# Dr. Martin Hölzer

## PERSONAL DATA

Name: Dr. rer. nat. Martin Hölzer

Gender: Male

Place and Date of Birth: Rudolstadt, Germany | 16 March 1988

Nationality: German

Address: Jansonstr. 11, 07745 Jena Phone: +49 160 92675865

Family status: Married

Twitter: @martinhoelzer

Email: hoelzer.martin@gmail.com

Code: github.com/hoelzer Web: hoelzer-lab.github.io

## SCIENTIFIC EDUCATION

01/2018 | **Doctorate degree**, Dr. rer. nat.

University of Jena

Grade: summa cum laude

Doctoral thesis: *The Dark Art of Next-Generation Sequencing: fundamental approaches for genomics, transcriptomics, and differential gene expression* Prof. Dr. Manja Marz, RNA Bioinformatics and High-Throughput Analysis

Faculty of Mathematics and Computer Sciences

since 06/2017 08/2013-06/2017 Leader of an associated bioinformatics research group at University of Jena

PhD student at University of Jena

12/2012 | Diploma in Bioinformatics

University of Jena

Grade: 1.4

Diploma thesis: Data management of mass spectra and fragmentation trees

with BExIS

Prof. Dr. Sebastian Böcker, Chair of Bioinformatics Faculty of Mathematics and Computer Sciences

10/2007–12/2012 | Studies of Bioinformatics at University of Jena

2006-2007 Civilian service, Diakonisches Altenhilfezentrum, Bad Blankenburg

1998-2006 University entrance qualification, Friedrich-Fröbel-Gymnasium, Bad Blankenburg, Grade 2.0

## **WORK EXPERIENCE**

### 10/2019-04/2020

#### Visiting Researcher

EMBL-EBI European Bioinformatics Institute, Dr. Rob Finn, Wellcome Trust Genome Campus, Hinxton, Cambridge, United Kingdom

Working in the research group of Dr. Rob Finn on the analysis and classification of metagenomic samples using Nanopore long-read sequencing data and hybrid approaches.

#### Current

#### Post-Doc & team leader of an associated research group

RNA Bioinformatics/High-Throughput Analysis, Prof. Dr. Manja Marz, University of Jena Supervision of Next-Generation Sequencing (NGS) projects including the automatization of workflows for assembly, annotation, variant calling, differential gene expression, metagenomics, and visualization of results. Development of novel applications for long-read sequencing data. Team leader of an associated and fresh bioinformatics group at the University of Jena.

#### since 06/2019

#### nanozoo GmbH

Co-founder and Co-managing director of nanozoo GmbH, Leipzig, Germany

Founded in mid-2019, nanozoo is a small bioinformatics company providing end-to-end services for the production and analysis of microbial data. *nanozoo* has set itself the goal of removing barriers in bioinformatic data analysis to provide up-to-date standards and analyses to a broad mass of researchers.

#### since 03/2017

#### **EVBC** member

Founding member of the "European Virus Bioinformatics Center" (EVBC), University of Jena The EVBC is intended to bring together virologists and bioinformaticians across Europe and provide a platform for interdisciplinary collaborative projects. My expertise covers sequencing, design and high-throughput analysis of virus-enriched and -infected biological samples.

#### 08/2013-06/2017

#### PhD student

RNA Bioinformatics/High-Throughput Analysis, Prof. Dr. Manja Marz, University of Jena Management of various NGS projects comprising 1) experimental design, 2) selection

Management of various NGS projects comprising 1) experimental design, 2) selection of appropriate sequencing parameters, and 3) data analysis, visualization and interpretation. Development of pipelines for downstream bioinformatical analyses. Examination of (meta-)genomic/transcriptomic data with a special focus on *de novo* assembly, annotation, and identification of differential expressed protein- and non-coding genes. Contributions to the emerging field of virus bioinformatics.

## 09/2009-05/2012

#### Student assistant

Chair of Bioinformatics, Prof. Dr. Sebastian Böcker, University of Jena

Integration of algorithms, data management and visualization for phylogenetic analyses and clustering.

## TASKS BEYOND OWN RESEARCH

#### · Next-Generation Sequencing

Management of more than 50 Next-Generation Sequencing projects, including design of experimental set-up and definition of sequencing parameters. Calculation of project costs and communication between the wet lab partners and the sequencing facility. Organization of data handling and computational analysis.

