

## Biographical Sketch

### Alexander Eichler

Department of Physics, HPF F 2  
ETH Zürich  
Otto-Stern Weg 1  
8093 Zürich, Switzerland

Telephone: +41 44 633 2261  
Email: eichlera@ethz.ch  
Web: [personal page](#)

#### A. PROFESSIONAL PREPARATION

University of Basel, CH	Physics Department	MSc, 2001-2006
University of Basel, CH	Schönenberger group	PhD., 2006-2009
ICN and ICFO, ES	Bachtold group	Postdoc, 2010-2013
ETH Zürich, CH	Degen group	Postdoc, 2013-2018

#### B. APPOINTMENTS

Privatdozent at ETH Zürich, CH	2022-now
Senior Scientist ( <i>permanent position</i> ), ETH Zürich, CH	2019-now
Postdoctoral Researcher and Senior Researcher, ETH Zürich, CH	2013-2018
Postdoctoral Researcher, ICN and ICFO in Barcelona, ES	2010-2013

#### C. AWARDS AND HONORS

KITE Award ( <i>shared</i> )	2022
Swiss Physical Society ABB Award ( <i>shared</i> )	2012
Marie-Curie IEF Fellowship ( <i>declined</i> )	2012
Marie-Curie IEF Fellowship	2010
SNSF prospective researcher fellowship ( <i>competitive</i> )	2009

#### D. TEACHING AND EDUCATION

1. Data Analysis in Physics (*initiator and lecturer*), Student Practical Labs (*lecturer, academic director*), graduate classes in Parametric Phenomena (*initiator and lecturer*) and undergraduate classes in General Physics (*substitution lecturer*) at ETH (2013-2019)
2. Conferences and Seminars to expert audiences (total > 50)
3. Supervision of PhD students (15), Master students (13), Semester and project students (22)
4. Jury member on 11 PhD thesis committees

#### F. FUNDING

1. SNSF Sinergia (2022-now), co-PI
2. SNSF Project (2021-now), PI
3. ETH Research Grant (2020-now), lead PI
4. SNSF Sinergia (2018-now), project partner and coordinator
5. ETH D-PHYS g-money (2016 and 2018), co-PI

#### E. SYNERGISTIC ACTIVITIES AND EXPERTISE

1. Initiator and organizer for the QSIT Workshop “Parametric Phenomena” (2017), the “Swiss NanoMRI meeting” (2017) and the “Swiss Nanomechanics Meeting” (2018) in Zürich, CH
2. Co-organizer for the conference “NanoMRI 7” held 2022 in Barcelona, ES
3. Co-organizer for the “Workshop on Parametric Phenomena” held 2023 in Zurich, CH
4. Local co-organizer for the “3rd SPM User Meeting” in Zürich, CH (2019)
5. Peer reviewer for journals (39) and funding agencies (2)

## List of Publications

Alexander Eichler

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For a full list of my publications, see my [Publons](#) and [Google Scholar](#) IDs

41. *Nanoscale magnets embedded in a microstrip*, R. Pachlatko, N. Prumbaum, M. D. Krass, U. Grob, C. L. Degen, and [A. Eichler](#)

*Under review*

40. *Near-resonant nuclear spin detection with high-frequency mechanical resonators*, D. A. Visani, L. Catalini, C. L. Degen, [A. Eichler](#), and J. del Pino

*Under review*

39. *A biased Ising model using two coupled Kerr parametric oscillators with external force*, P. Álvarez, D. Pittilini, F. Miserocchi, S. Raamamurthy, G. Margiani, O. Ameye, J. del Pino, O. Zilberberg, and [A. Eichler](#)

*Under review*

38. *Proliferation of unstable states and their impact on stochastic out-of-equilibrium dynamics*, T. L. Heugel, R. Chitra, [A. Eichler](#), and O. Zilberberg

*Under review*

37. *Deterministic and stochastic sampling of two coupled Kerr parametric oscillators*, G. Margiani, J. del Pino, T. L. Heugel, N. E. Bousse, S. Guerrero, T. W. Kenny, O. Zilberberg, D. Sabonis, and [A. Eichler](#),

*Phys. Rev. Research* **5**, L012029 (2023)

36. *The role of fluctuations in quantum and classical time crystals*

T. L. Heugel, [A. Eichler](#), R. Chitra, and O. Zilberberg

*SciPost Physics Core* **6**, 53 (2023)

35. *Ultra-high-Q nanomechanical resonators for force sensing*, [A. Eichler](#), *Materials for Quantum Technology* **2**, 043001 (2022)

34. *Force-detected magnetic resonance imaging of influenza viruses in the overcoupled sensor regime*

