

Zöbelein Carolin

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Independent mathematical scientist

In short

Current project: Hunting for graduate studies in mathematics ☺

Research motivation: Designing of a new kind of censorship free, access to knowledge warranty, privacy and anonymity preserving internet by a Mathematical Computer Science approach for Distributed Network Structures & Protocols as well as Algorithms, Combinatorics & Optimization.

Areas of work:

Mathematics

Algorithms, Combinatorics, Optimization, Mathematical Computer Science, Number Theory, Algebra, Cryptography, Graph Theory, Geometry

Computer Science

Theoretical Computer Science, Distributed Network Structures & Protocols, Online privacy & anonymity, Online traffic obfuscation and ways for circumventing blocking and censorship, Reverse engineering, Computer forensics, Cryptography, Social engineering

Numbers:

- Research time: \approx 3.25 years as independent research scientist, 3.25 years of student projects
- Projects: 4 large and several small as independent research scientist, 4 student projects
- Grants & Fellowships: 2, Total: 19 100 EUR
- Awards: 1
- Reviewer jobs: 1
- Exhibitions: 2
- Organized events: 1
- Teaching experience: \approx 16 years
- Coding experience: \approx 19 years
- Spoken languages: 7

Websites:

<https://research.carolin-zoebelein.de/>
<https://art.carolin-zoebelein.de/>
<https://blog.carolin-zoebelein.de/>

Practical experience

Current.....

Primary work

- **Independent mathematical scientist** **Remote, Germany**
Freelancer, Primary: Researcher, Secondary: Adviser and contractor *Since 2016/11*
Focus on Mathematical Computer Science of Distributed Network Structures & Protocols as well as Theoretical Computer Science like Algorithms, Combinatorics & Optimization, and Number Theory, with the aim of designing a new kind of censorship free, access to knowledge warranty, privacy and anonymity preserving internet
<https://research.carolin-zoebelein.de>

Secondary work

- **Artist** **Remote, Germany**
Freelancer *Since 2015/05*
Connection and integration of scientific phenomena into artwork, as well as artwork about mathematics, online privacy and anonymity, digital security and human rights
<https://art.carolin-zoebelein.de>
- **Consulting** **Remote, Germany**
Freelancer, For cross-subsidization *Since 2017/07*
<https://consulting.carolin-zoebelein.de>
- **Tor Project** **Remote**
Volunteering *Since 2016/05*
<https://www.torproject.org/>

Former.....

- **Infineon Technologies AG München** **Germany**
Student research project, Information Security - Cyber Defence Center *2018/11 - 2019/05*
Topic: Evading detection and treatment, Machine learning based malware detection
- **Friedrich-Alexander-University Erlangen-Nürnberg, Department for Mathematics** **Germany**
Student assistant, IT-Support *2016/04 - 2016/09*
- **Siemens AG Forchheim** **Germany**
Working student, Computer Tomography development *2015/03 - 2015/09*
Data analysis programming for research. Coding language: Matlab
- **Friedrich-Alexander-University Erlangen-Nürnberg** **Germany**
Teaching assistant *2012/10 - 2016/09*
Tutor for exercise lessons and practical courses in physics and mathematics
- **High-Octane Motorsports e.V., University Erlangen-Nürnberg** **Germany**
Student member, Society in terms of the competition Formula Student *2012/10 - 2013/07*
Tire simulation and data analysis. Coding language: Matlab
- **University medical centre Erlangen, ENT-hospital, Phoniatriy and pedaudiology** **Germany**
Research assistant, Group: Fluid physical principles of the human vocalisation *2011/01 - 2012/03*
Development and revision of simulation and data analysis programs for research: Simulation of human vocal folds oscillations, Revision and implementation of camera calibration software for recording of vocal folds oscillations of animals, DFG Research Group FOR 894
Coding languages: C/C++, C#, Python
- **Independent** **Germany**
Volunteering *2004/03 - 2016/03*
Unpaid private lessons for socially disadvantaged pupils

Education

Studies.....

