

## Curriculum Vitae – Prof. Dr. rer. nat. Sebastian Kempf

Name and title: Prof. Dr. rer. nat. Sebastian Kempf  
Date of birth: 09.06.1983  
Place of birth: Heppenheim  
Marital status: Single  
Nationality: German  
Office address: Karlsruhe Institute of Technology (KIT)  
Institute of Micro- and Nanoelectronic Systems  
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Researcher ID: P–7612–2016

Current position(s): W3-professorship for Micro- and Nanoelectronic Systems, Karlsruher Institute of Technology, Division III, Faculty for Electrical Engineering and Information Technology, Germany.  
Head of the Institute of Micro- and Nanoelectronic Systems (IMS), Karlsruher Institute of Technology, Division III, Faculty for Electrical Engineering and Information Technology, Germany.

Research interest(s): Development, fabrication, characterization and application of ultra-fast and ultra-high-resolution low-temperature particle detectors, in particular magnetic microcalorimeters and magnetic penetration depth thermometers.  
Development, fabrication, characterization and application of analog superconducting electronics, in particular superconducting quantum interference devices (SQUIDs), SQUID based multiplexing techniques, and readout techniques for SQUIDs  
Fabrication of superconducting (quantum) devices, quantum electrical circuits as well as superconductor-based quantum particle detectors  
Investigation of fundamental properties of superconducting quantum devices

## Academic Career:

since 10/2020	W3-professorship for “Micro- and Nanoelectrical Systems” at Karlsruhe Institute of Technology, Division III, Faculty for Electrical Engineering and Information Technology, Germany.
02/2018 – 09/2020	Senior scientist (permanent position) and head of research group “Superconducting Electronics” as well as service department “Sample Preparation” at Kirchhoff-Institute for Physics, Heidelberg University, Germany
07/2017	Habilitation in Physics, Faculty of Physics and Astronomy, Heidelberg University, Germany
01/2014 – 09/2020	Head of research group “Superconducting Electronics” at Kirchhoff-Institute for Physics, Heidelberg University, Germany
08/2013 – 12/2013	Postdoctoral fellow in the research group “Quantum Sensors” headed by Prof. Dr. Christian Enss at Kirchhoff-Institute for Physics, Heidelberg University, Germany
02/2013 – 08/2013	Guest scientist at Physikalisch-Technischen Bundesanstalt (PTB) Berlin, Research group „Kryosensorik“; Position at Kirchhoff-Institute for Physics, Heidelberg University, Germany
08/2012 – 02/2013	Postdoctoral fellow in the research group “Quantum Sensors” headed by Prof. Dr. Christian Enss at Kirchhoff-Institute for Physics, Heidelberg University, Germany
07/2012	Doctor rerum naturalium in Physics – summa cum laude
08/2007	Diploma in Physics – Grade: excellent
09/2002 – 07/2012	Physics studies at Heidelberg University, Germany

## Prizes, honours, and awards

2015	Certificate of honour for outstanding teaching, Heidelberg University, Germany
2013	Ruprecht-Karls-Prize, Heidelberg University, Germany

## Organisation of workshops, conferences, and meetings:

- Organisation of the focus session „Frontiers in Cryogenic Particle Detection” at the DPG spring meeting of the condensed matter section, Dresden, Germany, 2020
- Co-chair of the “First International Workshop on Physics and Applications of Metallic Magnetic Calorimeters”, Heidelberg University, Heidelberg, Germany, 2019
- Member of the local organization committee of the workshop “Cryoelectronic devices – KRYO 2018”, Kloster Schöntal, Schöntal, Germany, 2018
- Member of the local organization committee of the international conference “International Conference on Ultra Low Temperature Physics – ULT2017”, Kirchhoff-Institute for Physics, Heidelberg University, Heidelberg, Germany, 2017

- Member of the local organization committee of the international conference “14<sup>th</sup> International Workshop on Low Temperature Detectors – LTD14”, Kirchhoff-Institute for Physics, Heidelberg University, Heidelberg, Germany, 2011

### Collaborations, memberships, and committees:

since 12/2020	Principal Investigator of the “Karlsruhe School of Elementary Particle and Astroparticle Physics: Science and Technology (KSETA)”
since 12/2020	Member of the Steering Committee of the KIT Center “Elementary Particle and Astroparticle Physics (KCETA)”
since 12/2020	Member of the “Helmholtz International Research School for Astroparticle Physics and Enabling Technologies (HIRSAP)”
since 10/2020	Board-Member of the “Electron Capture in <sup>163</sup> Ho (ECHO)”-Collaboration
since 10/2019	Member of the scientific committee of the workshop “Cryoelectronic devices”
since 06/2018	Member of the management board of the EURAMET project 17FUN02 “MetroMMC – Measurement of fundamental nuclear decay data using metallic magnetic calorimeters” within the framework of the “European Metrology Programme for Innovation and Research (EMPIR)”
06/2016 – 06/2019	Member of the management board of the EURAMET project 15SIB10 “MetroBeta – Radionuclide beta spectra metrology” within the framework of the “European Metrology Programme for Innovation and Research (EMPIR)”
since 06/2012	Member of the “Electron Capture in <sup>163</sup> Ho (ECHO)”-Collaboration