#### Advisory board memberships

Member of the external advisory board of the EU project "Digital Skills on Computational Biology for Health Professionals" (BioS)

#### Supervision of bachlor theses

Sandra Triebel, A comparison of short-read, long-read, and hybrid de novo genome assembly tools for the reconstruction of Mycoplasma bovis strains. (completed autumn 2019)

Jannes Spangenberg, *Analysis of host-virus transcriptome data: exploring the unmapped.* (completed autumn 2019). co-supervised

Rebekka Köhl, RNA-Seq analysis of a transfected human cell line. (started 07/2018)

## · Supervision of practical works

Anne Muriel Christin Ritsch, *Transcribed endogenous viral elements in Myotis lucifugus*. (completed summer 2019), co-supervised

Lasse Faber, *Transcripto - A Snakemake de novo transcriptome assembly pipeline*. (completed spring 2019)

Daria Meyer, Endogenous Viral Elements (EVEs). (completed winter 2018), co-supervised

## · Supervision of master theses

Lisa-Marie Barf, Bioinformatic and in vitro comparison among Chlamydia spp. to elucidate chlamydial host specificity and phylogeny. (completed 06/2019), co-supervised

Lasse Faber, Effective clustering of de novo transcriptome assemblies. (started 04/2019)

Marie Lataretu, *Spotting fungal mitogenomes in de novo assemblies of short-read NGS data.* (completed summer 2018)

Ruman Gerst, *PCAGO:* An interactive web service to analyze RNA-Seq data with principal component analysis. (completed fall 2017)

## Organization of international conferences and meetings

Hands-on workshop on Nanopore sequencing: Adventures in metagenomics and antimicrobial resistance, Indian Institute of Technology, Delhi, 2019: Instructor  $23^{rd}$  International Bioinformatics Workshop on Virus Evolution and Molecular Epidemiology (VEME), 2018: Supporting Organizer

Hackathon on aging-related data, *Stay Young or Die Trying*, 2017: Supporting Organizer First Meeting of the *European Virus Bioinformatics Centre*, 2017: Supporting Organizer Hackathon on virus infected RNA-Seq data, *Fight against Ebola – in silico*, 2014: Organizer

#### Peer-reviews for international conferences

Annual International Conference on Research in Comp. Molecular Biology (RECOMB 2018) Annual International Conference on Intelligent Systems for Molecular Biology (ISMB 2017) German Conference on Bioinformatics (GCB 2014, 2015, 2017)

### · Peer-reviews for journals

Nature Communications (2019), Microbiome (2019), Genome Biology (2019), BMC Supplements (2019), Scientific Reports (2019), Frontiers in Microbiology (2019), Virus Research (2018), Molecular Ecology Resources (2018)

Publons: publons.com/author/1521002

## • Third-party funding applications

Assistance in writing research grants for third-party funding (DFG, SPP, ERC)

## **SCHOLARSHIPS**

DEC. 2018 – JAN. 2021 "Add-on Fellowship for Interdisciplinary Life Science" of €12,500 the Joachim Herz Stiftung

### **GRANTS**

**Amount** 

2020 - 2025 "Digitisat

"Digitisation of the life sciences: Ways into the future" We receive €1.35 million from the *Thuringian Ministry of Science* to advance the digitization of life sciences. The project will start in 2020 and is initially scheduled for five years. I was jointly responsible for the application and significantly involved in the compilation of the contents and the writing.

DEC. 2018 - DEC. 2019

Program of the University of Jena to support junior researchers in obtaining third-party funding

€ 9,930

#### TEACHING

at the University of Jena

#### Teaching instructor

2018, 2019

Practical course: VIROINFORMATICS

Responsibilitites: Prepared, supervised, and assisted students in a two-week practical course on the topic of virus detection from meta-transcriptomic NGS data.

2017, 2017/18 2018 Lecture & Practical course: LETEX BASICS FOR NATURAL SCIENTISTS

Responsibilitites: Presented lectures on the document preparation system &T<sub>E</sub>X. Supervised and assisted 30 undergraduate students in a one-week full-time course. Graded daily assignments, excercises, and exams.