- **Friedrich-Alexander-University Erlangen-Nürnberg** **Germany**
Bachelor of Science Computer Science, Paused 2017/10 - 2019/03
Major interests: Cryptography, IT-Security, Theoretical Computer Science
- **Friedrich-Alexander-University Erlangen-Nürnberg** **Germany**
Master of Science Physics, Aborted 2013/04 - 2016/09
- **Friedrich-Alexander-University Erlangen-Nürnberg** **Germany**
Bachelor of Science Physics, 2013/09 2008/10 - 2013/09
Bachelor thesis: *Dirac-Observablen in der Kosmologie* (Dirac observables in cosmology)
Chair for Theoretical Physics III: Institute for Quantum Gravity, Supervisor: Prof. Dr. Kristina Giesel
Major interests: Quantum Gravity, Mathematical Physics, Influence of Number Theory on Physics

School education.....

- **Peter-Vischer-School Nürnberg** **Germany**
Department Gymnasium, Mathematic, natural scientific focus 2004/09 - 2008/06
Abitur 2008/06 (University entrance qualification)
- **Peter-Vischer-School Nürnberg** **Germany**
Department Realschule, Mathematic, natural scientific, technical focus 2000/09 - 2004/07
School leaving certificate 2004/07
- **Ludwig-Uhland-School Nürnberg** **Germany**
Department Hauptschule 1998/09 - 2000/07

Training courses.....

- **Friedrich-Alexander-University Erlangen-Nürnberg** **Germany**
Training center for academic teaching (FBZHL) 2017/11
Didactics for tutors of the Faculty of Engineering - Basic course II
- **Friedrich-Alexander-University Erlangen-Nürnberg** **Germany**
Training center for academic teaching (FBZHL) 2017/10
Cross-cultural sensitization for tutors

Projects

Research.....

- **MfDN-Protocol**
Mathematical & Theoretical Computer Science research and design work. Since 2019/12
A mathematical forced decentralized network protocol.
Id: project_0058
Project info: <https://research.carolin-zoebelein.de/Projects/2019/MfDN-Protocol.html>
- **Combsee**
Mathematical & Theoretical Computer Science research and design work. Since 2019/12
Theoretical research and implementation of a decentralized, privacy preserving, search engine.
Former: *Decentralized privacy preserving search by mathematical design*
Id: project_0055
Related Funding: NGI Zero Discovery (Id: funding_0003)
Combsee Search: <https://www.combsee.org/>
Project info: <https://research.carolin-zoebelein.de/Projects/2019/Combsee.html>

Prior Knowledge MLT

- *Mathematical & Theoretical Computer Science research and design work.* *Since 2020/01*
Prior Knowledge Machine Learning Translation (MLT) uses advanced mathematical descriptions for language groups to reduce maximal error bounds and the number of free parameters of machine learning based translation.
Id: project_0059

Project info: <https://research.carolin-zoebelein.de/Projects/2020/Prior-Knowledge-MLT.html>

LittleBee

- *Research, design and implementation work.* *Since 2019/11*
LittleBee is a Python based research library for decentralized Machine Learning (ML).
Id: project_0056

Project info: <https://research.carolin-zoebelein.de/Projects/2019/LittleBee.html>

Art

#Hashtag

- *Digital art short film series* *Since 2019/08*
Making fully computer generated short films related to hashtags.
Id: project_0056art

Grants & Fellowships

NGI Zero Discovery

Netherlands, EU

- *NLnet Foundation* *Since 2019/12*
Grant, 12 months, 19 100 EUR, Related project: project_0055

NLnet manages the NGI0 Discovery Fund, a fund dedicated to search technologies which creates an open, trustworthy and reliable internet for all. The fund was established with financial support from the European Commission's Next Generation Internet programme, under the aegis of DG Communications Networks, Content and Technology.