M. D. Krass, N. Prumbaum, R. Pachlatko, U. Grob, H. Takahashi, Y. Yamauchi, C. L. Degen, and [A. Eichler](#)

*Phys. Rev. Applied* **18**, 034052 (2022), **Editor's Suggestion**

33. *Nanomechanical Resonators: Toward Atomic Scale*

B. Xu, P. Zhang, J. Zhu, Z. Liu, [A. Eichler](#), X.-Q. Zheng, J. Lee, A. Dash, S. More, S. Wu, Y. Wang, H. Jia, A. Naik, A. Bachtold, R. Yang, P. X.-L. Feng, and Z. Wang

*Acs Nano* **16**, 15545 (2022)

32. *Soft-clamped silicon nitride string resonators at millikelvin temperatures*

T. Gisler, M. Helal, D. Sabonis, U. Grob, M. Heritier, C. L. Degen, A. H. Ghadimi, and [A. Eichler](#)

*Phys. Rev. Lett.* **129**, 104301 (2022)

31. *Extracting the lifetime of a synthetic two-level system*

G. Margiani, S. Guerrero, T. L. Heugel, C. Marty, R. Pachlatko, T. Gisler, G. D. Vukasin, H. K. Kwon, J. M. L. Miller, N. E. Bousse, T. W. Kenny, O. Zilberberg, D. Sabonis, and [A. Eichler](#)

*Applied Physics Letters* **121**, 16 (2022)

30. *Strong parametric coupling between two ultra-coherent membrane modes*

D. Hälg, T. Gisler, E. C. Langman, S. Misra, O. Zilberberg, A. Schliesser, C. L. Degen, and [A. Eichler](#)

*Phys. Rev. Lett.* **128**, 094301 (2022)

29. *Ising machines with strong bilinear coupling*

T. L. Heugel, O. Zilberberg, C. Marty, R. Chitra, and [A. Eichler](#)

*Phys. Rev. Research* **4**, 013149 (2022)

28. *Spatial Correlation between Fluctuating and Static Fields over Metal and Dielectric Substrates*

M. H eritier, R. Pachlatko, Y. Tao, J. M. Abendroth, C. L. Degen, and [A. Eichler](#)

*Phys. Rev. Lett.* **127**, 216101 (2021)

27. *Membrane-based scanning force microscopy*

D. H alg, T. Gisler, Y. Tsaturyan, L. Catalini, U. Grob, M. D. Krass, M. H eritier, H. Mattiat, A. K. Thamm, R. Schirhagl, E. C. Langman, A. Schliesser, C. L. Degen, and [A. Eichler](#)

*Phys. Rev. Applied* **15**, L021001 (2021), **Editor's Suggestion**

See APS Focus story: [Force Scanning on a Shaky Membrane](#),

ETH D-PHYS news article: [New microscopy concept enters into force](#)

and the AIP news article [MRI with a Trampoline](#)

26. *Spin detection via parametric frequency conversion in a membrane resonator*

J. Kosata, O. Zilberberg, C. L. Degen, R. Chitra, and [A. Eichler](#)

*Phys. Rev. Applied* **14**, 014042 (2020)

25. *Magnetic resonance force microscopy with a one-dimensional resolution of 0.9 nanometers*

U. Grob, M. D. Krass, M. H eritier, R. Pachlatko, J. Rhensius, J. Kořata, B. A. Moores, H. Takahashi, [A. Eichler](#), and C. L. Degen

*Nano Letters* **19**, 7935 (2019)

24. *Rapid flipping of parametric phase states*

M. Frimmer, T. L. Heugel, Ź. Nosan, F. Tebbenjohanns, D. H alg, A. Akin, C. L. Degen, L. Novotny, R. Chitra, O. Zilberberg, and [A. Eichler](#)

*Phys. Rev. Lett.* **123**, 254102 (2019)

23. *Classical many-body time crystals*

T. L. Heugel, M. Oscity, [A. Eichler](#), O. Zilberberg, and R. Chitra

*Phys. Rev. Lett.* **123**, 124301 (2019)

See news article: [Appreciating the classical elegance of time crystals](#)

22. *Gate-controlled phase switching in a parametron*

Ź. Nosan, P. M arki, N. Hauff, C. Knaut, and [A. Eichler](#)

*Phys. Rev. E* **99**, 062205 (2019)

21. *GHz nanomechanical resonator in an ultraclean suspended graphene p–n junction*

M. Jung, P. Rickhaus, S. Zihlmann, [A. Eichler](#), P. Makk, and C. Sch onenberger

*Nanoscale* **11**, 4355 (2019)

20. *A parametric symmetry breaking transducer*

[A. Eichler](#), T. Heugel, A. Leuch, C. L. Degen, R. Chitra, and O. Zilberberg

*Appl. Phys. Lett.* **112**, 233105 (2018)

19. *Little is lost (perspective article)*

[A. Eichler](#)

*Science* **360**, 706 (2018)