2017/18

Practical course: HIGH-THROUGHPUT BIOINFORMATICS

Responsibilitites: Prepared, supervised, and assisted students in a two-week practical course on the topic of RNA-Seq data analysis.

## Teaching assistant

2016/17, 2017/18 2018/19 Lecture: BASIC BIOINFORMATIC APPLICATIONS

Responsibilities: Prepared and taught four 1.5-hour lectures on the topic of high-throughput data analysis and assembly (From raw read data to differential expressed genes). Prepared and supervised practical examples. Graded assignments and course exams.

2014/15, 2015, 2016, 2017 Lecture: VIRUS BIOINFORMATICS

 ${\it Responsibilitites}: \ {\it Developed} \ and \ taught \ hour-long \ lessons \ on \ viral \ replication, \ assembly, \ and \ sequencing.$ 

2014/15, 2015/16, 2016/17, 2017/18

Lecture: HIGH-THROUGHPUT BIOINFORMATICS

*Responsibilitites*: Developed and taught hour-long lessons on sequencing technologies and protocols, Next-Generation Sequencing design, quality control and data processing, *de novo* and reference-based assembly, read quantification, normalization, and differential gene expression analysis.

2015/16, 2018/19

Practical course: HIGH-THROUGHPUT BIOINFORMATICS

Responsibilitites: Prepared, supervised, and assisted students in a one-week practical course on the topic of RNA-Seq data analysis.

## SCIENTIFIC POSTER PRESENTATIONS

03/2019	3rd annual meeting of the European Virus Bioinformatics Center (EVBC), Glasgow, Scotland
	Virus- and interferon alpha-induced transcriptomes of the microbat Myotis daubentonii.
03/2019	29th Annual Meeting of the Society for Virology, Düsseldorf, Germany Virus- and interferon alpha-induced transcriptomes of the microbat Myotis daubentonii.
09/2018	German Conference on Bioinformatics, Vienna, Austria
	Long reads matter: The advantages of nanopore long-read sequencing.
05/2017	Bioinformatics Mittelerde Meeting, Leipzig, Germany
	PoSeiDon: a web server for the detection of evolutionary recombination events and positive selection.
03/2017	27th Annual Meeting of the Society for Virology, Marburg, Germany
	PoSeiDon: a web server for the detection of evolutionary recombination events and positive selection.
04/2016	26th Annual Meeting of the Society for Virology, Münster, Germany A method pipeline for the detection of positively selected sites in silico - exemplarily shown for bat Mx1.

## SCIENTIFIC ORAL PRESENTATIONS

11/2018	BioGeo-Colloquium, Jena, Germany
	The advantages of nanopore sequencing: because long reads matter
11/2018	Institut für Mikrobiologie der Bundeswehr, Munich, Germany
	A short and a long sequencing story about Ebola and Coronaviruses
10/2018	16. Herbstseminar der Bioinformatik, Doubice, Czech Republic
-	Session chair on virus bioinformatics
07/2018	11th International Conference on Virology/Microbiology, Vancouver, Canada
•	An Interface between Bioinformatics and Virology (KEYNOTE SPEAKER)
06/2018	CRC AquaDiva On Site Retreat, Vitaleum UG Hütten, Germany
•	Viral diversity, viral de novo assembly, and viral decay in groundwater
02/2018	33. Winterseminar der Bioinformatik, Bled, Slovenia
	PCAGO: An interactive web service to analyze RNA-Seq data with principal com-
	ponent analysis
08/2017	CRC AquaDiva Recruitment Symposium, Jena, Germany
	Next-Generation Sequencing meets viruses
02/2017	32. Winterseminar der Bioinformatik, Bled, Slovenia
	PoSeiDon: A web server for the detection of evolutionary recombination events
	and positive selection
10/2016	14. Herbstseminar der Bioinformatik, Doubice, Czech Republic
	Fun with PCA: Insights into RNA-Seq based principal component analysis
02/2016	31. Winterseminar der Bioinformatik, Bled, Slovenia
	Evolutionary analyses of positively selected sites in the interferon-induced innate
	immunity factor Mx1 of bats
03/2015	25th Annual Meeting of the Society for Virology, Bochum, Germany
	Differential transcriptional responses to Ebola and Marburg virus infection in cells
	from bats and humans
02/2015	30. Winterseminar der Bioinformatik, Bled, Slovenia
	Fight against Ebola – in silico –