NLnet Discovery: <https://nlnet.nl/discovery/>

Next Generation Internet: <https://www.ngi.eu/>

Funding info:

<https://research.carolin-zoebelein.de/Funding/2019/NGI-Zero-Search-and-Discovery-Fund.html>

Private Donors

Worldwide

- *Financial support from private donors* *Since 2018*

YOLANTE

Germany

- *Siemens AG* *2013*
Mentorship program for female students, Mentee

Awards

Mädchen für Technik Preis (Girls for Technology award)

Germany

- *Siemens AG* *2005/07*
Pupil award for extraordinary achievements in mathematical, natural scientific and technical subjects

Reviewer

- Member of the PoPETs 2020 artifact review committee

Publications

You can find an up-to-date list of my public work on my website <https://research.carolin-zoebelein.de/public.html#Publications>.

Apps

- **Cool Down**
Health & Fitness v01: 2018/09/09
Includes advertising, Coding language: Java
App for your mental health which wants to help you to conquer bad emotional times.
<https://play.google.com/store/apps/details?id=com.pertpony.cooldown>
- **Catchy Balls**
Casual Game v01: 2018/06/04
Includes In-App purchases, Coding language: Java
Catch all the balls which have the shown color and get points.
<https://play.google.com/store/apps/details?id=com.pertpony.catchyballs>

Exhibitions

- **'Concept' - International Exhibition on Conceptual Art** **Korea**
Group exhibition 2016/05/06 - 2016/05/29
CICA Museum, 196-30, Samdo-ro, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea 415-843
Artworks: Photo with title '*I was here*', Photo with title '*Signing*'
<https://cicamuseum.com/concept-2016-5-6-29>
https://cicamuseum.com/wp-content/uploads/2016/05/Concept_catalog.pdf
- **#TwitterArtExhibit: NYC - 2016** **USA**
Group exhibition 2016/03/31 - 2016/04/21
Trygve Lie Gallery, 317 E 52nd St., New York, NY 10022
Artwork: Postcard (Acrylic paint) with title '*All is public - No secrets*'
<http://twitterartexhibit.org>

Organized Meetups & Workshops

- **Why you should study Number Theory!** **Germany**
A friendly together for talking about Number Theory studies with coffee and tea. 2018/10
Friedrich-Alexander-University Erlangen-Nürnberg, Department for Mathematics

Teaching

Non academic.....

- Remote teaching about online anonymity, privacy and encryption tools
- Private lessons for pupils of fifth year and above, from all kinds of Bavarian school types.
Subjects: Mathematics, Physics, Chemistry, Technology, Computer Science, French, Spanish

Bachelor courses (Tutor).....

- Mathematics for engineers 1 & 2
- Experimental physics for natural scientists 1 & 2
- Experimental physics for engineers 1 & 2
- Experimental physics 5: Nuclear and particle physics
- Theoretical physics 4: Statistical physics
- Practical basis courses 1 in physics for physicists part 1 & 2
- Practical courses in physics for engineers

Master courses (Tutor).....

- Advanced experimental physics: Particle and astroparticle physics
- Advanced theoretical physics: Advanced quantum mechanics

Skills

Technical.....

Coding: C, C++, C#, Java, LabView, NASM, Perl, PHP, Python, Rust

Mobile Dev.: Android apps (Java)

Debugging: gdb, pdb, Valgrind

Database: MySQL, PostgreSQL, SQLite

Math: GNU PSPP, GNU Octave, Maple, Matlab, R, SageMath, Scilab

Virtualization: Docker, KVM, QEMU, VirtualBox

Cloud Comp.: AWS, Docker Cloud, Microsoft Azure

Networking: Ettercap, netcat, netstat, nmap, scapy, tcpdump, traceroute, Wireshark, ...

WebServer: Apache HTTP Server, nginx

Monitoring: Munin, Nagios, Zabbix

SCM: Puppet

VC: Git, SVN

CAD - Basics: Solid Edge, Pro/ENGINEER Wildfire

Languages.....

First: German

Good: English

Basics: Modern Standard Arabic, Standard Chinese, French, Spanish, Swahili

A few words: German Sign Language, Hausa, Modern Hebrew, Italian, Japanese, Kinyarwanda, Russian, Standard Tibetan

Free time activities

- Every kind of language (spoken, coding, math, ...)
- Hanging around on irc

May 22, 2020