Ben F. Maier — CV

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Academic Positions

Postdoc

since 2020, *Robert Koch Institute*
Research focusing on epidemic spreading processes in human systems, mainly infectious disease modelling and data analysis regarding the COVID-19 pandemic

Scientific Work

Publications	(co-)author of 14 articles
Talks	presenter at 19 events
Reviews	I reviewed manuscripts for PNAS, Science Advances, Nature Communications, Physical Review X, PLOS Digital Health, PLOS ONE, Physical Biology, Physica A, and Physical Review E.
PhD Thesis	Spreading Processes in Human Systems doi:10.18452/20950.

Education

2014–2019	**PhD in theoretical physics** *Humboldt University of Berlin, Robert Koch Institute*, final grade: *summa cum laude* (highest possible grade)
2011–2014	**MSc in physics** *Humboldt University of Berlin*, final grade: 1.2, thesis: 1.0 (highest possible grade)
2011–2012	**Erasmus exchange program** *Universiteit Utrecht (NL)*, ten-month visit
2008–2011	**BSc in physics** *Humboldt University of Berlin*, final grade: 1.7, thesis: 1.0 (highest possible grade)
2008	**Abitur (German high school diploma)** *Berlin*, final grade: 1.2, intensive courses: physics, computer science

Additional Work Experience

2019	**Full-Stack Developer** *Robert Koch Institute*, Conceptualization, implementation, and deployment of an internal web-application to improve data management and work flows (based on Django 2, JavaScript, MySQL 8)
since 2015	**Scientific Consultant/Data Scientist** *Self-employed*, customers include e.g. Universal Music Germany and the Santa Fe Institute
2010–2011	**Student Assistant** *Institute for Scientific Instruments (Berlin-Adlershof)*, Software development (C++)
2010	**Research Intern** *HU Berlin, Department of Physics, Group "PHÄ"*, Research internships in lattice gauge theory

Teaching

since 2016	**Co-Supervisor** *Robert Koch Institute*, Co-supervision of several Master students and one PhD student in the Biophysics program of HU Berlin
2018	**Teaching Assistant** *Santa Fe Insitute*, "Introduction to Dynamical Systems" on the MOOC-platform "Complexity Explorer"
2016	**Teacher** *Deutsche SchülerAkademie*, three-week course on "Network Science and Complex Systems" in a summer school for gifted high-school students
2013–2014	**Teaching Assistant** *Department of Physics (HU Berlin)*, Course: "Classical Mechanics and Introduction to Thermodynamics"
2013	**Teacher** *Student Association Physics (HU Berlin)*, Lectures in a prep course for the course "Computational Physics"
2010–2011	**Teaching Assistant** *Department of Medicine (HU Berlin): Charité*, Introductory lab class in physics for freshmen in medicine
2009	**Teacher** *Student Association Physics (HU Berlin)*, Lectures in a prep course for freshmen in physics

Fellowships & Awards

since 2019	Add-on Fellow for Interdisciplinary Life Science of the Joachim Herz Stiftung
2014	HU Berlin Research Track Scholarship
2011–2014	Fellow of the German National Academic Foundation (SDV) including scholarship
2008	Award for excellent performance in the Abitur exam (Deutsche Physikalische Gesellschaft)
2007	Award for excellent performance in the physics intensive course (Deutsche Physikalische Gesellschaft)

Publications

- **epipack: An infectious disease modeling package for Python**
  2021, Journal of Open Source Software 6 (60), 3097. doi:10.21105/joss.03097.
  B. F. Maier*
- **Potential benefits of delaying the second mRNA COVID-19 vaccine dose**
  2021, arXiv. arXiv:2102.13600.
  B. F. Maier*, A. Burdinski, A. H. Rose, F. Schlosser, D. Hinrichs, C. Betsch, L. Korn, P. Sprengholz, M. Meyer-Hermann, T. Mitra, K. Lauterbach, D. Brockmann
- **Digital contact tracing contributes little to COVID-19 outbreak containment**
  2021, medRxiv. doi:10.1101/2021.06.21.21259258.
  A. Burdinski*, D. Brockmann, B. F. Maier*
- **Effective containment explains subexponential growth in recent confirmed COVID-19 cases in China**
  2020, Science 368 (6492), pp. 742-746. arXiv:2002.07572. doi:10.1126/science.abb4557.
  B. F. Maier*, D. Brockmann
- **COVID-19 lockdown induces structural changes in mobility networks — Implication for mitigating disease dynamics**
  2020, PNAS 117 (52), 32883-32890. arXiv:2007.01583. doi:10.1073/pnas.2012326117.
  F. Schlosser*, B. F. Maier, D. Hinrichs, A. Zachariae, D. Brockmann
- **Thresholding normally distributed data creates complex networks**
  2020, Phys. Rev. E 101, 062302. arXiv:1902.08278. doi:10.1103/PhysRevE.101.062302.
  G. T. Cantwell*, Y. Liu, B. F. Maier*, A. C. Schwarze, C. A. Serván, J. Snyder, G. St-Onge
- **Commentary: A network science summer course for high school students**
  2020, Network Science, 1-13. arXiv:2005.02487. doi:10.1017/nws.2020.12.
  F. Klimm*, B. F. Maier*