### Referee activities:

Referee for the scientific journals – Journal of Low Temperature Physics – Applied Physics Letters – IEEE Transactions on Applied Superconductivity – IEEE Transactions on Microwave Theory and Techniques – Superconductor Science and Technology – MDPI Instruments – Journal of Astronomical Telescopes, Instruments and Systems

### Ten selected publications:

- [1] **Measurement of the <sup>229</sup>Th isomer energy with magnetic microcalorimeter**  
T. Sikorski, J. Geist, D. Hengstler, S. Kempf, L. Gastaldo, C. Enss, C. Mokry, J. Runke, C. Düllmann, P. Wobrauschek, K. Beeks, V. Rosecker, J. Sterba, G. Kazakov, T. Schumm, and A. Fleischmann  
Phys. Rev. Lett. **125** (2020) 142503, DOI: [10.1103/PhysRevLett.125.142503](https://doi.org/10.1103/PhysRevLett.125.142503)
- [2] **High-resolution and low-background <sup>163</sup>Ho spectrum: interpretation of the resonance tails**  
C. Velte, F. Ahrens, A. Barth, K. Blaum, M. Braß, M. Door, H. Dorrer, Ch. E. Düllman, S. Eliseev, C. Enss, P. Filianin, A. Fleischmann, L. Gastaldo, A. Goeggelmann, T. Day Goodacre, M. W. Haverkort, D. Hengstler, J. Jochum, K. Johnston, M. Keller, S. Kempf *et al.*  
Eur. Phys. J. C **79** (2019) 1026, DOI: [10.1140/epjc/s10052-019-7513-x](https://doi.org/10.1140/epjc/s10052-019-7513-x)

- [3] **Software defined radio system for the ECHO experiment**  
O. Sander, N. Karcher, O. Krömer, S. Kempf, M. Wegner, C. Enss, and M. Weber  
IEEE Transactions on Nuclear Science **6** (2019) 1204, DOI: [10.1109/tns.2019.2914665](https://doi.org/10.1109/tns.2019.2914665)
- [4] **Consistent Measurements of  $^{233}\text{U}$  gamma emissions using metallic magnetic calorimeters with ultra-high energy resolution**  
G.-B. Kim, R. Hummatov, S. Kempf, C. Flynn, R. Cantor, A. Fleischmann, S. T. P. Boyd, C. Enss, and S. Friedrich  
J. Radioanalytical and Nuclear Chemistry **318** (2018) 803-808, DOI: [10.1007/s10967-018-6182-9](https://doi.org/10.1007/s10967-018-6182-9)
- [5] **Physics and Applications of Metallic Magnetic Calorimeters**  
S. Kempf, A. Fleischmann, L. Gastaldo, and C. Enss  
J. Low Temp. Phys. **193** (2018) 365-379, DOI: [10.1007/s10909-018-1891-6](https://doi.org/10.1007/s10909-018-1891-6)
- [6] **Characterization of the  $^{163}\text{Ho}$  electron capture spectrum: A step towards the electron neutrino mass determination**  
P. C-O. Ranitzsch, C. Hassel, M. Wegner, D. Hengstler, S. Kempf, A. Fleischmann, C. Enss, L. Gastaldo, A. Herlert, and K. Johnston  
Phys. Rev. Lett. **119** (2017) 122501, DOI: [10.1103/PhysRevLett.119.122501](https://doi.org/10.1103/PhysRevLett.119.122501)
- [7] **The Electron Capture in  $^{163}\text{Ho}$  Experiment - ECHO**  
L. Gastaldo, K. Blaum, K. Chrysalidis, T. Day Goodacre, A. Domula, M. Door, H. Dorrer, Ch. E. Düllmann, K. Eberhardt, S. Eliseev, C. Enss, A. Faessler, P. Filianin, A. Fleischmann, D. Fonnesu, L. Gamer, R. Haas, C. Hassel, D. Hengstler, J. Jochum, K. Johnston, U. Kebschull, S. Kempf *et al.*  
Eur. Phys. J. Special Topics **226** (2017) 1623-1694, DOI: [10.1140/epjst/e2017-70071-y](https://doi.org/10.1140/epjst/e2017-70071-y)
- [8] **Demonstration of a scalable frequency-domain readout of metallic magnetic calorimeters by means of a microwave SQUID multiplexer**  
S. Kempf, M. Wegner, A. Fleischmann, L. Gastaldo, F. Herrmann, M. Papst, D. Richter, and C. Enss  
AIP Advances **7** (2017) 015007, DOI: [10.1063/1.4973872](https://doi.org/10.1063/1.4973872)
- [9] **Towards noise engineering: Recent insights in low-frequency excess flux noise of superconducting quantum devices**  
S. Kempf, A. Ferring, and C. Enss  
Appl. Phys. Lett. **109** (2016) 162601, DOI: [10.1063/1.4965293](https://doi.org/10.1063/1.4965293)
- [10] **Reproducibility and calibration of MMC-based high-resolution gamma detectors**  
C. R. Bates, C. Pies, S. Kempf, D. Hengstler, A. Fleischmann, L. Gastaldo, C. Enss, and S. Friedrich  
Appl. Phys. Lett. **109** (2016) 023513, DOI: [10.1063/1.4958699](https://doi.org/10.1063/1.4958699)