## CITATION ANALYSIS

Total number of publications: 22 No. of peer rev. publications: 19 No. of submissions & preprints: 2 No. of book chapters: 1 h-index: 7 Citations: 142 Average impact factor: 4.9 ORCID 0000-0001-7090-8717 Google Scholar goo.gl/CY4352

Publications

## Peer-reviewed journal publications

Ψ These authors contributed equally

- N. F. Mostajo<sup>Ψ</sup>, M. Lataretu<sup>Ψ</sup>, S. Krautwurst, F. Mock, D. Desirò, K. Lamkiewicz, M. Collatz, A. Schoen, F. Weber, M. Marz<sup>Ψ</sup>, and M. Hölzer<sup>Ψ</sup>. A comprehensive annotation and differential expression analysis of short and long non-coding RNAs in 16 bat genomes. NAR Genomics and Bioinformatics. 2(1):lqz006, 2019.
  IF. na
- A. Viehweger, S. Krautwurst, K. Lamkiewicz, R, Madhugiri, J. Ziebuhr, M. Hölzer, and M. Marz. Direct RNA nanopore sequencing of full-length coronavirus genomes provides novel insights into structural variants and enables modification analysis. *Genome Research*, 2019. IF: 10.1
- 17 **M.** Hölzer $^{\Psi}$ , A. Schoen $^{\Psi}$ , J. Wulle, MA. Müller, C. Drosten, M. Marz, and F. Weber. Virus- and interferon alpha-induced transcriptomes of cells from the microbat *Myotis daubentonii*. *iScience* 1:647–661, 2019. **IF: na**
- K. Laroucau, F. Vorimore, R. Aaziz, L. Solmonson, RC. Hsia, PM. Bavoil, P. Fach, M. Hölzer, A. Wuenschmann, and K. Sachse. *Chlamydia buteonis*, a new *Chlamydia* species isolated from a red-shouldered hawk. *Systematic and Applied Microbiology* 2019.
- 15 R. Kallies, M. Hölzer, R. Brizola Toscan, U. Nunes da Rocha, J. Anders, M. Marz, and A. Chatzinotas. Evaluation of sequencing library preparation protocols for viral metagenomic analysis from pristine aquifer groundwaters. *Viruses* 11(6):484, 2019.
  IF: 3.7
- S. Peter, M. Hölzer, K. Lamkiewicz, P. Speroni di Fenizio, HA. Hwaeer, M. Marz, S. Schuster, P. Dittrich, and B. Ibrahim. Structure and hierarchy of influenza virus models revealed by reaction network analysis. *Viruses* 11(5), 2019. **IF: 3.7**
- M. Hölzer and M. Marz. De novo transcriptome assembly: A comprehensive cross-species comparison of short-read RNA-Seq assemblers. GigaScience 8(5), 2019.
  IF: 7.3

