Curriculum Vitae

Personal Data

Title	Dr.
First name	Miriam Katharina
Name	Brosi
Current position	Postdoctoral researcher (until 16.01.2025)
Current institution(s)/ site(s), country	MAX IV Laboratory, Lund University, Sweden
Identifiers/ORCID	https://orcid.org/0000-0003-2477-8688

Qualifications and Career

Stages	Periods and Details
Degree programme	Bachelor of Science, 2008-2012, Department of Physics, Karlsruhe Institute of Technology, Karlsruhe, Germany
	Master of Science, 2012-2014, Department of Physics, Karlsruhe Institute of Technology, Karlsruhe, Germany, (*with distinction*)
Doctorate	31.01.2020, Prof. Anke-Susanne Müller, Laboratory for Applications of Synchrotron Radiation (LAS), Karlsruhe Institute of Technology, Germany, (*summa cum laude*)
Stages of academic/ professional career	2022 - now, Postdoctoral researcher, MAX IV Laboratory, Lund University, Sweden. *In the accelerator development group, I focus on theoretical and experimental studies of collective effects in the ultra-low emittance ring of the 4th gen. synchrotron light source.*
	Oct. - Dec. 2021, Guest-scientist, Laboratoire de Physique des Lasers, Atomes et Molécules (PhLAM), Université des Sciences et Technologies de Lille, France. *Detailed comparison of two Vlasov-Fokker-Planck solver simulation codes for the propagation of particle distributions under the influence of collective effects.*
	2020 - 2021, Postdoctoral researcher, Karlsruhe Institute of Technology, Germany. *With a PhD student, I implemented a new operation mode enabling more extreme beam propertied. I coordinated and wrote the specification for the procurement of optimized power-supplies for the storage ring magnets, including calculations on the stability tolerances and effects on operation.*

Supplementary Career Information

Not applicable

Activities in the Research System

During my PhD, I supervised and co-supervised one bachelor and three master students, working on measurement data analysis, simulations on the influence of arbitrary impedances on beam dynamics, data analysis based on machine learning and fast, single shot measurement

methods respectively. Furthermore, during three summer semesters, I was the tutor ("Übungsleiter") for bi-weekly exercises for students attending the lectures on accelerator physics. Over four years, I was involved in organizing and supervising the accompanying simulation course and practical hands-on course on the accelerator. As postdoctoral researcher, I scientifically advised a PhD student on their investigation of additional impedances added to the accelerator and the resulting influence on the studied collective effects, who will defend his thesis in May this year. Since this month, I am supervising a Bachelor student with the task to establish time-correlated single-photon counting as a bunch shape measurement method.

Supervision of Researchers in Early Career Phases

Not applicable

Scientific Results

Category A

"Fast mapping of terahertz bursting thresholds and characteristics at synchrotron light sources", Phys. Rev. Accel. Beams 19 (11 2016), Doi:10.1103/PhysRevAccelBeams.19.110701, *OpenAccess,* **M. Brosi**, J. L. Steinmann, E. Blomley, E. Bründermann, M. Caselle, N. Hiller, B. Kehrer, Y.-L.Mathis, M. J. Nasse, L. Rota, M. Schedler, P. Schönfeldt, M. Schuh, M. Schwarz, M. Weber, and A.-S. Müller. *I developed a fast measurement method for the coherent synchrotron radiation intensity to extensively study a wide range of parameters. This allowed me to systematically compare measurement results and simulations for the micro-bunching instability.*
"Systematic studies of the microbunching instability at very low bunch charges", Phys. Rev. Accel. Beams 22 (2 2019), Doi:10.1103/PhysRevAccelBeams.22.020701. *OpenAccess,* **M. Brosi**, J. L. Steinmann, E. Blomley, T. Boltz, E. Bründermann, J. Gethmann, B. Kehrer, Y.-L. Mathis, A. Papash, M. Schedler, P. Schönfeldt, P. Schreiber, M. Schuh, M. Schwarz, A.-S. Müller, M. Caselle, L. Rota, M. Weber, and P. Kuske. *This paper concentrated on a region of the instability at very low particle numbers which is not fully described by the working theory. So, I performed extensive measurements and compared them to numerical simulations by P. Kuske.*
"Studies of the Micro-Bunching Instability in the Presence of a Damping Wiggler", Journal of Physics: Conference Series 1067.6 (2018), Doi:10.1088/1742-6596/1067/6/062017. *OpenAccess,* **M. Brosi**, J. Gethmann, A. Bernhard, B. Kehrer, A. Papash, P. Schönfeldt, P. Schreiber, J. L. Steinmann, and A.-S. Müller. *As main author, I performed all measurements and simulations of the effect of the damping time on the micro-bunching instability. J. Gethmann handled the operation of the superconducting damping wiggler to control the damping time.*
"Parallelized Vlasov-Fokker-Planck solver for desktop personal computers" Phys. Rev. Accel. Beams 20 (3 2017), Doi:10.1103/PhysRevAccelBeams.20.030704, *OpenAccess,* P. Schönfeldt, **M. Brosi**, M. Schwarz, J. L. Steinmann, and A.-S. Müller. *This publication describes the simulation code Inovesa where I was strongly involved in the scientific conceptualization. I was furthermore responsible for the measurements used to compare and validate the simulations.*
"Accelerated Deep Reinforcement Learning for Fast Feedback of Beam Dynamics at KARA", IEEE Transactions on Nuclear Science 68.8 (2021), Doi:10.1109/TNS.2021.3084515. W. Wang, M. Caselle, T. Boltz, E. Blomley, **M. Brosi**, T. Dritschler, A. Ebersoldt, A. Kopmann, A. S. Garcia, P. Schreiber, E. Bründermann, M. Weber, A.-S. Müller, and Y. Fang. *For this publication I was*