- **Combining clinical epidemiology, NGS-based analysis and modelling approaches to reveal transmission dynamics of vancomycin-resistant enterococci in a high risk population within a tertiary care hospital**
  2020, PloS one 15 (6), e0235160. doi:10.1371/journal.pone.0235160.
  B. Neumann*, J. K. Bender, B. F. Maier, A. Wittig, S. Fuchs, T. Semmler, D. Brockmann, H. Einsele, S. Kraus, L. H. Wieler, U. Vogel, G. Werner
- **Netwulf: Interactive visualization of networks in Python**
  2019, Journal of Open Source Software 4 (42), 1425. doi:10.21105/joss.01425.
  U. Aslak*, B. F. Maier*
- **Generalization of the small-world effect on a model approaching the Erdős-Rényi random graph**
  2019, Scientific reports 9 (1), 9268. arXiv:1901.02381. doi:10.1038/s41598-019-45576-3.
  B. F. Maier*
- **Modular hierarchical and power-law small-world networks bear structural optima for minimal first passage times and cover time**
  2019, Journal of Complex Networks 7 (6), 865-895. arXiv:1808.00240. doi:10.1093/comnet/cnz010.
  B. F. Maier*, C. Huepe, D. Brockmann
- **Cover time for random walks on arbitrary complex networks**
  2017, Phys. Rev. E 96 (4), 042307. arXiv:1706.02356. doi:10.1103/PhysRevE.96.042307.
  B. F. Maier*, D. Brockmann
- **Application of Ewald's Method for Efficient Summation of Dyon Long-Range Potentials**
  2013, PoS Confinement10:051. arXiv:1212.5557. doi:10.22323/1.171.0051.
  B. Maier*, F. Bruckmann, S. Dinter, E. M. Ilgenfritz, M. Müller-Preußker, M. Wagner
- **Confining dyon gas with finite-volume effects under control**
  2012, Phys. Rev. D 85, 034502. arXiv:1111.3158. doi:10.1103/PhysRevD.85.034502.
  F. Bruckmann*, S. Dinter, E. M. Ilgenfritz, B. Maier, M. Müller-Preußker, M. Wagner*

Theses

2019 Spreading Processes in Human Systems (PhD)
doi:10.18452/20950.

2014 Thermophoresis in Liquids and its Connection to Equilibrium Quantities (MSc)
doi:10.18452/21036.

2011 Simulations of Dyon Configurations in SU(2) Yang-Mills Theory (BSc)
doi:10.18452/21035.

IT Knowledge

OSes	various Linux distributions, Mac OSX
Scientific	Numpy, Scipy, Matlab, Mathematica, Sun Grid Engine, Polars (Pandas alternative)
Development	Python, C++, JavaScript, bash, various SQL dialects
Web	D3.js, Phaser.js, Three.js, P5.js, HTML, CSS, django
APIs	Twitter, Spotify
Office	LaTeX, MS Word, MS Excel, Keynote, Pages
Graphic design	Affinity Designer, Affinity Photo, Autodesk Graphic, Gimp, InkScape
Audio & Music	Ableton Live 9, Maschine 2, Reason 8, Audacity, Foxdot, Sonic Pi

Languages

German	mother tongue
English	fluent (TOEFL-certified)
French	basic (level A2)