- Z. Chen, E. Amro, F. Becker, M. Hölzer, S. Rasa, S. Njeru, B. Han, S. Di Sanzo, Y. Chen, D. Tang, S. Tao, R. Haenold, M. Groth, V. Romanov, J. Kirkpatrick, J. Kraus, H. Kestler, M. Marz, A. Ori, F. Neri, Y. Morita, and K. L. Rudolph. Cohesin-mediated NF-κB signaling limits hematopoietic stem cell self-renewal in aging and inflammation. J. Exp. Med. 216(1):152–175, 2018.
   IF: 10.8
- D. Desirò, M. Hölzer, B. Ibrahim, and M. Marz. SilentMutations (SIM): a tool for analyzing long-range RNA-RNA interactions in viral genomes and structured RNAs. Virus Res., 2018.
- D. Steinbach, M. Hölzer, M. Marz, M. Gajda, F. C. Von Rundstedt, and M. O. Grimm. Analysis of molecular mechanism of progression of non-muscle-invasive bladder cancer (NMIBC) by genome-wide exome and UTR mutation analysis. *Eur Urol Suppl.* 17(2):e1523, 2018.
  IF: 3.5
- 9 P. Möbius, G. Nordsiek, M. Hölzer, M. Jarek, M. Marz, and H. Köhler. Complete Genome Sequence of JII-1961, a Bovine *Mycobacterium avium* subsp. *paratuberculosis* Field Isolate from Germany. *Genome Announc.* 5(34), 2017. IF: 1.2
- J. Fuchs, M. Hölzer, M. Schilling, C. Patzina, A. Schoen, T. Hoenen, G. Zimmer, M. Marz, F. Weber, M. A. Müller, and G. Kochs. Evolution and Antiviral Specificities of Interferon-Induced Mx Proteins of Bats against Ebola, Influenza, and Other RNA Viruses. J Virol. 12; 91(15), 2017.
  IF: 4.7
- P. Möbius, E. Liebler-Tenorio, M. Hölzer, and H. Koehler. Evaluation of associations between genotypes of *Mycobacterium avium* subsp. *paratuberculsis* and presence of intestinal lesions characteristic of paratuberculosis. *Veterinary microbiology*. 201:188-194, 2017.
  IF: 2.6
- 6 K. Riege $^{\Psi}$ , M. Hölzer $^{\Psi}$ , T. Klassert, E. Barth, J. Bräuer, M. Collatz, F. Hufsky, N. Mostajo, M. Stock, B. Vogel, H. Slevogt, and M. Marz. Massive Effect on LncRNAs in Human Monocytes During Fungal and Bacterial Infections and in Response to Vitamins A and D. *Sci Rep.* 7:40598, 2017. IF: 4.8
- T. E. Klassert, J. Bräuer, M. Hölzer, M. Stock, K. Riege, C. Zubiría-Barrera, M. M. Müller, S. Rummler, C. Skerka, M. Marz, and H. Slevogt. Differential Effects of Vitamins A and D on the Transcriptional Landscape of Human Monocytes during Infection. Sci Rep. 7:40599, 2017.
- M. Hölzer<sup>Ψ</sup>, V. Krähling<sup>Ψ</sup>, F. Amman, E. Barth, S. H. Bernhart, V. A. O. Carmelo, M. Collatz, G. Doose, F. Eggenhofer, J. Ewald, J. Fallmann, L. M. Feldhahn, M. Fricke, J. Gebauer, A. J. Gruber, F. Hufsky, H. Indrischek, S. Kanton, J. Linde, N. M. Berrospi, R. Ochsenreiter, K. Rieger, L. Rivarola-Duarte, A. H. Sahyoun, S. J. Saunders, S. E. Seemann, A. Tanzer, B. Vogel, S. Wehner, M. T. Wolfinger, R. Backofen, J. Gorodkin, I. Grosse, I. Hofacker, S. Hoffmann, C. Kaleta, P. F. Stadler, S. Becker, and M. Marz. Differential transcriptional responses to Ebola and Marburg virus infection in bat and human cells. *Sci Rep.* 6:34589, 2016.
- M. Hölzer, K. Laroucau, H. H. Creasy, S. Ott, F. Vorimore, P. M. Bavoil, M. Marz, and K. Sachse. Whole-genome sequence of *Chlamydia gallinacea* type strain 08-1274/3. *Genome Announc*. 4(4):e00708-16, 2016. IF: 1.2

- P. Möbius $^{\Psi}$ , M. Hölzer $^{\Psi}$ , M. Felder, G. Nordsiek, M. Groth, H. Köhler, K. Reichwald, M. Platzer, and M. Marz. Comprehensive insights in the *Mycobacterium avium* subsp. *paratuberculosis* genome using new WGS data of sheep strain JIII-386 from Germany. *Genome Biol Evol.* 7(9):2585-2601, 2015. IF: 3.9
- 1 A. H. Sahyoun, M. Hölzer, F. Jühling, C. Höner Zu Siederdissen, M. Al-Arab, K. Tout, M. Marz, M. Middendorf, P. F. Stadler, and M. Bernt. Towards a comprehensive picture of alloacceptor tRNA remolding in metazoan mitochondrial genomes. *Nucleic Acids Res.* 43(16):8044–8056, 2015. IF: 11.5

## Submitted journal publications & preprints

A. Viehweger, **M. Hölzer**, and C. Brandt. Addressing dereplication crisis: Taxonomy-free reduction of massive genome collections using embeddings of protein content. *bioRxiv.* 10.1101/855262v2, 2019.

