

Scientific Area	Developing Quantum Software q. optics, q. computing, open q. system
Topic title	Mitigating undesired parametric processes in quantum-limited amplifiers
Main host institution	KIT www.kit.edu
Supervisor/institution	Anja Metelmann/KIT https://metelmann-group.com
Co-Supervisor/institution	D. Zumbühl/Uni Basel https://www.unibas.ch/en.html
Mentor¹/institution	Ioan Pop/KIT www.kit.edu
Secondment institution	PTB Braunschweig: https://www.ptb.de/cms/ and/or Zurich Instruments: https://www.zhinst.com/ch/fr
Topic description	
<p>The research projects is focused on the of theory and applications of engineered quantum systems, with a focus on their `real-world' application for high-precision measurements, quantum-limited information processing, and quantum computation. The project aims to develop strategies to improve the performance of quantum limited amplifiers. Such amplifiers face the challenge of higher-order nonlinearities, resulting in a limitation of the dynamical range of the amplifier. In this PhD project we aim for pathways to mitigate the effect of undesired processes and nonlinearitiess, e.g. to avoid unwanted backaction processes and to enhance sensitivity in our measurement protocols.</p>	
Recommended applicant's profile	
<p>Master degree in Physics or a related field. Desirable skills: Knowledge about open quantum systems theory, basics on quantum optics and its applications. Experience with engineered quantum systems, for example superconducting circuits and/or optomechanical systems. In addition, interest in working together with experimentalists and proficiency in the English language.</p>	

¹ Mentor: The primary role of the mentors will be to identify and facilitate specific training objectives, advise on any problems faced by the ESR, including career matters with an external perspective and provide mediation in the case of disputes.