Talks

- Fighting the pandemic with complexity science
  Davis Complexity Group Seminar, UC Davis, *online presentation* (2021)
- Temporal networks, modeling infectious diseases, interactive visualizations, and other fancy buzzwords: Three Python packages that might make your life easier
  Networks 2021, HONS2021 Satellite, *online presentation* (2021)
- Signaling on modular hierarchical and other small-world networks
  NetSci, *Rome* (2020)
- Misconceptions of spreading processes in sparse temporal networks
  PIK, RD4 seminar series, *Potsdam* (2020)
- Epidemic spreading on face-to-face temporal networks
  SFI Seminar series, *Santa Fe* (2019)
- Flockworks: A class of dynamic network models for face-to-face interactions
  CompleNet, *Tarragona* (2019)
- Tacoma: A C++/Python package for temporal network analysis
  CompleNet, *Tarragona* (2019)
- Flockworks: A class of dynamic network models for face-to-face interactions
  Conference on Complex Sytems, *Thessaloniki* (2018)

- When you're sick, please stay at home—Making sense of spreading phenomena using human mobility and contact data
  "idalab" company seminar (invited), *Berlin* (2018)
- Flockworks: A class of dynamic network models for face-to-face interactions
  DPG Spring Meeting, *Berlin* (2018)
- Flockworks: A class of dynamic network models for face-to-face interactions
  Group seminar DTU COMPUTE, *Copenhagen* (2017)
- Influence of group-structured network topologies on dynamical processes
  Princeton-Humboldt cooperation workshop CoCCoN, *Princeton* (2017)
- Influence of group-structured network topologies on dynamical processes
  "Biophysics and Evolutionary Dynamics" Gruppenseminar UC Berkeley, *Berkeley* (2016)
- Flockworks: A class of dynamic network models for face-to-face interactions
  NetSci, *Seoul* (2016)
- Flockworks: A class of dynamic network models for face-to-face interactions
  Network Journal Club, *Oxford* (2016)
- Modular hierarchical random networks—Topology and Dynamics
  NetSci, *Zaragoza* (2015)
- Application of Ewald's Method for Efficient Summation of Dyon Long-Range Potentials
  Confinement X, *Munich* (2012)
- Confining dyon gas with finite-volume effects under control
  DPG Spring Meeting, *Göttingen* (2012)
- Simulations of dyon configurations in SU(2) Yang-Mills theory
  DPG Spring Meeting, *Karlsruhe* (2011)

Schools

2015–2019	Member of the HU Berlin IRI Life Sciences Graduate School *Berlin*
2018	Complex Systems Summer School *Santa Fe Institute*
2017–2018	Specialization "Deep Learning" *coursera.org*
2015	Seminar "Time-Management" *Humboldt Graduate School Berlin*
2015	Member of the Humboldt Graduate School *Berlin*
2015	Complex Networks: Theory, Methods and Applications *Lake Como School of Advanced Studies in Complex Systems*

Press Coverage

Jul 2021	Herd Immunity: Is This How the Pandemic Comes to an End? *Die Zeit*, newspaper article
Jun 2020	Schneller als das Virus *ARTE Re:*, TV broadcast
Mar 2020	How the Virus Got Out *The New York Times*, newspaper article
Mar 2020	Coronavirus curve shows much of Europe could face Italy-like surge within weeks - The Washington Post *The Washington Post*, newspaper article
Mar 2021	Drei Ideen, um die Pandemie besser in den Griff zu kriegen *rbb24*, newspaper article
Mar 2021	Dritte Welle: Längere Impfintervalle würden Tausende Leben retten *DIE WELT*, newspaper article
Feb 2021	Corona: So sinnvoll sind Grenzschließungen zu Tschechien und Österreich *DER SPIEGEL*, magazine article
May 2020	Corona-Leitfaden: Diese Zahlen helfen Ihnen, die Pandemie zu verstehen *DIE WELT*, newspaper article
May 2020	"Eine Vorhersage würde ich für maximal sechs Tage wagen" *Welt am Sonntag*, newspaper article
May 2020	Die Zahlen der Pandemie *Welt am Sonntag*, newspaper article
Apr 2020	Gut gemeint ist nicht immer gut gemacht: Richtig helfen in der Corona-Krise *Deutschlandfunk Nova*, radio broadcast
Apr 2020	Warum Abstand halten an Ostern gegen die Pandemie helfen kann *rbb24*, magazine article
Apr 2020	Lockerung des Lockdowns: So groß ist die Gefahr der zweiten Welle *DIE WELT*, newspaper article
Mar 2020	Epidemiological models show Europe faces Italy-like coronavirus surges within weeks *The Independent*, newspaper article
Mar 2020	Nachbarschaftshilfe: "Nicht einfach draufloshelfen" *Die Zeit*, newspaper article
Mar 2020	"Es kann nicht sein, dass Impfstoff liegen bleibt" *Süddeutsche Zeitung*, newspaper article
Feb 2021	Wieso die Fallzahlen steigen und Social Distancing hilft *rbb24*, newspaper article