R. Gerst and M. Hölzer. PCAGO: An interactive web service to analyze RNA-Seq data with principal component analysis. *bioRxiv.* doi.org/10.1101/433078, 2018.

## **Book chapter**

**M.** Hölzer and M. Marz. Chapter Nine – Software Dedicated to Virus Sequence Analysis "Bioinformatics Goes Viral". *Adv Virus Res.* (ed. M. Beer), 99:233-257, Academic Press, 2017.

#### **Theses**

M. Hölzer. The Dark Art of Next-Generation Sequencing: fundamental approaches for genomics, transcriptomics, and differential gene expression. *PhD thesis*, University of Jena, 2018.

M. Hölzer. Data management of mass spectra and fragmentation trees with BExIS. *Diploma thesis*, in German, University of Jena, 2012.

## **SOFT SKILLS**

06/2019	Managing a Bioinformatics Core Facility, European Bioinformatics Institute
	(EMBL-EBI), Hinxton, UK
07/2018	Fördermöglichkeiten für exzellente Nachwuchswissenschaftler/innen, Dr. Mareile
	Knees, Jena
05/2018	Workshop "Drittmittel einwerben", Jana Dümmler, Graduate Academy, Jena
02/2018	Patente als Chance für meine Forschung, Dr. Christian Liutik, Patentinforma-
	tionszentrum FSU, Jena
02/2018	Pursuing an Academic Career in Germany: Pros and Cons, Dr. Hanna Kauhaus,
	Graduate Academy, Jena
02/2018	Proposal Writing Workshop, Frank Lauterbach, iRTG AquaDiva, Jena
03/2014	Mitteldeutscher Fundraisingtag, Crowdfunding: Chancen und Grenzen,
	FundraisingForum e.V., Jena
04/2013	Jugendgruppenleiter Card (JuLeiCa), nationwide uniform identity card for vol-
•	untary people in youth work, VTPV e.V., Bad Blankenburg
03/2012	Mitteldeutscher Fundraisingtag, Fundraising und Freiwillige: wie passt das
•	zusammen? FundraisingForum e.V., Jena

09/2010 | Web 2.0 - für Vereine, Initiativen & Parteien, Thomas Mergen, Friedrich-Naumann-Stiftung für die Freiheit, Erfurt

Various workshops, seminars, and advanced trainings about time and group management, group dynamics, self-motivation, project planning, association and employment law, speech, presentation, administration, and building

management.

## LEADERSHIP EXPERIENCES & NON-SCIENTIFIC ACTIVITIES

Scout association "Bund der Pfadfinderinnen und Pfadfinder" (BdP)		
since 2019	Management board member of "VTPV" registered society	
	Administrative tasks and representation of the scout activities in Thuringia.	
since 2012	Management board member of "Scoutactive" registered society	
	Administrative tasks and writing of proposals for staff funding.	
since 2008	Assistant manager of BdP scouting center of Thuringia	
	Administrative tasks, coordination of staff and volunteers, realization of adventure activities for kids and youths, technical support, web site and hardware supervision.	
since 2007	Assistant leader of BdP "Landesverband Thüringen e.V."	
	Organization of scout activities in Thuringia and across national borders. Organized events, trainings, and elections.	
2005-2015	Group leader of BdP scout tribe "Falken vom Greifenstein"	
	Administration of the association. Active participation and mainly responsible for the management and organization of various scout camps, international cooperations, and regular meetings. Managed team conflict and morale, represented the association at national and international events.	
since 1998	Member of BdP	

## Water of Life

2019/20	Member of the Cambridge University Whisky Appreciation Society
since 2017	Co-Founder and organizer of the Bad Blankenburger "Kessel-Treffen"
	Coordination of Scottish events and whisky tastings, www.kessel-treffen.de.
since 2014	Whisky tastings
	Preparation and execution of whisky tastings for beginner and advanced

#### Music

since 1999 | Piano

## **LANGUAGES**

**German** Native language

**English** Written and spoken fluently

## REFERENCES

#### Prof. Dr. Manja Marz

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## Dr. Konrad K. W. Sachse

1992-2015
Head of Department
Friedrich Loeffler Institute
Institute of Molecular Pathogenesis
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Prof. Dr. Friedemann Weber

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Dr. rer. nat. Martin Hölzer

Jena, December 19, 2019