18. *Nanoladder cantilevers made from diamond and silicon*

M. H eritier, [A. Eichler](#), Y. Pan, U. Grob, I. Shorubalko, M. D. Krass, Y. Tao, and C. L. Degen

*Nano Lett.* **18**, 1814 (2018)

17. *Nanoscale imaging of current density with a single-spin magnetometer*

K. Chang, [A. Eichler](#), J. Rhensius, L. Lorenzelli, and C. L. Degen

*Nano Lett.* **17**, 2367 (2017)

16. *Parametric symmetry breaking in a nonlinear resonator*  
A. Leuch, L. Papariello, O. Zilberberg, C. L. Degen, R. Chitra, and [A. Eichler](#)  
*Phys. Rev. Lett.* **117**, 214101 (2016)
15. *Ultrasensitive mechanical detection of magnetic moment using a commercial disk drive write head*  
Y. Tao, [A. Eichler](#), T. Holzherr, and C. L. Degen  
*Nature Communications* **7**, 12714 (2016)
14. *Ultrasensitive hysteretic force sensing with parametric nonlinear oscillators*  
L. Papariello, O. Zilberberg, [A. Eichler](#), and R. Chitra  
*Phys. Rev. E* **94**, 022201 (2016)  
See ETHZ news article: [Measuring forces with oscillations](#)
13. *Accelerated nanoscale magnetic resonance imaging through phase multiplexing*  
B. Moores, [A. Eichler](#), Y. Tao, H. Takahashi, P. Navaretti, and C. Degen  
*Appl. Phys. Lett.* **106**, 213101 (2015)  
Cover story. See news article: [New Technique Speeds nanoMRI Imaging](#)
12. *Nanotube mechanical resonators with quality factors reaching 5 million*  
J. Moser, [A. Eichler](#), J. Güttinger, M. I. Dykman, and A. Bachtold  
*Nature Nanotechnology* **9**, 1007 (2014)
11. *Atomic monolayer deposition on the surface of nanotube mechanical resonators*  
A. Tavernarakis, J. Chaste, [A. Eichler](#), G. Ceballos, M. C. Gordillo, J. Boronat, and A. Bachtold  
*Phys. Rev. Lett.* **112**, 196103 (2014)
10. *Symmetry breaking in a mechanical resonator made from a carbon nanotube*  
[A. Eichler](#), J. Moser, M. I. Dykman, and A. Bachtold  
*Nature Communications* **4**, 2843 (2013)
9. *Ultrasensitive force detection with a nanotube mechanical resonator*  
J. Moser, J. Güttinger, [A. Eichler](#), M. J. Esplandiu, D. E. Liu, M. I. Dykman, and A. Bachtold  
*Nature Nanotechnology* **8**, 493 (2013)
8. *Strong coupling between mechanical modes in a nanotube resonator*  
[A. Eichler](#), M. del Álamo Ruiz, J. A. Plaza, and A. Bachtold  
*Phys. Rev. Lett.* **109**, 025503 (2012)
7. *A Nanomechanical Mass Sensor with Yoctogram Resolution*  
J. Chaste, [A. Eichler](#), J. Moser, G. Ceballos, R. Rurali, and A. Bachtold  
*Nature Nanotechnology* **7**, 301 (2012)
6. *Parametric Amplification and Self-Oscillation in a Nanotube Mechanical Resonator*  
[A. Eichler](#), J. Chaste, J. Moser, and A. Bachtold  
*Nano Letters* **11**, 2699 (2011)
5. *Nonlinear Damping in Mechanical Resonators Made from Carbon Nanotubes and Graphene*  
[A. Eichler](#), J. Moser, J. Chaste, M. Zdrojek, I. Wilson-Rae, and A. Bachtold  
*Nature Nanotechnology* **6**, 399 (2011)
4. *Gate-tunable Split-Kondo Effect in a Carbon Nanotube Quantum Dot*  
[A. Eichler](#), M. Weiss, C. Schönenberger  
*Nanotechnology* **22**, 265204 (2011)
3. *Permalloy-based carbon nanotube spin-valve*  
H. Aurich, A. Baumgartner, F. Freitag, [A. Eichler](#), J. Trbovic, and C. Schönenberger  
*Appl. Phys. Lett.* **97**, 153116 (2010)

*2. Tuning the Josephson current in carbon nanotubes with the Kondo effect*

A. Eichler, R. Deblock, M. Weiss, C. Karrasch, V. Meden, C. Schönenberger, and H. Bouchiat  
*Phys. Rev. B* **79**, 161407(R) (2009)

*1. Even-odd Effect in Andreev Transport through a Carbon Nanotube Quantum Dot*

A. Eichler, M. Weiss, S. Oberholzer, A. Levy-Yeyati, J. C. Cuevas, A. Martín-Rodero, and C. Schönenberger  
*Phys. Rev. Lett.* **99**, 126602 (2007)