involved in the reference simulations and the discussions on the basic understanding of the instability, based on my previous work, necessary to build the presented feedback system.
"KAPTURE-2. A picosecond sampling system for individual THz pulses with high repetition rate", Journal of Instrumentation 12.01 (2017), Doi:10.1088/1748-0221/12/01/c01040. M. Caselle, L. A. Perez, M. Balzer, A. Kopmann, L. Rota, M. Weber, **M. Brosi**, J. Steinmann, E. Bründermann, and A.-S. Müller. *This publication describes the ultra-fast data acquisition system, that allowed me to develop the fast mapping technique used during my PhD. I contributed with extensive knowledge of the scientific requirements and served as the main test user of the device.*
"From self-organization in relativistic electron bunches to coherent synchrotron light: observation using a photonic time-stretch digitizer", Scientific Reports 9.1 (2019), Doi:10.1038/s41598-019-45024-2. *OpenAccess,* S. Bielawski, E. Blomley, **M. Brosi**, E. Bründermann, E. Burkard, C. Evain, S. Funkner, N. Hiller, M. J. Nasse, G. Niehues, E. Roussel, M. Schedler, P. Schönfeldt, J. L. Steinmann, C. Szwaj, S. Walther, and A.-S. Müller. *Here, I was involved in the test measurements of a new photonic time-stretch system to measure the longitudinal bunch shape at KARA. Furthermore I performed the complimentary measurements of the coherent synchrotron radiation intensity used as cross-check.*
"Frequency-Comb Spectrum of Periodic-Patterned Signals". Phys. Rev. Lett. 117 (17 2016), Doi:10.1103/PhysRevLett.117.174802. *OpenAccess,* J. L. Steinmann, E. Blomley, **M. Brosi**, E. Bründermann, M. Caselle, J. L. Hesler, N. Hiller, B. Kehrer, Y.-L. Mathis, M. J. Nasse, J. Raasch, M. Schedler, P. Schönfeldt, M. Schuh, M. Schwarz, M. Siegel, N. Smale, M. Weber, and A.-S. Müller. *In this publication we used heterodyne mixing spectroscopy in the low THz frequency range to individual revolution harmonics of the electron bunches at the storage ring. I assisted in the measurements and was lively involved in the discussions about possible application as high resolution metrology measurements of beam parameters.*

Category B

"In-Depth Analysis of the Micro-Bunching Characteristics in Single and Multi-Bunch Operation at KARA," PhD Thesis, Karlsruhe Institute of Technology, 2020. Doi:10.5445/IR/1000120018. **M. Brosi**. *To investigate the micro-bunching instability in synchrotron light sources, I developed measurement techniques, data analysis methods and compared simulations with beam based measurements leading to a deeper understanding and the foundation for a feedback system.*
"Asymmetric Influence of the Amplitude-Dependent Tune Shift on the Transverse Mode-Coupling Instability", arXiv, https://arxiv.org/abs/2401.15065, 2024. *OpenAccess*, **M. Brosi**, F. Cullinan, Å. Andersson, J. Breunlin, P. Fernandes Tavares. *Our recent investigations showed an unexpected asymmetric dependence of the beam dynamics during the TMCI instability on the non-linear optics. I could show the effect in measurements as well as in tracking simulations and compared it with theoretical considerations by F. Cullinan. To be submitted to PRAB.*
"Time-resolved measurement and simulation of a longitudinal single-bunch instability at the MAX IV 3 GeV ring", Proc. IPAC'23 (Venezia), JACoW Publishing, 2023, Doi:10.18429/jacow-ipac2023-wepa020. *OpenAccess,* **M. Brosi**, Å. Andersson, J. Breunlin, F. Cullinan, and P. Tavares. *I investigated a longitudinal instability occurring due to the resistive vacuum chamber for long bunch lengths. I extended the used simulation tool to include the corresponding impedance and achieve a high agreement with the time-resolved measurements I conducted.*
"Simulations of the Micro-Bunching Instability for SOLEIL and KARA Using Two Different VFP Solver Codes", Proc. IPAC'22 (Bangkok, Thailand). JACoW Publishing, 2022, Doi: 10.18429/JACoW-IPAC2022-WEPOMS005. *OpenAccess,* **M. Brosi**, S. Bielawski, C. Evain, A.-

S. Müller, E. Roussel, P. Schreiber, and C. Szwaj. *In this publication I compared two independent simulation codes on two different synchrotron light sources. The comparison involved performing systematic scans over varying parameters and understanding the inner workings of the tools to put the observed differences in context.*

Academic Distinctions

In 2023 I was awarded second rank of the Otto-Haxel-Award for Physics 2020. This dissertation prize is jointly award by the Universities of Göttingen, Heidelberg and the Karlsruhe Institute of Technology in cooperation with the German Physical Society.
In 2021 I was furthermore awarded the Helmholtz Doctoral Prize 2020 by the Helmholtz Association in the research field Matter for my achievements during my PhD thesis.
The first two years of my PhD, I was funded by a full scholarship of the Helmholtz International Research School for Teratronics (HIRST).
I was honored for my presentation of scientific results by a best poster prize awarded by the Wilhelm und Else Heraeus-Stiftung in 2016 at the 607. WE-Heraeus-Seminar on Semiconductor detectors in astronomy, medicine, particle physics and photon science in Bad Honnef.
In 2019 I was invited to the 69th Lindau Nobel Laureate Meeting on Physics in Lindau, Germany. For this I was selected as one of 580 young scientists from 89 countries.

Data protection and consent to the processing of optional data

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