Feb 2021 Zu viele Hoffnungen und absurde Zweifel an neuen Tests
rbb24, newspaper article

Mar 2020 Solidarität: Richtig helfen in der Corona-Krise
NDR, radio broadcast

Feb 2021 Warum die Berliner Amtsärzte richtig argumentieren - aber falsche Schlüsse ziehen
rbb24, newspaper article

May 2020 Tracking quarantine movement
Deutsche Welle: "Science Unscripted", podcast

May 2020 Die Pandemie
Gemeinsam gegen Corona - der Wissenspodcast von GEOlino, podcast

Apr 2020 Corona ist ein Marathon, kein Sprint
rbb24, magazine article

Mar 2020 Nicht drauflos helfen
neues deutschland, newspaper article

Mar 2020 Distanz und Nähe
neues deutschland, newspaper article

Jun 2021 Herdenimmunität: Endet so die Pandemie?
Die Zeit, newspaper article

Mar 2021 Simulationsrechnung: So lässt sich die dritte Corona-Welle brechen
nordbayern.de, magazine article

Mar 2021 Lauterbach hält Änderung der Impfstrategie für dringend nötig
Der Tagesspiegel, newspaper article

Feb 2021 Corona-Strategie von Karl Lauterbach: So will er die dritte Welle brechen
DER SPIEGEL, magazine article

Feb 2021 Lauterbach schlägt neue Impf- und Teststrategie vor
BSAktuell, newspaper article

Apr 2020 The Effects of Physical Isolation on the Pandemic Quantified
The Scientist Magazine, magazine article

Apr 2020 Coronavirus: China got it right by locking down Wuhan, German study says
South China Morning Post, newspaper article

Apr 2020 Bleibt zu Hause!
Laborjournal, newspaper article

Apr 2020 Einkaufen für Nachbarn? Richtig helfen in Corona-Zeiten
FIT FOR FUN, magazine article

Mar 2020 Veći dio Evrope može zadesiti scenarij iz Italije
Radio Televizija BN, newspaper article

Mar 2020 Advierten que en pocas semanas toda Europa puede estar como Italia
La Nación, newspaper article

Mar 2020 Prognoze epidemiologa: Veći dio Evrope za nekoliko sedmica će zadesiti italijanski scenarij
Klix.ba, newspaper article

Mar 2020 COVID-19. Europa à beira de se tornar uma gigantesca Itália
Rádio e Televisão de Portugal, newspaper article

Mar 2020 Scholz will Strategiewechsel bei Corona-Politik
fuldainfo.de, magazine article

Open-Source Software

- **epipack**, Build epidemiological models for analytical and numerical analyses as well as network simulations, github.com/benmaier/epipack
- **netwulf**, Interactive visualizations of networks, github.com/benmaier/netwulf
- **tacoma**, C++ and Python package for the analysis and simulation of temporal networks in continuous time, github.com/benmaier/tacoma
- **cMHRN**, fast creation of modular-hierarchical, power-law, and regular small-world networks, github.com/benmaier/cMHRN
- **QSuite**, a command-line interface for efficient management and analysis of simulations on compute clusters, github.com/benmaier/qsuite
- **binpacking**, optimal distribution of weights to containers, github.com/benmaier/binpacking
- **EffectiveDistance**, computing the effective distance of spreading processes in transport networks, github.com/benmaier/effective-distance
- **RadialDistanceLayout**, radial visualization of a shortest-path tree with respect to the effective distance, github.com/benmaier/radial-distance-layout
- **NetworkProperties**, collection of useful network analysis methods, github.com/benmaier/network-properties
- **nwDiff**, Python package for the simulation and analysis of diffusion processes in complex networks, github.com/benmaier/nwDiff
- **cNetworkDiff**, C++-based packaged for the simulation and analysis of diffusion processes in complex networks, github.com/benmaier/cNetworkDiff
- **fisheye**, JavaScript library for local magnification of data in visualizations, github.com/benmaier/fisheye, see also: beta.observablehq.com/@benmaier/a-visually-more-appealing-fisheye-function
- **GTOM**, Python package for computing the "general topological overlap measure" of potentially very large networks, github.com/benmaier/GTOM
- **species-overlap**, Fast evaluation of incidence- and abundance-based species overlap measures, github.com/benmaier/species-overlap
- **quasispycies**, Classes to compute the stable equilibrium of the quasi-species-equation on complex networks, github.com/benmaier/quasispycies