Early Access)

[4] **R. Fritschek** and G. Wunder. newblock On-the-fly secure key generation with deterministic models. In *Proc. IEEE International Conference on Communications (ICC)*, Paris, France, 2017.

[5] **R. Fritschek** and G. Wunder. On full-duplex secure key generation with deterministic models. In *Proc. IEEE Conference on Communications and Network Security (CNS '17) - 4th Workshop on Physical-Layer Methods for Wireless Security*, Las Vegas, Nevada, 2017, **invited**

[6] **R. Fritschek** and G. Wunder. Towards a constant-gap sum-capacity result for the gaussian wiretap channel with a helper. In *Proc. IEEE International Symposium on Information Theory (ISIT)*, Barcelona, Spain, July 2016.

[7] **R. Fritschek** and G. Wunder. Deterministic imac revisited: Constant-gap capacity in the weak interference case. In *Proc. IEEE International Conference on Communications (ICC)*, London, UK, 2015.

[8] **R. Fritschek** and G. Wunder. Constant-gap sum-capacity approximation of the deterministic interfering multiple access channel. In *Proc. IEEE International Symposium on Information Theory (ISIT)*, Hong Kong, China, 2015.

[9] **R. Fritschek** and G. Wunder. Upper bounds and duality relations of the linear deterministic sum capacity for cellular systems. In *Proc. IEEE International Conference on Communications (ICC)*, Sydney, Australia, 2014.

[10] **R. Fritschek** and G. Wunder. Enabling the multi-user generalized degrees of freedom in the gaussian cellular channel. In *Proc. IEEE Information Theory Workshop (ITW)*, Hobart, Australia, 2014.

Book Chapter

[1] **R. Fritschek** and G. Wunder. Enabling the Multi-User Generalized Degrees of Freedom in Cellular In *Communications in Interference Limited Networks*, Springer, 2016